3GPP TSG-T (Terminals) Meeting #9
Hawaii, USA, 20 - 22 September, 2000

Tdoc TP-000156

3G TS 31.120 V1.0.0 (2000-08)

Technical Specification

3rd Generation Partnership Project; Technical Specification Group Terminals; UICC-Terminal Interface; Physical, Electrical and Logical Test Specification (Release 1999)

Keywords
USIM,UICC

3GPP

Postal address

3GPP support office address
650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet
http://www.3gpp.org

Contents

Foreword

This Technical Specification (TS) has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

- x the first digit:
  - 1 presented to TSG for information;
  - 2 presented to TSG for approval;
  - 3 or greater indicates TSG 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 an early draft of the USIM Conformance Test Specification. It is being elaborated during 2000 by 3GPP MCC task 162 under the guidance of 3GPP TSG-T WG3. It is expected to be complete by late November 2000 and then submitted for approval to 3GPP TSG-T #10 (6 - 8 December, Bangkok). For further information, please contact the T3 secretary (Michael.Sanders@etsi.fr) or the 31.120 rapporteur as listed in the history section.

Introduction

The present document defines a generic Terminal/Integrated Circuit Card (ICC) interface. The present document is independent of the 3G USIM application and can thus be the platform for any IC card application.

The aim of the present document is to ensure interoperability between an ICC and a 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 ICC. Any internal technical realisation of either the ICC or the Terminal is only specified where these are reflected over the interface.

Application specific details for applications residing on an ICC are specified in the respective application specific documents. The Universal Subscriber Identity Module (USIM)-application for 3G telecommunication networks is specified in document 3G TS 31.102 [2].

1 Scope

The present document specifies the interface between the UICC and the Terminal for 3G telecom network operation.

The present document specifies:

- the requirements for the physical characteristics of the UICC;
- the electrical interface between the UICC and the Terminal;
- the initial communication establishment and the transport protocols;
- the model which serves as a basis for the logical structure of the UICC;
- the communication commands and the procedures;
- the application independent files and protocols.

The administrative procedures and initial card management are not part of the present document.

2 References

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

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

[1] 3G TS 23.038: "Alphabets and language-specific information".

[2] 3G TS 31.102: "Characteristics of the USIM application".

[3] 3G TS 31.110: "Numbering system for telecommunication IC card applications".

[4] 3G TS 31.111: "USIM Application Toolkit (USAT)".

[5] ITU-T Recommendation E.118: "The international telecommunication charge card".

[6] ISO 639 (1988): "Code for the representation of names of languages".

[7] ISO/IEC 7810 (1995): "Identification cards - Physical characteristics".

[8] ISO/IEC 7811-1 (1995): "Identification cards - Recording technique - Part 1: Embossing".

[9] ISO/IEC 7811-3 (1995): "Identification cards - Recording technique - Part 3: Location of embossed characters on ID-1 cards".

[10] ISO/IEC 7816-1 (1998): "Identification cards - Integrated circuit(s) cards with contacts, Part 1: Physical characteristics".

[11] ISO/IEC 7816-2 (1999): "Identification cards - Integrated circuit(s) cards with contacts, Part 2: Dimensions and locations of the contacts".

[12] ISO/IEC 7816-3 (1997): "Identification cards - Integrated circuit(s) cards with contacts, Part 3: Electronic signals and transmission protocols".

[13] ISO/IEC 7816-4 (1995): "Identification cards - Integrated circuit(s) cards with contacts, Part 4: Interindustry commands for interchange".

[14] ISO/IEC 7816-5 (1994): "Identification cards - Integrated circuit(s) cards with contacts, Part 5: Numbering system and registration procedure for application identifiers".

[15] ISO/IEC 7816-6 (1996): "Identification cards - Integrated circuit(s) cards with contacts, Part 6: Interindustry data elements".

[16] ISO/IEC 7816-8 (1999): "Identification cards - Integrated circuit(s) cards with contacts, Part 8: Security related Interindustry commands".

[17] ISO/IEC FCD 7816-9 (1999): "Identification cards - Integrated circuit(s) cards with contacts, Part 9: Additional Interindustry commands and security attributes".

[18] ISO/IEC 10646-1 (1993): "Information technology - Universal Multiple-Octet Coded Character Set (UCS) - Part 1: Architecture and Basic Multilingual Plane".

3 Definitions, symbols, abbreviations and coding

3.1 Definitions

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

3V technology Smart Card: smart Card operating at 3V-± 10% and 5V ± 10%.

1.8V technology Smart Card: smart Card operating at 1.8V ± 10% and 3V ± 10%.

3V technology Terminal: Terminal operating the Smart Card - Terminal interface at 3V ± 10% and 5V ± 10%.

1.8V technology Terminal: Terminal operating the Smart Card - Terminal interface at 1.8V ± 10% and 3V ± 10%.

Function: function contains a command and a response pair.

Application DF: application DF is the entry point to an application.

Access conditions: set of security attributes associated with a file.

Application: application consists of a set of security mechanisms, files, data and protocols (excluding transmission protocols).

Application protocol: set of procedures required by the application.

Card session: link between the card and the external world starting with the ATR and ending with a subsequent reset or a deactivation of the card.

Current directory: latest MF or DFor ADF selected.

Current EF: latest EF selected.

Data Object: information coded as TLV objects, i.e. consisting of a Tag, a Length and a Value part.

Dedicated File (DF): file containing access conditions and, optionally, Elementary Files (EFs) or other Dedicated Files (DFs).

Directory: general term for MF, DF and ADF.

Elementary File (EF): file containing access conditions and data and no other files.

File: directory or an organised set of bytes or records in the UICC.

File identifier: 2 bytes which address a file in the UICC.

GSM session: that part of the card session dedicated to the GSM operation.

ID-1 UICC: UICC having the format of an ID-1 card (see ISO/IEC 7816-1 [10]).

Master File (MF): unique mandatory file containing access conditions and optionally DFs and/or EFs.

Multi-application card: card that can have more than one selectable application.

Multi-session card: card that supports more than one concurrent selectable application session during a card session.

Multi-application capability Terminal: Terminal that can support more than one application.

Normal USIM operation: relating to general, PIN related, 3G and or GSM security and subscription related procedures.

Padding: one or more bits appended to a message in order to cause the message to contain the required number of bits or bytes.

Plug-in UICC: second format of UICC.

Proactive UICC: UICC, which is capable of issuing commands to the Terminal. Part of USAT.

Record: string of bytes within an EF handled as a single entity.

Record number: number, which identifies a record within an EF.

Record pointer: pointer, which addresses one record in an EF.

Selectable application: application that is selectable by an AID according to the process described in ISO/IEC 7816-4 [13] over the Terminal-UICC interface.

Selectable application session: link between the application and the external world during a card session starting with the application selection and ending with de-selection or termination of the card session.

UICC application toolkit procedures: defined in 3G TS 31.111 [4].

USIM session: USIM session is a selectable application session for a USIM application.

3.2 Symbols

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

t_F	fall time
t_R	rise time
V_{IH}	Input Voltage (high)
V_{IL}	Input Voltage (low)
V_{OH}	Output Voltage (high)
V_{OL}	Output Voltage (low)

3.3 Abbreviations

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

AC	Access Condition
ACK	ACKnowledge
ADF	Application Dedicated File
ADM	Access condition to an EF which is under the control of the authority which creates this file
AID	Application IDentifier
ALW	ALWays
AM	Access Mode

AM-DO	Access Mode Data Object
APDU	Application Protocol Data Unit
ARR	Access Rule Reference
ATR	Answer To Reset
BGT	Block Guard Time
BWT	Block Waiting Time
C-APDU	Command APDU
CLA	CLAss
CRT	Control Reference Template
CLK	Clock
C-TPDU	Command TPDU
CWI	Character Waiting Integer
CWT	Character Waiting Time
DAD	Destination ADdress
DF	Dedicated File
DO	Data Object
EDC	Error Detection Code byte
EF	Elementary File
etu	elementary time unit
f	frequency
FCP	File Control Parameters
Fi	Clock rate conversion factor
FID	File IDentifier
GSM	Global System for Mobile communications
ICC	Integrated Circuit Card
I-Block	Information Block
ID	IDentifier
IEC	International Electrotechnical Commission
IFS	Information Field Sizes
IFSC	Information Field Size for the UICC
IFSD	Information Field Size for the Terminal
INF	INFormation field
INS	INStruction
I/O	Input/Output
ISO	International Organization for Standardization
Lc	Length of Command data sent by the application layer in a case 3 or 4 Command.
LCSI	Life Cycle Status Information
Le	Maximum length of data Expected by the application layer in response to a case 2 or 4 Command.
LEN	LENgth
LRC	Longitudinal Redundancy Check
LSB	Least Significant Bit
Luicc	Exact Length of data available in the UICC to be returned in response to the case 2 or 4 Command received by the UICC
MF	Master File
MMI	Man Machine Interface
MSB	Most Significant Bit
NAD	Node Address byte
NEV	NEVer
NPI	Numbering Plan Identifier
OSI	Open System Interconnection
P1	Parameter 1
P2	Parameter 2
P3	Parameter 3
PCB	Protocol Control Byte
PIN	Personal Identification Number
PPS	Protocol and Parameter Selection
PS	PIN Status
PS_DO	PIN Status Data Object
R-APDU	Response APDU

R-Block	Receive-ready Block
RFU	Reserved for Future Use
R-TPDU	Response TPDU
RST	Reset
SAD	Source ADdress
S-Block	Supervisory Block
SC	Security Condition
SC_DO	Security Condition Data Object
SE	Security Environment
SEID	Security Environment IDentifier
SFI	Short (elementary) File Identifier
State H	High state logic level
State L	Low state logic level
SW	Status Word
TE	Terminal Equipment
TLV	Tag Length Value
TPDU	Transfer Protocol Data Unit
USIM	Universal Subscriber Identity Module
UE	User Equipment
WI	Waiting time Integer
VPP	Programming power input, optional use by the card
WTX	Waiting Time eXtenstion
WWT	Work Waiting Time

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.

In the UICC, all bytes specified as RFU shall be set to '00' and all bits specifies as RFU shall be set to 0. If the GSM and/or USIM application exists on a UICC or is built on a generic telecommunications card, then other values may apply for the non- GSM or non-USIM applications. The values will be defined in the appropriate specifications for such cards and applications. These bytes and bits shall not be interpreted by a Terminal in a GSM or 3G session.

The coding of Data Objects in the present document is according to ISO/IEC 7816-6 [16].

4 Default values for UICC-Terminal interface testing

A USIM containing the following default values is used for all tests of this present document unless otherwise stated.

For each data item, the logical default values and the coding within the elementary files (EF) of the USIM follow.

NOTE 1: Bx represents Byte x of the coding.
NOTE 2: Unless otherwise defined, the coding values are hexadecimal.

EF_{IMSI} (IMSI)
Logically: 2460813579

Coding:	B1	B2	B3	B4	B5	B6	B7	B8	B9
Hex	06	21	64	80	31	75	F9	FF	FF

EF_{AD} (Administrative Data)
Logically: Normal operation

OFM to be deactivated by the Terminal
MNC: 3 digit

Coding:	B1	B2	B3	B4
Hex	00	00	00	03

EF_{LOCI} (Location Information)
Logically: LAI-MCC: 246
LAI-MNC: 081
LAI-LAC: 0001
TMSI: "FF .. FF"

Coding:	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11
Hex	FF	FF	FF	FF	42	06	18	00	01	FF	00

EF_{Keys} (Ciphering and Integrity Keys)
Logically: Key Set Identifier KSI: 0x
Ciphering Keys CK: xx
Integrity Keys IK: xx

Coding:	B1	B2	B3	...	B16	B17	B18	...	B30	B31	B32
Hex	0x	xx	xx	...	xx	xx	xx	...	xx	xx	xx

EF_{KeysPS} (Ciphering and Integrity Keys for Packet Switched domain)
Logically: Key Set Identifier KSI: 0x
Ciphering Keys CK: xx
Integrity Keys IK: xx

Coding:	B1	B2	B3	...	B16	B17	B18	...	B30	B31	B32
Hex	0x	xx	xx	...	xx	xx	xx	...	xx	xx	xx

EF_{ACC} (Access Control Class)
Logically: One and only one access class from 0 - 9, e.g. class 7 for which the coding is "00 80".

EF_{FPLMN} (Forbidden PLMNs)
Besides of the 4 mandatory EF_{FPLMN} 2 optional EF_{FPLMN} are defined according to TS 31.102 subclause 4.2.16

Logically: PLMN1: 234 001 (MCC MNC)
PLMN2: 234 002
PLMN3: 234 003
PLMN4: 234 004
PLMN5: 234 005
PLMN6: 234 006

Coding:	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12
Hex	32	04	10	32	04	20	32	04	30	32	04	40

	B13	B14	B15	B16	B17	B18
	32	04	50	32	04	60

EF_{UST} (USIM Service Table)
Logically:
Local Phone Book available
PLMN selector available
Fixed dialling numbers available
Barred dialling numbers available
The GSM Access available
The Group Identifier level 1 and level 2 not available

Coding:	B1	B2	B3	B4
binary	x1xx xx11	xxxx xxxx	xxxx 1x00	xxxx x1xx

The coding of EF_{UST} shall conform with the capabilities of the USIM used.

EF_{EST} (Enable Service Table)

Logically:

Fixed Dialling Numbers (FDN) disabled.
Barred Dialling Numbers (BDN) disabled.
APN Control list (ACL) disabled

Coding:	B1
binary	0000 0000

The coding of EF_{EST} shall conform with the capabilities of the USIM, unused Bits are set to '0'.

EF_{ADN} (Abbreviated Dialling Number)

Logically:

At least 10 records.

Record 1 to 10:

Length of alpha identifier:	32 characters;
Alpha identifier:	"ABCDEFGHIJKLMNOPQRSTUVWXYZABCDEF";
Length of BCD number:	"03";
TON and NPI:	Telephony and Unknown;
Dialled number:	123;
CCI:	None;
Ext1:	None.

Record 1:

Coding:	B1	B2	B3	...	B32	B33	B34	B35	B36	B37	B38	B39	...	B46
Hex	41	42	43	...	46	03	81	21	F3	FF	FF	FF	...	FF

$EF_{UPLMNsel}$ (UPLMN selector)

Besides of the 8 mandatory $EF_{PLMNwACT}$ 4 optional $EF_{PLMNwACT}$ are defined according to the TS 31.102 subclause 4.2.5. The Radio Access Technology identifier for the first two PLMN (1st PLMN and 2nd PLMN) are set to both UTRAN and GSM, all other PLMN to UTRAN only.

Logically:

1st PLMN:	244 081 (MCC MNC)
1st ACT:	UTRAN
2nd PLMN:	244 081
2nd ACT:	GSM
3rd PLMN:	244 082
3rd ACT:	UTRAN
4th PLMN:	244 082
4th ACT:	GSM
5th PLMN:	244 003
5th ACT:	UTRAN
6th PLMN:	244 004
6th ACT:	UTRAN
7th PLMN:	244 005
7th ACT:	UTRAN
8th PLMN:	244 006
8th ACT:	UTRAN
9th PLMN:	244 007
9th ACT:	UTRAN
10th PLMN:	244 008
10th ACT:	UTRAN
11th PLMN:	244 009

11th ACT: UTRAN
12th PLMN: 244 010
12th ACT: UTRAN

Coding:	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15
Hex	42	04	18	80	00	42	04	18	00	80	42	04	28	80	00
	B16	B17	B18	B19	B20	B21	B22	B23	B24	B25	B26	B27	B28	B29	B30
	42	04	28	00	80	42	04	30	80	00	42	04	40	80	00
	B31	B32	B33	B34	B35	B36	B37	B38	B39	B40	B41	B42	B43	B44	B45
	42	04	50	80	00	42	04	60	80	00	42	04	70	80	00
	B46	B47	B48	B49	B50	B51	B52	B53	B54	B55	B56	B57	B58	B59	B60
	42	04	80	80	00	42	04	90	80	00	42	04	01	80	00

$EF_{OPLMNsel}$ (OPLMN Selector)
Besides of the mandatory $EF_{OPLMNsel}$, an optional $EF_{OPLMNsel}$ is defined according to the TS 31.102 subclause 4.2.53. The Radio Access Technology identifier for the first PLMN is set to both UTRAN and GSM, the other PLMN to UTRAN only.

Logically: 1st PLMN: 254 001 (MCC MNC)
1st ACT: UTRAN
2nd PLMN: 254 001
2nd ACT: GSM

Coding:	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10
Hex	52	04	10	80	00	52	04	10	00	80

CHV1 (PIN)
Logically: 2468

Coding:	B1	B2	B3	B4	B5	B6	B7	B8
Hex	32	34	36	38	FF	FF	FF	FF

CHV2 (PIN2)
Logically: 3579

Coding:	B1	B2	B3	B4	B5	B6	B7	B8
Hex	33	35	37	39	FF	FF	FF	FF

Unblock CHV1 (PUK)
Logically: 13243546

Coding:	B1	B2	B3	B4	B5	B6	B7	B8
Hex	31	33	32	34	33	35	34	36

Unblock CHV2 (PUK2)
Logically: 08978675

Coding:	B1	B2	B3	B4	B5	B6	B7	B8
Hex	30	38	39	37	38	36	37	35

Other Values of the USIM
All other values for EFs provided by the USIM shall be set to the default values defined in the Annex E of TS 31.102.

5 Physical Characteristic Tests

The following tests apply to 3G Terminals using either ID-1 or Plug-in UICC.

5.1 Contact pressure

5.1.1 Definition and applicability

The contact pressure shall be large enough to ensure reliable and continuous contact (e.g. to overcome oxidisation and to prevent interruption caused by vibration).

5.1.2 Conformance requirement

Under no circumstances shall the contact force exceed 0,5 N per contact.

5.1.2.1 Reference

3G TS 31.101 section 4.4.4.

5.1.3 Test purpose

To verify that the contact pressure of each contacting element is not greater than 0,5 N when each of the following types of card is used:

1) Unembossed.

2) Embossed on the contact side.

NOTE: Only type 2) applies to the plug-in UICC.

5.1.4 Method of test

5.1.4.1 Initial conditions

The Terminal manufacturers shall provide a separate card reader (mechanical components) to make the measurement possible.

5.1.4.2 Procedure

The pressure of each contacting element is measured.

5.1.5 Acceptance criteria

The contact force shall not exceed 0,5 N per contact.

5.2 Curvature of the contacting elements

5.2.1 Definition and applicability

The contact pressure shall be large enough to ensure reliable and continuous contact (e.g. to overcome oxidisation and to prevent interruption caused by vibration).

5.2.2 Conformance requirement

The radius of any curvature of the contacting elements shall be greater than or equal to 0,8 mm over the contact area.

5.2.2.1 Reference

3G TS 31.101 section 4.4.4.

5.2.3 Test purpose

To verify that the radius of curvature of the contacting elements is greater than or equal to 0,8 mm over the contact area.

5.2.4 Method of test

5.2.4.1 Initial conditions

The Terminal manufacturers shall provide a separate card reader (mechanical components) to make the measurement possible.

5.2.4.2 Procedure

The radius of curvature of the contacting elements is measured on both axes.

5.2.5 Acceptance criteria

The radius of any curvature of the contacting elements shall be greater than or equal to 0,8 mm over the contact area.

6 Electrical Characteristic Tests

The following tests apply to 3G Terminals using either ID-1 or Plug-in UICC.

6.1 Test of the power transition phases

6.1.1 Phase preceding Terminal power on

6.1.1.1 Definition and applicability

When the mobile equipment is switched off, the contacts of the UICC-Terminal interface remain in an inactive state in order to prevent any damage to the UICC.

6.1.1.2 Conformance requirement

The residual voltage across the contacts of the UICC-Terminal interface (C1, C2, C3, C6, C7) shall not exceed +/- 0,4 Volts referenced to GND.

6.1.1.3 Reference:

3G TS 31.101, section 4.4.3

6.1.1.4 Test purpose

To verify that the residual voltage across the contacts of the UICC-Terminal interface (C1, C2, C3, C6, C7) is not greater than +/- 0,4 Volts referenced to GND.

6.1.1.5 Method of test

6.1.1.5.1 Initial condition

The Terminal shall be connected to an UICC simulator.

The contact C1 (Vcc) of the UICC-Terminal interface shall be loaded with an impedance of 10 kOhm.

The other contacts (C2, C3, C6, C7) shall be loaded with an impedance of 50 kOhm.

6.1.1.5.2 Procedure

The residual voltage on each contact shall be measured.

6.1.1.6 Acceptance criteria

The residual voltage on each contact shall not exceed +/- 0,4 Volts referenced to GND.

6.1.2 Phase during UICC power on

6.1.2.1 Definition and applicability

When the mobile station is switched on or when the UICC-Terminal interface is being activated after supply voltage switching, the contacts shall be activated in a defined sequence in order to prevent any damage to the UICC.

The timing of this sequence is not defined, a measurement resolution better than or equivalent to 100 ns is assumed.

A 1.8V technology Terminal may switch from 1.8V to 3V and a 3V technology Terminal may switch from 3V to 5V after it has analysed the ATR and identified the UICC voltage class by deactivating the UICC and activating it at the new supply voltage.

This test applies to

a) 3V technology Terminals

b) 1.8V technology Terminals

6.1.2.2 Conformance requirement

a-1) When the UE is soft powered on, the contacts of the UICC-Terminal interface shall be activated to 3V mode in the following order:

1 - RST in state L,

2 - Vcc powered,

3 - I/O (Terminal) in reception mode,

4 - Clock signal provided with a suitable and stable clock.

a-2) When the UICC – Terminal interface is being activated after the 3V/5V switching the contacts shall be activated to 5V mode in the order given in a-1)

b-1) When the UE is soft powered on, the contacts of the UICC-Terminal interface shall be activated to 1.8V mode in the following order:

1 - RST in state L,

2 - Vcc powered,

3 - I/O (Terminal) in reception mode,

4 - Clock signal provided with a suitable and stable clock.

b-2) When the UICC – Terminal interface is being activated after the 1.8V/3V switching the contacts shall be activated to 3V mode in the order given in b-1)

6.1.2.3 Reference:

a-1), a-2), b-1), b-2): 3G TS 31.101 section 4.4.2

6.1.2.4 Test purpose

To verify that the contacts of the UICC-Terminal interface are activated in the correct order, as described in the conformance requirement.

6.1.2.5 Method of test

6.1.2.5.1 Initial condition

The Terminal shall be connected to an UICC-Terminal simulator.

6.1.2.5.2 Procedure

To test the requirements a-1) and b-1), the UE shall be soft powered on.

To test the requirement a-2) and b-2) the Terminal shall be caused to switch the voltage on the UICC-Terminal interface.

The verification of each activation procedure shall be started with the first contact leaving the inactive state. The UICC-Terminal interface shall be monitored until it is fully activated.

6.1.2.6 Acceptance criteria

The contacts of the UICC-Terminal interface shall be activated in the correct order, as described in the conformance requirement.

6.1.3 Phase during Terminal power off

6.1.3.1 Definition and applicability

When the mobile station is soft powered off or when the UICC-Terminal interface is being deactivated for 1.8V/3V or 3V/5V switching, the contacts shall be deactivated in a defined sequence in order to prevent any damage to the UICC.

The timing of this sequence is not defined, a measurement resolution better than or equivalent to 100 ns is assumed.

NOTE: If during UE operation the UICC is physically removed it is impractical to ensure correct sequencing of deactivation and the possible damage to the UICC cannot be safeguarded by a type approval test. Furthermore, in this situation the integrity of the UICC data is not guaranteed.

This test applies to

a) 3V technology Terminals

b) 1.8V technology Terminals

6.1.3.2 Conformance requirement

a-1) Depending on the state of the clock at the time of deactivation, the contacts of the UICC-Terminal shall be deactivated in one of two ways.

If the clock is running, the contacts of the UICC-Terminal interface shall be deactivated in the following order:

1 - RST at low level,

2 - Clock stopped at low level,

3 - I/O at status A,

4 - Vcc inactive.

If the clock is stopped and is not restarted, the Terminal is allowed to deactivate all the contacts in any order, provided that all signals reach low level before Vcc leaves high level.

a-2) When the UICC – Terminal interface is deactivated for 3V/5V switching, the contacts shall be deactivated as given in a-1).

b-1) Depending on the state of the clock at the time of deactivation, the contacts of the UICC-Terminal shall be deactivated in one of two ways.

If the clock is running, the contacts of the UICC-Terminal interface shall be deactivated in the following order:

1 - RST at low level,

2 - Clock stopped at low level,

3. I/O at status A,

4.- Vcc inactive.

If the clock is stopped and is not restarted, the Terminal is allowed to deactivate all the contacts in any order, provided that all signals reach low level before Vcc leaves high level.

b-2) When the UICC-Terminal interface is deactivated for 1.8V/3V switching, the contacts shall be deactivated as given in b-1).

6.1.3.3 Reference:

a-1), a-2), b-1), b-2): 3G TS 31.101, section 4.4.2

6.1.3.4 Test purpose

To verify that, depending on the state of the clock (running or stopped), the contacts of the UICC-Terminal interface become deactivated in the correct order, as given in the conformance requirement.

6.1.3.5 Method of test

6.1.3.5.1 Initial condition

The Terminal shall be connected to an UICC simulator.

The UICC characteristics of the directories (see 3G TS 31.101 section 11.1.1.4.6.1) shall indicate that clock stop is allowed.

6.1.3.5.2 Procedure

To test the requirements a-1) and b-1), the UE shall be soft powered off.

To test the requirement a-2) and b-2), the Terminal shall be caused to switch the voltage on the UICC-Terminal interface.

The UICC-Terminal interface shall be monitored until it is fully deactivated.

6.1.3.6 Acceptance criteria

The contacts of the UICC-Terminal interface shall be deactivated in the correct order, as given in the conformance requirements.

6.1.4 UICC Type Recognition and Voltage Switching

6.1.4.1 Reaction of 3V technology Terminals on type recognition of 3V technology UICCs

6.1.4.1.1 Definition and applicability

When a 3V technology Terminal detects a 3V technology UICC during the ATR analysis the Terminal may either switch to 5V operation or stay in 3V operation.

This test applies to 3V technology Terminals.

6.1.4.1.2 Conformance requirement

1) A 3V technology Terminal shall initially activate the UICC with 3V (i.e. the first activation of a card session).

2) The Terminal shall analyse the ATR and identify the voltage class supported by the UICC.

3) If a 3V technology Terminal identifies a 3V technology UICC the Terminal may switch to 5V operation. Switching from 3V to 5V shall only be performed by deactivating the UICC and activating it with 5V supply voltage immediately after the analysis of the ATR without issuing any further commands.

6.1.4.1.3 Reference:

3G TS 31.101, section 6.2

6.1.4.1.4 Test purpose

1) To verify that a 3V technology Terminal initially activates the UICC with 3V.

2) To verify that a 3V technology Terminal correctly identifies the voltage class.

3) To verify that a 3V technology Terminal deactivates the UICC-Terminal interface immediately after the recognition of a 3V technology UICC (in order to switch the supply voltage) or proceeds with the 3V operation during the whole card session without switching to 5V supply voltage.

6.1.4.1.5 Method of test

6.1.4.1.5.1 Initial condition

The Terminal shall be connected to an UICC simulator simulating a 3V technology UICC with nominal test conditions according to table 6.1.1. All elementary files shall be coded as default.

The Terminal shall be powered on.

6.1.4.1.5.2 Procedure

The UICC simulator shall send an ATR indicating a 3V technology UICC.

The UICC-Terminal interface shall be monitored for at least 1 minute until the UE is switched off.

6.1.4.1.6 Acceptance criteria

1) The initial activation of the UICC-Terminal interface shall be performed with 3V supply voltage.

2) The Terminal shall react in one of the following ways:

   a) The Terminal deactivates the UICC-Terminal interface immediately after the receipt of the ATR from the UICC.

   b) The UICC proceeds with the card session without switching to another supply voltage.

6.1.4.2 Reaction of 3V technology Terminals on type recognition of 1.8V technology UICCs

6.1.4.2.1 Definition and applicability

When a 3V technology Terminal detects a 1.8V technology UICC during the ATR analysis the Terminal shall stay in 3V operation.

This test applies to 3V technology Terminals.

6.1.4.2.2 Conformance requirement

1) A 3V technology Terminal shall initially activate the UICC with 3V (i.e. the first activation of a card session).

2) The Terminal shall analyse the ATR and identify the voltage class supported by the UICC.

3) If a 3V technology Terminal identifies a 1.8V technology UICC during the ATR analysis the Terminal shall stay in 3V operation.

6.1.4.2.3 Reference:

3G TS 31.101, section 6.2

6.1.4.2.4 Test purpose

1) To verify that a 3V technology Terminal initially activates the UICC with 3V.

2) To verify that a 3V technology Terminal correctly identifies the voltage class.

3) To verify that a 3V technology Terminal stays in 3V operation during the whole card session.

6.1.4.2.5 Method of test

6.1.4.2.5.1 Initial condition

The Terminal shall be connected to an UICC simulator simulating a 1.8V technology UICC with nominal test conditions according to table 6.1.1. All elementary files shall be coded as default.

The Terminal shall be powered on.

6.1.4.2.5.2 Procedure

The UICC simulator shall send an ATR indicating a 1.8V technology UICC.

The UICC-Terminal interface shall be monitored for at least 1 minute until the UE is switched off.

6.1.4.2.6 Acceptance criteria

1) The initial activation of the UICC-Terminal interface shall be performed with 3V supply voltage.

2) The Terminal shall react in the following way:

   The UICC proceeds with the card session without switching to another supply voltage.

6.1.4.3 Reaction of 1.8V technology Terminals on type recognition of 1.8V technology UICCs

6.1.4.3.1 Definition and applicability

When a 1.8V technology Terminal detects a 1.8V technology UICC during the ATR analysis the Terminal may either switch to 3V operation or stay in 1.8V operation.

This test applies to 1.8V technology Terminals.

6.1.4.3.2 Conformance requirement

1) A 1.8V technology Terminal shall initially activate the UICC with 1.8V (i.e. the first activation of a card session).

2) The Terminal shall analyse the ATR and identify the voltage class supported by the UICC.

3) If a 1.8V technology Terminal identifies a 1.8V technology UICC the Terminal may switch to 3V operation. Switching from 1.8V to 3V shall only be performed by deactivating the UICC and activating it with 3V supply voltage immediately after the analysis of the ATR without issuing any further commands.

6.1.4.3.3 Reference:

3G TS 31.101, section 6.2

6.1.4.3.4 Test purpose

1) To verify that a 1.8V technology Terminal initially activates the UICC with 1.8V.

2) To verify that a 1.8V technology Terminal correctly identifies the voltage class.

3) To verify that a 1.8V technology Terminal deactivates the UICC-Terminal interface immediately after the recognition of a 1.8V technology UICC (in order to switch the supply voltage) or proceeds with the 1.8V operation during the whole card session without switching to 3V supply voltage.

6.1.4.3.5 Method of test

6.1.4.3.5.1 Initial condition

The Terminal shall be connected to an UICC simulator simulating a 1.8V technology UICC with nominal test conditions according to table 6.1.1. All elementary files are coded as default.

The Terminal shall be powered on.

6.1.4.3.5.2 Procedure

The UICC simulator shall send the ATR indicating a 3V technology UICC.

The UICC-Terminal interface shall be monitored for at least 1 minute until the UE is switched off.

6.1.4.3.6 Acceptance criteria

1) The initial activation of the UICC-Terminal interface shall be performed with 1.8V supply voltage.

2) The Terminal shall react in one of the following ways:

   a) The Terminal deactivates the UICC-Terminal interface immediately after the analysis of the ATR from the UICC.

   b) The UICC proceeds with the card session without switching to another supply voltage.

6.1.4.4 Reaction of 1.8V technology Terminals on type recognition of 3V technology UICCs

6.1.4.4.1 Definition and applicability

When a 1.8V technology Terminal detects a 3V technology UICC during the ATR analysis the Terminal shall switch to 3V operation.

This test applies to 1.8V technology Terminals.

6.1.4.4.2 Conformance requirement

1) A 1.8V technology Terminal shall initially activate the UICC with 1.8V (i.e. the first activation of a card session).

2) The Terminal shall analyse the ATR and identify the voltage class supported by the UICC.

3) If a 1.8V technology Terminal identifies a 3V technology UICC the Terminal shall switch to 3V operation. Switching from 1.8V to 3V shall only be performed by deactivating the UICC and activating it with 3V supply voltage immediately after the analysis of the ATR without issuing any further commands.

6.1.4.4.3 Reference:

3G TS 31.101, section 6.2

6.1.4.4.4 Test purpose

1) To verify that a 1.8V technology Terminal initially activates the UICC with 1.8V.

2) To verify that a 1.8V technology Terminal correctly identifies the voltage class.

3) To verify that a 1.8V technology Terminal deactivates the UICC-Terminal interface immediately after the recognition of a 3V technology UICC (in order to switch the supply voltage).

4) To verify that a 1.8V technology Terminal activates the UICC with 3V.

6.1.4.4.5 Method of test

6.1.4.4.5.1 Initial condition

The Terminal shall be connected to an UICC simulator simulating a 3V technology UICC with nominal test conditions according to table 6.1.1. All elementary files are coded as default.

The Terminal shall be powered on.

6.1.4.4.5.2 Procedure

The UICC simulator shall send the ATR indicating a 3V technology UICC.

The UICC-Terminal interface shall be monitored for at least 1 minute until the UE is switched off.

6.1.4.4.6 Acceptance criteria

1) The initial activation of the UICC-Terminal interface shall be performed with 1.8V supply voltage.

2) The Terminal shall react in of the following way:

   a) The Terminal deactivates the UICC-Terminal interface immediately after the analysis of the ATR from the UICC.

   b) The UICC proceeds with the card session switching to 3V operation.

6.1.4.5 Reaction of Terminals receiving a corrupted ATR

6.1.4.5.1 Definition and applicability

If a Terminal receives an ATR which is corrupted, the Terminal shall deactivate the UICC-Terminal interface and repeat the activation with the same voltage class. It shall perform this procedure at least 3 times before rejecting the UICC.

6.1.4.5.2 Conformance requirement

1) The Terminal shall analyse the ATR in order to identify the voltage class supported by the UICC.

2) If a Terminal cannot analyse the ATR, the Terminal shall deactivate the UICC-Terminal interface and repeat the activation with the same voltage class. It shall perform this procedure at least 3 times before rejecting the UICC without issuing any further command.

6.1.4.5.3 Reference:

3G TS 31.101 section 6.2

6.1.4.5.4 Test purpose

1) To verify that a 3G Terminal deactivates the UICC-Terminal interface and repeats the activation with the same voltage class.

2) To verify that this procedure is performed at least 3 times before rejecting the UICC in the case that the Terminal cannot analyse the ATR.

6.1.4.5.5 Method of test

6.1.4.5.5.1 Initial condition

The Terminal shall be connected to an UICC simulator. All elementary files shall be coded as default.

The Terminal shall be powered on.

6.1.4.5.5.2 Procedure

The UICC simulator shall send an invalid ATR without identification of a voltage class.

6.1.4.5.6 Acceptance criteria

Immediately after the reception of the invalid ATR, the Terminal shall deactivate the UICC-Terminal interface and repeat the activation of the UICC with the same voltage class. This procedure shall be performed at least 3 times before rejecting the UICC.

6.1.4.6 Reaction of a Terminals receiving no ATR

6.1.4.6.1 Definition and applicability

A Terminal shall initially activate the UICC with the lowest voltage class available. If no ATR is received, the UICC-Terminal interface shall be deactivated and activated with the next higher class, if supported by the Terminal.

6.1.4.6.2 Conformance requirement

If a Terminal does not receive an ATR, the Terminal shall deactivate the UICC-Terminal interface and repeat the activation with the next higher voltage class.

6.1.4.6.3 Reference:

3G TS 31.101 section 6.2

6.1.4.6.4 Test purpose

To verify that a Terminal deactivates the UICC-Terminal interface and repeats the activation with the next higher voltage class in case that the Terminal cannot receive an ATR.

6.1.4.6.5 Method of test

6.1.4.6.5.1 Initial condition

The Terminal shall be connected to an UICC simulator. All elementary files shall be coded as default.The Terminal shall be powered on.

6.1.4.6.5.2 Procedure

The UICC simulator shall send no ATR.

6.1.4.6.6 Acceptance criteria

If no ATR is received by the Terminal, the Terminal shall wait at least 40 000 clock cycles before deactivating the UICC-Terminal interface. The Terminal shall then repeat the activation procedure with the next higher voltage class.

6.2 Electrical tests on each Terminal contact

6.2.1 Nominal test conditions

The following tables give the electrical conditions that must be applied by the UICC simulator to all contacts during a test if not stated otherwise.

Table 6.2.1-1: Nominal test conditions on 5V UICC – Terminal interface

Contacts	Low level	High level	Max. capacitive load
C1 (Vcc)	---	I = 10 mA	
C2 (RST)	I = -200 µA	I = +20 µA	30 pF
C3 (CLK)	I = -200 µA	I = +20 µA	30 pF
C5 (GND)	---	---	
C7 (I/O) Terminal input Terminal output	 I = + 1 mA I = -1 mA	 I = +20 µA I = +20 µA	30 pF

Table 6.2.1-2: Nominal test conditions on 3V UICC-Terminal interface

Contacts	Low level	High level	Max. capacitive load
C1 (Vcc)	---	I = 7.5 mA	
C2 (RST)	I = -200 µA	I = +20 µA	30 pF
C3 (CLK)	I = -20 µA	I = +20 µA	30 pF
C5 (GND)	---	---	
C7 (I/O) Terminal input Terminal output	 I = +1 mA I = -1 mA	 I = +20 µA I = +20 µA	30 pF

Table 6.2.1-3: Nominal test conditions on 1.8V UICC-Terminal interface

Contacts	Low level	High level	Max. capacitive load
C1 (Vcc)	---	I = 5 mA	
C2 (RST)	I = -200 µA	I = +20 µA	30 pF
C3 (CLK)	I = -20 µA	I = +20 µA	30 pF
C5 (GND)	---	---	
C7 (I/O) Terminal input Terminal output	 I = +1 mA I = -1 mA	 I = +20 µA I = +20 µA	30 pF

NOTE 1: Measurements of contacts voltage levels can be done at any time since the beginning of activation of the UICC and the end of deactivation of the UICC (ISO/IEC 7816-3 section 5.1).

NOTE 2: The reference point of all measurements is the contact C5 (Ground).

NOTE 3: Currents flowing into the UICC are considered positive.

6.2.2 Electrical tests on contact C1

C1 = Card power supply (VCC)

6.2.2.1 Test 1

6.2.2.1.1 Definition and applicability

When the mobile station is activated, the supply voltage on the UICC -Terminal interface shall remain in the specified range in order to ensure correct operation and to prevent any damage to the UICC.

This test applies to

a) 3V technology Terminals

b) 1.8V technology Terminals

6.2.2.1.2 Conformance requirement

a-1) The voltage on contact C1 of the UICC-Terminal interface shall be 5V +/- 10 % for Icc up to 10 mA when the Terminal is in 5V operation mode.

a-2) The voltage on contact C1 of the UICC-Terminal interface shall be 3V +/- 10 % for Icc up to 7.5 mA when the Terminal is in 3V operation mode.

b-1) The voltage on contact C1 of the UICC-Terminal interface shall be 3V +/- 10 % for Icc up to 7.5 mA when the Terminal is in 3V operation mode.

b-2) The voltage on contact C1 of the UICC-Terminal interface shall be 1.8V +/- 10 % for Icc up to 5 mA when the Terminal is in 1.8V operation mode.

6.2.2.1.3 Reference:

a-1): 3G TS 31.101 section 5.1

a-2), b-1): 3G TS 31.101 section 5.2

b-2): 3G TS 31.101 section 5.3

6.2.2.1.4 Test purpose

To verify that the Terminal keeps the voltage on contact C1 of the UICC-Terminal interface within the ranges specified in the conformance requirements.

6.2.2.1.5 Method of test

6.2.2.1.5.1 Initial condition

The Terminal shall be connected to an UICC simulator.

The UE shall be activated.

The remaining contacts of the UICC-Terminal interface shall be in nominal test conditions (See 3G TS 31.120 section 6.2.1).

6.2.2.1.5.2 Test Procedure

The voltage of contact C1 (Vcc) of the UICC-Terminal interface shall be measured.

6.2.2.1.6 Acceptance criteria

The voltage on contact C1 of the UICC-Terminal interface shall be within the ranges specified in the conformance requirements.

6.2.2.2 Test 2

6.2.2.2.1 Definition and applicability

When the mobile station is activated, the supply voltage on the UICC-Terminal interface shall be able to counteract spikes in the current consumption of the UICC up to the limits given in the conformance requirement, ensuring that the supply voltage stays in the specified range.

This test applies to

a) 3V technology Terminals

b) 1.8V technology Terminals

6.2.2.2.2 Conformance requirement

a-1) The voltage on contact C1 of the UICC-Terminal interface shall be 5V +/- 10 % for spikes in the current consumption with a maximum charge of 40 nAs with no more than 400 ns duration and an amplitude of at most 200 mA when the Terminal is in 5V operation mode.

a-2) The voltage on contact C1 of the UICC-Terminal interface shall be 3V +/- 10 % for spikes in the current consumption with a maximum charge of 12 nAs with no more than 400 ns duration and an amplitude of at most 60 mA when the Terminal is in 3V operation mode.

b-1) The voltage on contact C1 of the UICC-Terminal interface shall be 3V +/- 10 % for spikes in the current consumption with a maximum charge of 12 nAs with no more than 400 ns duration and an amplitude of at most 60 mA when the Terminal is in 3V operation mode.

b-2) The voltage on contact C1 of the UICC-Terminal interface shall be 1.8V +/- 10 % for spikes in the current consumption with a maximum charge of 12 nAs with no more than 400 ns duration and an amplitude of at most 60 mA when the Terminal is in 1.8V operation mode.

6.2.2.2.3 Reference:

a-1): 3G TS 31.101 section 5.1

a-2), b-1): 3G TS 31.101 section 5.2

b-2): 3G TS 31.101 section 5.3

6.2.2.2.4 Test purpose

To verify that the Terminal keeps the voltage on contact C1 of the UICC-Terminal interface within the specified range for the conditions given in the UICC-Terminal conformance requirement.

6.2.2.2.5 Method of test

6.2.2.2.5.1 Initial condition

The Terminal shall be connected to an UICC simulator.

The UE shall be activated.

The remaining contacts of the interface shall held in nominal test condition (See 3G TS 31.120 section 6.2.1).

6.2.2.2.5.2 Procedure

In order to test the requirements a-1), the voltage on contact C1 of the UICC-Terminal interface shall be monitored and the following current spikes shall be applied:

1) continuous spikes:

   current amplitude 20 mA

   current offset 0 mA

   Duration 100 ns

   Pause 100 ns

2) continuous spikes:

   current 20 mA

   current offset 0 mA

   Duration 400 ns

   Pause 400 ns

3) continuous spikes:

   current amplitude 15 mA

   current offset 5 mA

   (i.e. maximum amplitude = 5 mA + 15 mA = 20 mA

   Duration 150 ns

   Pause 300 ns

4) random spikes:

   current amplitude 200 mA

   current offset 0 mA

Duration 200 ns

Pause between 0,1 ms and 500 ms, randomly varied

5) random spikes:

current amplitude 100 mA

current offset 0 mA

Duration 400 ns

Pause between 0,1 ms and 500 ms, randomly varied

6) random spikes

current amplitude 195 mA

current offset 5mA

(i.e. maximum amplitude = 5 mA + 195 mA = 200 mA

Duration 200 ns

Pause between 0,1 ms and 500 ms, randomly varied

In order to test the requirements a-2), b-1) and b-2), the voltage on contact C1 of the UICC-Terminal interface shall be monitored and the following current spikes shall be applied:

1) continuous spikes:

current amplitude 12 mA

current offset 0 mA

Duration 100 ns

Pause 100 ns

2) continuous spikes:

current 12 mA

current offset 0 mA

Duration 400 ns

Pause 400 ns

3) continuous spikes:

current amplitude 9 mA

current offset 3 mA

(i.e. maximum amplitude = 3 mA + 9 mA = 12 mA

Duration 150 ns

Pause 300 ns

4) random spikes:

current amplitude 60 mA

current offset 0 mA

Duration 200 ns

Pause between 0,1 ms and 500 ms, randomly varied

5) random spikes:

current amplitude 30 mA

current offset 0 mA

Duration 400 ns

Pause between 0,1 ms and 500 ms, randomly varied

6) random spikes

current amplitude 57 mA

current offset 3 mA

(i.e. maximum amplitude = 3 mA + 57 mA = 60 mA

Duration 200 ns

Pause between 0,1 ms and 500 ms, randomly varied

NOTE: The specified spike durations shall be measured at 50 % of the spike amplitude.

6.2.2.2.6 Acceptance criteria

The voltage on contact C1 of the UICC-Terminal interface shall be within the ranges specified in the conformance requirements.

6.2.2.3 Electrical tests on contact C2

C2 = Reset (RST)

6.2.2.3.1 Definition and applicability

When the mobile station is activated, the voltage on contact C2 of the UICC-Terminal interface shall remain in the specified range in order to ensure correct operation and to prevent any damage to the UICC.

This test applies to

a) 3V technology Terminals

b) 1.8V technology Terminals

6.2.2.3.2 Conformance requirement

a-1) The voltage on contact C2 (RST) of the UICC-Terminal interface shall be between -0,3V and +0,6V for a current of -200 µA in low state and between 4,0V and Vcc + 0,3V for a current of +20 µA in high state when the Terminal is in 5V operation mode.

a-2) The voltage on contact C2 (RST) of the UICC-Terminal interface shall be between -0,3V and +0,6V for a current of -200 µA in low state and between 2,4 V and Vcc + 0,3V for a current of +20 µA in high state . when the Terminal is in 3V operation mode.

b-1) The voltage on contact C2 (RST) of the UICC-Terminal interface shall be between -0,3V and +0,6V for a current of -200 µA in low state and between 2,4 V and Vcc + 0,3V for a current of +20 µA in high state . when the Terminal is in 3V operation mode.

b-2) The voltage on contact C2 (RST) of the UICC-Terminal interface shall be between -0,3V and +0,36V for a current of -200 µA in low state and between 1,44V and Vcc + 0,3V for a current of +20 µA in high state when the Terminal is in 1.8V operation mode.

6.2.2.3.3 Reference:

a-1): 3G TS 31.101 section 5.1

a-2), b-1): 3G TS 31.101 section 5.2

b-2): 3G TS 31.101 section 5.3

6.2.2.3.4 Test purpose

To verify that the Terminal keeps the voltage on contact C2 (RST) of the UICC-Terminal interface within the specified range, as given in the conformance requirement.

6.2.2.3.5 Method of test

6.2.2.3.5.1 Initial condition

The Terminal shall be connected to an UICC simulator.

The UE shall be activated.

The remaining contacts of the UICC-Terminal interface shall be held in nominal test conditions (See 3G TS 31.120 section 6.2.1).

6.2.2.3.5.2 Procedure

The voltage on contact C2 (RST) of the UICC-Terminal interface shall be measured.

6.2.2.3.6 Acceptance criteria

The voltage on contact C2 (RST) of the UICC-Terminal interface shall be within the range specified in the conformance requirement.

6.2.2.4 Electrical tests on contact C3

C3 = Clock (CLK)

6.2.2.4.1 Definition and applicability

When the mobile station is activated, the voltage, the rise/fall time of the signal, the clock cycle ratio and the frequency on contact C3 of the UICC – Terminal interface shall remain in the specified range in order to ensure correct operation and to prevent any damage to the UICC.

This test applies to

a) 3V technology Terminals

b) 1.8V technology Terminals

6.2.2.4.2 Conformance requirement

a-1) The voltage on contact C3 (CLK) of the UICC – Terminal interface shall be between -0,3V and +0,5V for a current of -200 µA in low state and between 3,5V and Vcc +0,3V for a current of +20 µA in high state when the Terminal is in 5V operation mode.

a-2) The rise and the fall time of the clock signal shall not exceed 9 % of the clock period with a maximum of 0,5 µs when the Terminal is in 5V operation mode.

a-3) The cycle ratio of the clock signal shall be between 40 % and 60 % of the period, in steady state when the Terminal is in 5V operation mode.

a-4) The frequency of the clock signal shall be between 1 MHz and 5 MHz when the Terminal is in 5V operation mode.

a-5) The voltage on contact C3 (CLK) of the UICC – Terminal interface shall be between -0,3V and +0,6V for a current of -20 µA in low state and between 2,1V and Vcc +0,3V for a current of +20 µA in high state when the Terminal is in 3V operation mode.

a-6) The rise and the fall time of the clock signal shall not exceed 50 ns when the Terminal is in 3V operation mode.

a-7) The cycle ratio of the clock signal shall be between 40 % and 60 % of the period, in steady state when the Terminal is in 3V operation mode.

a-8) The frequency of the clock signal shall be between 1 MHz and 5 MHz when the Terminal is in 3V operation mode.

b-1) The voltage on contact C3 (CLK) of the UICC – Terminal interface shall be between -0,3V and +0,6V for a current of -20 μA in low state and between 2,1V and Vcc +0,3V for a current of +20 μA in high state when the Terminal is in 3V operation mode.

b-2) The rise and the fall time of the clock signal shall not exceed 50 ns when the Terminal is in 3V operation mode.

b-3) The cycle ratio of the clock signal shall be between 40 % and 60 % of the period, in steady state when the Terminal is in 3V operation mode.

b-4) The frequency of the clock signal shall be between 1 MHz and 5 MHz when the Terminal is in 3V operation mode.

b-5) The voltage on contact C3 (CLK) of the UICC-Terminal interface shall be between -0,3V and +0,36V for a current of -20 μA in low state and between 1.26V and Vcc +0,3V for a current of +20 μA in high state when the Terminal is in 1.8V operation mode.

b-6) The rise and the fall time of the clock signal shall not exceed 50 ns when the Terminal is in 1.8V operation mode.

b-7) The cycle ratio of the clock signal shall be between 40 % and 60 % of the period, in steady state when the Terminal is in 1.8V operation mode.

b-8) The frequency of the clock signal shall be between 1 MHz and 5 MHz when the Terminal is in 1.8V operation mode.

6.2.2.4.3 Reference:

a-1 – a-4) 3G TS 31.101 section 5.1

a-5 – a-8), b-1 – b-4) 3G TS 31.101 section 5.2

b-5 - b-8) 3G TS 31.101 section 5.3.

6.2.2.4.4 Test purpose

To verify that the Terminal keeps the voltage, the rise and fall time, the cycle ratio and the frequency on contact C3 (CLK) of the UICC – Terminal interface within the ranges specified in the conformance requirements.

6.2.2.4.5 Method of test

6.2.2.4.5.1 Initial condition

The Terminal shall be connected to an UICC simulator.

The UE shall be activated.

The remaining contacts of the UICC-Terminal interface shall be held in nominal test conditions (See 3G TS 31.120 section 6.1.1).

6.2.2.4.5.2 Procedure

The voltage, the rise/fall time, the clock cycle ratio and the frequency on contact C3 (CLK) of the UICC-Terminal interface shall be measured.

6.2.2.4.6 Acceptance criteria

The voltage, the rise and fall time, the cycle ratio and the frequency on contact C3 (CLK) of the UICC-Terminal interface shall be within the ranges specified in the conformance requirements.

6.2.2.5 Electrical tests on contact C7

C7 = Input - output (I/O)

6.2.2.5.1 Definition and applicability

When the mobile station is activated, the Terminal shall keep the voltage, the current and the rise/fall time of the signal on contact C7 of the UICC-Terminal interface within the specified range in order to ensure correct operation and to prevent any damage to the UICC.

This test applies to

a) 3V technology Terminals

b) 1.8V technology Terminals

6.2.2.5.2 Conformance requirement

a-1) Terminal receiving state A (low state):

With an imposed voltage of 0V the current flowing out of the Terminal shall not exceed 1 mA when the Terminal is in 5V operation mode.

a-2) Terminal transmitting state A (low state):

The voltage shall be between -0,3V and 0,8V when a current of 1 mA flowing into the Terminal is applied when the Terminal is in 5V operation mode.

a-3) Terminal transmitting or receiving state Z (high state):

The voltage shall be between +3,8V and Vcc + 0,3V when a current of 20 μA flowing out of the Terminal is applied when the Terminal is in 5V operation mode.

a-4) The rise time and the fall time of the I/O signal shall not exceed 1 μs when the Terminal is in 5V operation mode.

a-5) Terminal receiving state A (low state):

With an imposed voltage of 0V the current flowing out of the Terminal shall not exceed 1 mA when the Terminal is in 3V operation mode.

a-6) Terminal transmitting state A (low state):

The voltage shall be between -0,3V and 0,6V when a current of 1 mA flowing into the Terminal is applied when the Terminal is in 3V operation mode.

a-7) Terminal transmitting or receiving state Z (high state):

The voltage shall be between 2,1V and Vcc + 0,3V when a current of 20 μA flowing out of the Terminal is applied when the Terminal is in 3V operation mode.

a-8) The rise time and the fall time of the I/O signal shall not exceed 1 μs when the Terminal is in 3V operation mode.

b-1) Terminal receiving state A (low state):

With an imposed voltage of 0V the current flowing out of the Terminal shall not exceed 1 mA when the Terminal is in 3V operation mode.

b-2) Terminal transmitting state A (low state):

The voltage shall be between -0,3V and 0,6V when a current of 1 mA flowing into the Terminal is applied when the Terminal is in 3V operation mode.

b-3) Terminal transmitting or receiving state Z (high state):

The voltage shall be between 2,1V and Vcc + 0,3V when a current of 20 μA flowing out of the Terminal is applied when the Terminal is in 3V operation mode.

b-4) The rise time and the fall time of the I/O signal shall not exceed 1 μs when the Terminal is in 3V operation mode.

b-5) Terminal receiving state A (low state):

With an imposed voltage of 0V the current flowing out of the Terminal shall not exceed 1 mA when the Terminal is in 1.8V operation mode.

b-6) Terminal transmitting state A (low state):

The voltage shall be between -0,3V and 0,4V when a current of 1 mA flowing into the Terminal is applied when the Terminal is in 1.8V operation mode.

b-7) Terminal transmitting or receiving state Z (high state):

The voltage shall be between 1.26V and Vcc + 0,3V when a current of 20 μA flowing out of the Terminal is applied when the Terminal is in 1.8V operation mode.

b-8) The rise time and the fall time of the I/O signal shall not exceed 1 μs when the Terminal is in 1.8V operation mode.

6.2.2.5.3 Reference:

a-1 – a-4) 3G TS 31.101 section 5.1

a-5 – a-8), b-1 – b-4) 3G TS 31.101 section 5.2

b-4 – b-8) 3G TS 31.101 section 5.3

6.2.2.5.4 Test purpose

To verify that the Terminal keeps the voltage, the current and the rise and fall times of the signal on contact C7 (I/O) of the UICC-Terminal interface within the ranges specified in the conformance requirements.

6.2.2.5.5 Method of test

6.2.2.5.5.1 Initial condition

The Terminal shall be connected to an UICC simulator.

The UE shall be activated.

The remaining contacts of the UICC-Terminal interface shall be held in nominal test conditions (See 3G TS 31.120 section 6.2.1).

6.2.2.5.5.2 Procedure

The voltage, the current and the rise/fall time on contact C7 (I/O) of the UICC-Terminal interface shall be measured.

6.2.2.5.6 Acceptance criteria

The voltage, the current and the rise and fall times of the signal on contact C7 (I/O) of the UICC-Terminal interface shall be within the ranges specified in the conformance requirements.

7 Initial Communication Tests

The following tests apply to 3G Terminals using either ID-1 or Plug-in UICC.

7.1 ATR

7.1.1 ATR characters

7.1.1.1 Definition and applicability

When the UICC is reset, it sends a string of byte, containing information which must be interpreted by the Terminal to ascertain the transmission protocol to be used.

7.1.1.2 Conformance requirement

1) The Terminal shall adopt the data encoding convention and initial etu time defined in the initial character TS of the ATR.

2) The Terminal shall be able to receive interface characters for transmission protocols other than T=0 and T=1, historical bytes and a check byte, even if only T=0 and T=1 are used by the Terminal.

7.1.1.2.1 Reference

3G TS 31.101 section 6.3.

7.1.1.3 Test purpose

1) To verify that the Terminal adopts the data encoding convention and initial etu time defined in the initial character TS of the ATR.

2) To verify that the Terminal accepts interface characters for transmission protocols other than T=0 and T=1, historical bytes and a check byte.

7.1.1.4 Method of test

7.1.1.4.1 Initial conditions

The Terminal is connected to the UICC (or UICC simulator).

7.1.1.4.2 Procedure

a) The Terminal shall be powered on.

b) The UICC (or UICC simulator) shall send a valid ATR (mandatory transmission protocols).

c) The Terminal shall be made to send further commands to the UICC (or UICC simulator) (e.g. by entering the PIN).

d) The Terminal is switched off and on.

e) Steps b), c) and d) shall be repeated as many times as there are ATRs.

7.1.1.5 Acceptance criteria

After step c), the Terminal shall work with the UICC (or UICC simulator).

7.2 Clock stop mode

7.2.1 Definition and applicability

The Terminal may switch off the clock signal to the UICC, but only if the UICC indicates that it supports this feature.

This test applies to 3G Terminals.

7.2.2 Conformance requirement

The Terminal shall not stop the clock, unless the requirements indicated in byte 1 of the file characteristics are met.

The Terminal shall wait at least 1860 clock cycles after having received the last character, including the guard time (2 etu), of the response before it switches off the clock (if it is allowed to do so). It shall wait at least 744 clock cycles before it sends the first command after having started the clock.

7.2.2.1 Reference

3G TS 31.101 section 6.7 and 11.1.1.4.6.1.
ISO/IEC 7816-3, section 5.3.4 and 6.5.5.

7.2.3 Test purpose

1) To verify that the clock is only switched off if requirements are met as indicated in the ATR first global interface byte and /or file characteristics (byte 1 of the directory characteristics).

2) To verify that the timing of the clock switching is as specified.

7.2.4 Method of test

7.2.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator. CHV 1 shall be enabled.

7.2.4.2 Procedure

a) The UICC simulator shall be used with bits set as follows:

b4	b3	b2	b1	Meaning
0	0	-	0	Never allowed

b) The Terminal shall be powered on. When the Terminal is in mode PIN check, 10 seconds shall elapse before the PIN shall be entered.

c) The Terminal shall be powered off, and the UICC simulator shall be used with bits set as follows:

b4	b3	b2	b1	Meaning
0	1	-	0	Unless at high level

d) The Terminal shall be powered on. When the Terminal is in mode PIN check, 10 seconds shall elapse before the PIN shall be entered.

e) The Terminal shall be powered off, and the UICC simulator shall be used with bits set as follows:

b4	b3	b2	b1	Meaning
1	0	-	0	Unless at low level

f) The Terminal shall be powered on. When the Terminal is in mode PIN check, 10 seconds shall elapse before the PIN shall be entered.

g) The Terminal shall be powered off, and the UICC simulator shall be used with bits set as follows:

b4	b3	b2	b1	Meaning
0	0	-	1	Clock stop allowed

h) The Terminal shall be powered on. When the Terminal is in mode PIN check, 10 seconds shall elapse before the PIN shall be entered.

7.2.5 Acceptance criteria

1. During step b), the Terminal shall not switch off the clock.
2. During step d), the Terminal shall not switch off the clock, unless at high level.
3. During step f), the Terminal shall not switch off the clock, unless at low level.
4. During steps d), f) and h), the Terminal shall not switch off the clock until at least 1860 clock cycles after having received the last character of the response including the minimum guard time (2 etu).
5. During steps d), f) and h), the Terminal shall wait at least 744 clock cycles before it sends the first command after having restarted the clock.

7.3 Speed Enhancement

7.3.1 Definition and applicability

The Terminal shall at least support speed enhancement using (F,D) = (512,8) and (512,16) in addition to (372,1), the default.

This test applies to 3G Terminals.

7.3.2 Conformance requirement

1. For the Terminal, it is mandatory to support F=512 and D=8 and F=512 and D=16 (in addition to the default values F=372 and D=1).

7.3.3 Test purpose

1. To verify that the Terminal supports the transmission parameters F=512 and D=8 and F=512 and D=16.

7.3.4 Method of test

7.3.4.1 Initial conditions

The Terminal is connected to the UICC simulator.

7.3.4.2 Procedure

a) The Terminal is powered on.

b) The UICC simulator sends an ATR as follows:

Character name	Content	meaning
TS	3B	direct convention
T0	10	TB1, TC1, TD1 not transmitted, TA1 transmitted, no historical characters
TA1	94	F=512, D=8

c) After receipt of the PPS Request, the UICC simulator answers with the PPS Response "FF 10 94 7B" using a work waiting time of 9600 etu (initial waiting time).

d) The UICC simulator transmits with enhanced speed (F=512, D=8).

e) The Termnal is switched off and on. The UICC simulator sends an ATR as follows:

Character name	Content	meaning
TS	3B	direct convention
T0	10	TB1, TC1, TD1 not transmitted, TA1 transmitted, no historical characters
TA1	95	F=512, D=16

f) After receipt of the PPS Request, the UICC simulator answers with the PPS Response "FF 10 95 7B" using a work waiting time of 9600 etu (initial waiting time).

g) The UICC simulator transmits with enhanced speed (F=512, D=16).

7.3.5 Acceptance criteria

After step b) the Terminal shall send to the UICC simulator the PTS Request "FF 10 94 7B".

After step c) the Terminal shall work with the UICC simulator.

After step e) the Terminal shall send to the UICC simulator the PTS Request "FF 10 95 7B".

After step f) the Terminal shall work with the UICC simulator.

8 Transmission Protocol Tests

The following tests apply to 3G Terminals using either ID-1 or Plug-in UICC.

8.1 Character transmission

8.1.1 Bit/character duration during the transmission from the Terminal to the UICC.

8.1.1.1 Definition and applicability

A character consists of 10 consecutive bits:

- 1 start bit in state L;
- 8 bits, which comprise the data byte;
- 1 even parity checking bit.

8.1.1.2 Conformance requirement

The bit/character duration and the delay between two consecutive characters (between start leading edges) sent by the Terminal shall be in the range specified.

8.1.1.2.1 Reference

3G TS 31.101 section 7.2.1

8.1.1.3 Test purpose

To verify the timing during the transmission from the Terminal to the UICC.

8.1.1.4 Method of test

8.1.1.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator, and powered on.

8.1.1.4.2 Procedure

A number of characters are transmitted from the Terminal to the UICC simulator. The UICC simulator shall measure the bit/character duration and the delay between two consecutive characters for all characters transmitted by the Terminal.

8.1.1.5 Acceptance criteria

The timing shall be in the specified range.

8.1.2 Bit/character duration during the transmission from the UICC to the Terminal.

8.1.2.1 Definition and applicability

A character consists of 10 consecutive bits:

- 1 start bit in state L;
- 8 bits, which comprise the data byte;
- 1 even parity checking bit.

8.1.2.2 Conformance requirement

The bit/character duration and the delay between two consecutive characters (between start leading edges) sent by the Terminal shall be in the range specified.

8.1.2.2.1 Reference

3G TS 31.101 section 7.2.1

8.1.2.3 Test purpose

To verify the timing during the transmission from the UICC to the Terminal.

8.1.2.4 Method of test

8.1.2.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator, and powered on.

8.1.2.4.2 Procedure

The UICC simulator shall send responses with the maximum and minimum bit/character duration specified in 3G TS 31.101.

8.1.2.5 Acceptance criteria

The Terminal shall accept the response and act accordingly.

8.2 T=0 protocol

8.2.1 Timing

8.2.1.1 Definition and applicability

The minimum interval between the leading edge of the start bits of two consecutive characters shall be at least 12 etu. The Work Waiting Time (WWT) is the maximum interval between the start leading edge of any character sent by the UICC and the start leading edge of the previous character sent by either by the UICC or the terminal.

The value of the WWT shall not exceed $960 \times WI \times Fi/f$. WI is an integer received in the specific interface byte TC2. The clock rate conversion factor, Fi, may be indicated in TA1.

8.2.1.2 Conformance requirement

1) If TA1 is absent the Terminal shall use the default value Fi = 372.

2) If no TC2 is available the Terminal shall use the default value of WI (10).

3) The Terminal shall accept characters sent by the UICC with the Work Waiting Time within the specified range.

8.2.1.2.1 Reference

3G TS 31.101 section 7.2.2.1.

8.2.1.3 Test purpose

1) To verify the correct evaluation of the characters TA1 and TC2 indicated in the ATR.

2) To verify that the Terminal accepts the minimum and maximum Work Waiting Time during the transmission from the UICC to the Terminal.

3) To verify that the Terminal deactivates the UICC if WWT is exceeded.

8.2.1.4 Method of test

8.2.1.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator, and powered on.

8.2.1.4.2 Procedure

a) Upon reception of a reset the UICC simulator shall transmit the ATR as follows:

Character	Value	Description
TS	'3B' or '3F'	Indicates direct or inverse convention
T0	'87'	TD1 only is present 7 bytes of historical bytes
TD1	'80'	TD2 only is present
TD2	'1F'	TA3 only is present Global interface bytes following
TA3	'42'	Clock stop supported (low electrical state) 3V UICC
T1	'80'	
T2	'31'	Card data services
T3	'C0'	SELECT by AID supported EFDIR present
T4	'73'	Card capabilities
T5	'BE'	SFI supported

T6	'20'	
T7	'00'	No extended Lc and Le No Logical channels supported
TCK	'XX'	Check byte

b) Upon reception of a reset the UICC simulator shall transmit the ATR as follows:

Character	Value	Description
TS	'3B' or '3F'	Indicates direct or inverse convention
T0	'97'	TA1 and TD1 are present 7 bytes of historical bytes
TA1	'95'	Clock rate conversion factor FI=9 (F=512) Baud rate adjustment factor DI=5 (D=16)
TD1	'C0'	TC2 and TD2 are present
TC2	'01'	WI=1 meaning WWT=960x(Fi/f)x1
TD2	'1F'	TA3 only is present Global interface bytes following
TA3	'42'	Clock stop supported (low electrical state) 3V UICC
T1	'80'	
T2	'31'	Card data services
T3	'C0'	SELECT by AID supported EFDIR present
T4	'73'	Card capabilities
T5	'BE'	SFI supported
T6	'20'	
T7	'00'	No extended Lc and Le No Logical channels supported
TCK	'XX'	Check byte

b-1) The UICC simulator shall transmit with a WWT of 12 etu.

b-2) The UICC simulator shall transmit with the specified WWT (960 x (Fi/f) x WI).

b-3) The UICC simulator shall transmit with the specified WWT + 2 etus (WWT exceeded).

8.2.1.5 Acceptance criteria

In step a), the Terminal shall work with the UICC simulator using the default values of TA1 and TC2.

In steps b-1) and b-2) the Terminal shall work with the UICC simulator.

In step b-3) the Terminal shall initiate a deactivation of the UICC within 960 etu following the excess of WWT.

8.2.2 Command processing, ACK, NACK, NULL procedure bytes

8.2.2.1 Definition and applicability

Procedure bytes are used to keep up the communication between the terminal and the UICC. They shall not be transmitted to the Application Layer.

The status bytes SW1 SW2 form an end sequence indicating the status of the UICC at the end of a command.

8.2.2.2 Conformance requirement

The Terminal shall correctly use the different modes of data transmission.

8.2.2.2.1 Reference

3G TS 31.101 section 7.2.2.3.

ISO 7816-3, section 8.3.

8.2.2.3 Test purpose

To verify that the Terminal correctly uses the different modes of data transmission.

8.2.2.4 Method of test

8.2.2.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator, and powered on.

T=0 ATR shall have been received and eventual PPS procedure successfully completed.

8.2.2.4.2 Procedure

a) The Terminal shall be made to initiate a VERIFY CHV command.

b) The UICC simulator shall answer the first 3 bytes with ACK=INS complemented.

c) The UICC simulator shall answer the next data byte with NULL (NULL="60").

d) The UICC simulator shall then send ACK=INS. This byte is sent when the elapsed time since step b) is greater than the Work Waiting Time.

e) The UICC simulator shall answer the transmission of the rest of the data with NULL.

f) The UICC simulator shall then send SW1 and SW2, indicating correct execution of the command ("90" and "00" for SW1 and SW2 respectively). These bytes are sent when the elapsed time since step d) is greater than the Work Waiting Time.

8.2.2.5 Acceptance criteria

The command shall be executed correctly.

8.2.3 Command processing, use of procedure bytes ’61xx’ and ‘6Cxx’

8.2.3.1 Definition and applicability

Procedure bytes '61XX' and '6CXX' are returned by the UICC to control exchanges between the Transport Layer of the Terminal and the UICC, and should never be returned to the Application Layer of the Terminal. Command processing in the UICC is not complete if it has returned procedure bytes '61XX' or '6CXX'.

8.2.3.2 Conformance requirement

The UICC returns procedure bytes ‘61xx ‘and ‘6Cxx’ to the Transport Layer of the Terminal to indicate to it the manner in which it should retrieve the data requested by the command currently being processed. These procedure bytes are only used when processing case 2 and 4 commands using T=0.

8.2.3.2.1 Reference

3G TS 31.101 section 7.3.1.1.5.

ISO 7816-3, section 8.3.

8.2.3.3 Test purpose

To verify that the Terminal correctly handles the procedure bytes '61XX' and '6CXX'.

8.2.3.4 Method of test

8.2.3.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator, and powered on.

T=0 ATR shall have been received and eventual PPS procedure successfully completed.

8.2.3.4.2 Procedure

a) The Terminal shall be made to initiate a case 4 command (ex: SELECT command).

b) The UICC simulator shall send ‘61xx’ procedure bytes.

c) Following receipt of the command, the UICC simulator shall send ‘61yy’ procedure bytes (yy ≤. xx).

d) Following receipt of the command, the UICC simulator shall then send SW1 and SW2, indicating correct execution of the command ("90" and "00" for SW1 and SW2 respectively).

e) The Terminal shall be made to initiate a case 2 command with Le > Luicc (ex: READ RECORD command).

f) The UICC simulator shall sends ‘6Czz’ procedure bytes.

g) Following receipt of the command, the UICC simulator shall then send the rest of the data and SW1 and SW2, indicating correct execution of the command ("90" and "00" for SW1 and SW2 respectively).

8.2.3.5 Acceptance criteria

After step b) the Terminal shall send a GET RESPONSE command with Le = ‘xx’.

After step c) the Terminal shall send a GET RESPONSE command with Le = ‘yy’.

After step f) the Terminal shall send the previous command with Le = ‘zz’.

8.2.4 Command processing, status bytes

8.2.4.1 Definition and applicability

The status bytes SW1 SW2 form an end sequence indicating the status of the UICC at the end of a command.

8.2.4.2 Conformance requirement

In the case of an error, the UICC may return status indicating error or warning conditions instead of the ‘61xx’ or ‘6Cxx’ response.

8.2.4.2.1 Reference

3G TS 31.101 sections 7.2.2.3. and 10.2.1.

8.2.4.3 Test purpose

To verify that the Terminal correctly handles status bytes different than ’9000’.

8.2.4.4 Method of test

8.2.4.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator, and powered on.

T=0 ATR shall have been received and eventual PPS procedure successfully completed.

8.2.4.4.2 Procedure

a) Warning:

a-1) The Terminal shall be made to initiate a case 4 command (ex: SELECT command).

a-2) The UICC simulator shall send warning status bytes (‘62xx’ ’63xx’ or ‘9xxx’).

a-3) Following receipt of the command, the UICC simulator shall then send the rest of the data and SW1 and SW2, indicating correct execution of the command ("90" and "00" for SW1 and SW2 respectively).

b) Error:

b-1) The Terminal shall be made to initiate a case 4 command (ex: SELECT command).

b-2) The UICC simulator shall send error status bytes (‘6xxx’ except ‘6Cxx’, ‘61xx’, ‘62xx’ and ‘63xx’).

8.2.4.5 Acceptance criteria

After step a-2) the Terminal shall send a GET RESPONSE command with Le = ‘00’.

After step b-2) the Terminal shall discontinue processing of the command.

8.2.5 Error correction

8.2.5.1 Definition and applicability

If the UICC as receiver detects a parity error within 11 ± 0.2 etu starting from the leading edge of the start bit, in a character just received, it shall set I/O to state L to indicate the error to the Terminal.

8.2.5.2 Conformance requirement

The error detection and correction procedure is mandatory for T=0 protocol except for the Terminal during the ATR-procedure.

8.2.5.2.1 Reference

3G TS 31.101 section 7.2.2.4.

8.2.5.3 Test purpose

To verify the error handling during the transmission from the Terminal to the UICC.

8.2.5.4 Method of test

8.2.5.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator, and powered on.

8.2.5.4.2 Procedure

The UICC simulator shall transmit an error signal in response to a received character by setting the I/O line to state L for a maximum of 2 etu and a minimum of 1 etu 10.5 ± 0.2 etu after the leading edge of the start bit of the received character.

8.2.5.5 Acceptance criteria

The Terminal shall repeat the disputed character after a minimum delay of 2 etu.

8.2.6 Error detection

8.2.6.1 Definition and applicability

If the Terminal as receiver detects a parity error within 11 ± 0.2 etu starting from the leading edge of the start bit, in a character just received, it shall set I/O to state L to indicate the error to the UICC.

8.2.6.2 Conformance requirement

The error detection and correction procedure is mandatory for T=0 protocol except for the Terminal during the ATR-procedure.

8.2.6.2.1 Reference

3G TS 31.101 section 7.2.2.4.

8.2.6.3 Test purpose

To verify the error handling during the transmission from the UICC to the Terminal.

8.2.6.4 Method of test

8.2.6.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator, and powered on.

8.2.6.4.2 Procedure

The UICC simulator shall send a response with a parity error and check that the terminals correctly handles it.

8.2.6.5 Acceptance criteria

The Terminal shall detect the parity error by setting the I/O line to state L for a maximum of 2 etu and a minimum of 1 etu 10.5 ± 0.2 etu after the leading edge of the start bit of the erroneous character and correctly evaluate the character when repeated by the UICC simulator.

8.3 T=1 protocol

8.3.1 Character Waiting Time

8.3.1.1 Definition and applicability

CWT is defined as the maximum delay between the leading edges of two consecutive characters in the block.

8.3.1.2 Conformance requirement

CWI is used to calculate CWT and shall be in the range from 0 to 5. The value is set in bits b4 to b1 in TB3. The value of CWT may be calculated from the following equation: CWT = $(11 + 2^{CWI})$ etu.

8.3.1.2.1 Reference

3G TS 31.101 section 7.2.3.1.

ISO 7816-3, section 9.5.3.

8.3.1.3 Test purpose

To verify that the Terminal respects the CWT indicated by the UICC.

8.3.1.4 Method of test

8.3.1.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator, and powered on.

8.3.1.4.2 Procedure

a) Upon reception of a warm reset the UICC simulator shall transmit the ATR as follows:

Character	Value	Description
TS	'3B' or '3F'	Indicates direct or inverse convention
T0	'97'	TA1, and TD1 are present 7 bytes of historical bytes
TA1	'95'	Clock rate conversion factor FI=9 (F=512) Baud rate adjustment factor DI=5 (D=16)
TD1	'81'	Only TD2 is present Protocol T=1 supported by UICC
TD2	'A1'	TB3 and TD3 are present Protocol T=1 supported by UICC
TB3	'05'	Block Waiting Integer=0 Character Waiting Integer=5 indicating CWT=43 etu
TD3	'1F'	Only TA4 is present Global interface bytes following
TA4	'42'	Clock stop supported (low electrical state) 3V UICC
T1	'80'	
T2	'31'	Card data services
T3	'C0'	SELECT by AID supported EFDIR present
T4	'73'	Card capabilities
T5	'BE'	SFI supported
T6	'20'	
T7	'00'	No extended Lc and Le No Logical channels supported
TCK	'XX'	Check byte

b) Following receipt of the first block by the UICC simulator, the Terminal shall be made to initiate a command requiring reception of an I-Block.

b-1) The UICC simulator shall send the I-Block (data + '9000' indicating correct execution of the command) using CWT=11 etu.

b-2) The UICC simulator shall send the I-Block (data + '9000' indicating correct execution of the command) using CWT=43 etu.

b-3) The UICC simulator shall send the I-Block (data + '9000' indicating correct execution of the command) using CWT=48 etu.

8.3.1.5 Acceptance criteria

In step b.1) and b.2) the Terminal shall acknowledge reception of the I-Block without error.

In step b.3) CWT excess behaviour not defined.

8.3.2 Block Timing

8.3.2.1 Definition and applicability

BWT is defined as the maximum delay between the leading edge of the last character of the block received by the card and the leading edge of the first character of the next block sent by the card.

BGT is defined as the minimum delay between the leading edge of two consecutive characters sent in opposite directions. The value of BGT shall be 22 etu.

8.3.2.2 Conformance requirement

BWI is used to calculate BWT and shall be in the range from 0 to 4. The value is set in bits b5 to b8 in TB3. The value of BWT may be calculated from the following equation: BWT = 11 + (2^{BWI} x 960 x 372/f) etu.

The delay between the last character of a block received by the UICC and the first character of the next block sent from the UICC shall be in the interval: BGT < delay < BWT.

8.3.2.2.1 Reference

3G TS 31.101 section 7.2.3.

ISO 7816-3, section 9.5.3.

8.3.2.3 Test purpose

To verify that the Terminal respects the BGT and BWT indicated by the UICC in the ATR and detects time-out.

8.3.2.4 Method of test

8.3.2.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator, and powered on.

8.3.2.4.2 Procedure

a) Upon reception of a warm reset the UICC simulator shall transmit the ATR as follows:

Character	Value	Description
TS	'3B' or '3F'	Indicates direct or inverse convention

T0	'97'	TA1, and TD1 are present 7 bytes of historical bytes
TA1	'95'	Clock rate conversion factor FI=9 (F=512) Baud rate adjustment factor DI=5 (D=16)
TD1	'81'	Only TD2 is present Protocol T=1 supported by UICC
TD2	'A1'	TB3 and TD3 are present Protocol T=1 supported by UICC
TB3	'31'	Block Waiting Integer=3 indicating BWT=11+(8x960x372/f) etu Character Waiting Integer=1 indicating CWT=13 etu
TD3	'1F'	Only TA4 is present Global interface bytes following
TA4	'42'	Clock stop supported (low electrical state) 3V UICC
T1	'80'	
T2	'31'	Card data services
T3	'C0'	SELECT by AID supported EFDIR present
T4	'73'	Card capabilities
T5	'BE'	SFI supported
T6	'20'	
T7	'00'	No extended Lc and Le No Logical channels supported
TCK	'XX'	Check byte

b) Following receipt of the first block by the UICC simulator, the Terminal shall be made to initiate a command requiring reception of chained I-Blocks.

c) The UICC simulator shall measure the delay between the last character of each block sent by the UICC and the first character of each following block sent by the Terminal.

d) BWT:

d-1) The UICC simulator shall send the I-Blocks using BGT = 22 etu.

d-2) The UICC simulator shall send each I-Block using BWT = $11 + (2^{BWI} \times 960 \times 372/f)$ etu.

Or:

d-3) The UICC simulator shall send the first I-Block using BWT = $500 + [11 + (2^{BWI} \times 960 \times 372/f)]$ etu.

8.3.2.5 Acceptance criteria

In step c) the Terminal shall use a BGT of at least 22 etus.

In steps d-1) and d-2) the Terminal shall acknowledge reception of the I-Blocks without error.

In step d-3) the Terminal shall detect a time-out and send an R-Block requesting retransmission of the last block.

8.3.3 Block Waiting Time extension

8.3.3.1 Definition and applicability

WTX is a parameter used to ask for more time to process a command.

Supervisory blocks, S-block, are used to send control information.

S-blocks are always used in pairs. A S(request) is always followed by a S(response) block.

- S(WTX request), a request for an extension of the waiting time;
- S(WTX response), an acknowledge of the extension of the waiting time.

8.3.3.2 Conformance requirement

The UICC might need more than BWT to process the previously received block, a S(WTX request) is sent by the UICC. The terminal shall acknowledge with a S(WTX response).

When an S(… request) has been sent and either a BWT time-out occurs (with the terminal) or the received response is not a S(… response), the **S(… request)** shall be resent.

8.3.3.2.1 Reference

3G TS 31.101 section 7.2.3.1.

ISO 7816-3, sections 9.5.3. and 9.7.3. Scenario 2, 14 and 15.

8.3.3.3 Test purpose

To verify that the Terminal respects the WTX procedure and applies the extended BWT.

8.3.3.4 Method of test

8.3.3.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator, and powered on.

8.3.3.4.2 Procedure

a) Upon reception of a warm reset the UICC simulator shall transmit the ATR as follows:

Character	Value	Description
TS	'3B' or '3F'	Indicates direct or inverse convention
T0	'97'	TA1, and TD1 are present 7 bytes of historical bytes
TA1	'95'	Clock rate conversion factor FI=9 (F=512) Baud rate adjustment factor DI=5 (D=16)
TD1	'81'	Only TD2 is present Protocol T=1 supported by UICC
TD2	'A1'	TB3 and TD3 are present Protocol T=1 supported by UICC
TB3	'21'	Block Waiting Integer=2 indicating BWT=11+(4x960x372/f) etu Character Waiting Integer=1 indicating CWT=13 etu
TD3	'1F'	Only TA4 is present Global interface bytes following
TA4	'42'	Clock stop supported (low electrical state) 3V UICC
T1	'80'	
T2	'31'	Card data services
T3	'C0'	SELECT by AID supported EFDIR present
T4	'73'	Card capabilities
T5	'BE'	SFI supported
T6	'20'	
T7	'00'	No extended Lc and Le No Logical channels supported
TCK	'XX'	Check byte

b) Following receipt of the first block by the UICC simulator, the Terminal shall be made to initiate a command requiring exchange of I-Blocks.

c-1) Error free S(WTX request):

c-1-1) Following receipt of the I-block, the UICC simulator shall send a S(WTX request) without error (BWT multiplied by 2).

c-1-2) The UICC simulator shall use the extended BWT when receiving the S(WTX response), then complete the command (data + '9000' indicating correct execution of the command).

c-2) Error in S(WTX request):

c-2-1) Following receipt of the I-block, the UICC simulator shall send a S(WTX request) and generate the following errors:

- Parity error.
- NAD ≠ '00'.
- S(WTX response) instead of S(WTX request).
- Other S(.... response) instead of S(WTX request).
- LEN error.

c-2-2) Following reception of the block sent by the Terminal (correct or with error assumed) the UICC simulator shall retransmit the S(WTX request) without error.

c-2-3) The UICC simulator shall use the extended BWT when receiving the S(WTX response), then complete the command (data + '9000' indicating correct execution of the command).

8.3.3.5 Acceptance criteria

After steps c-1-1) and c-2-2) the Terminal shall send a S(WTX response).

After step c-2-1) the Terminal shall send an R-Block requesting retransmission of the last block.

8.3.4 Chaining - Respect of IFSC by Terminal

8.3.4.1 Definition and applicability

Chaining allows the terminal or the UICC to transfer information, which is longer than IFSC or IFSD. If information longer than IFSC or IFSD is transferred, the information should be divided into pieces, each has a length ≤ IFSC or IFSD. Each piece should be sent in an I-block using the chaining function.

When a receiver receives a more-data I-block, a R(N(R)) shall be sent. N(R)= N(S) of the expected I-block. At least one chained block should follow.

The IFSC defines the maximum length of the information field of blocks that can be received by the UICC.

8.3.4.2 Conformance requirement

The default value of the IFSC is 32 bytes. Another value may be indicated in TA3 of the ATR.

When the terminal is the sender, all I-blocks of a chain shall have LEN = IFSC bytes except for the last, which could have a value in the range of 0 to IFSC.

8.3.4.2.1 Reference

3G TS 31.101 section 7.2.3.1.1. and 7.2.3.5.

ISO 7816-3, section 9.7.3. Scenario 5 and 6.

8.3.4.3 Test purpose

To verify that the Terminal respects the Information Field Size of the UICC in chaining mode.

8.3.4.4 Method of test

8.3.4.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator, and powered on.

8.3.4.4.2 Procedure

a) No TA3

a-1) Upon reception of a warm reset the UICC simulator shall transmit the ATR as follows:

Character	Value	Description
TS	'3B' or '3F'	Indicates direct or inverse convention
T0	'97'	TA1, and TD1 are present 7 bytes of historical bytes
TA1	'95'	Clock rate conversion factor FI=9 (F=512) Baud rate adjustment factor DI=5 (D=16)
TD1	'81'	Only TD2 is present Protocol T=1 supported by UICC
TD2	'A1'	TB3 and TD3 are present Protocol T=1 supported by UICC
TB3	'00'	Block Waiting Integer=0 Character Waiting Integer=0
TD3	'1F'	Only TA4 is present Global interface bytes following
TA4	'42'	Clock stop supported (low electrical state) 3V UICC
T1	'80'	
T2	'31'	Card data services
T3	'C0'	SELECT by AID supported EFDIR present
T4	'73'	Card capabilities
T5	'BE'	SFI supported
T6	'20'	
T7	'00'	No extended Lc and Le No Logical channels supported
TCK	'XX'	Check byte

a-2) Following receipt of the first block by the UICC simulator, the Terminal shall be made to initiate a command requiring exchange of chained I-Blocks.

a-3) Following receipt of the command, the UICC simulator shall acknowledge reception of the I-Blocks without error and send the rest of I-blocks (data + ‘9000’ indicating correct execution of the command).

b) TA3=’FE’

b-1) Upon reception of a warm reset the UICC simulator shall transmit the ATR as follows:

Character	Value	Description
TS	'3B' or '3F'	Indicates direct or inverse convention
T0	'97'	TA1, and TD1 are present 7 bytes of historical bytes
TA1	'95'	Clock rate conversion factor FI=9 (F=512) Baud rate adjustment factor DI=5 (D=16)
TD1	'81'	Only TD2 is present Protocol T=1 supported by UICC
TD2	'B1'	TA3, TB3 and TD3 are present Protocol T=1 supported by UICC
TA3	'FE'	IFSC is 254 bytes long
TB3	'00'	Block Waiting Integer=0 Character Waiting Integer=0
TD3	'1F'	Only TA4 is present

		Global interface bytes following
TA4	'42'	Clock stop supported (low electrical state) 3V UICC
T1	'80'	
T2	'31'	Card data services
T3	'C0'	SELECT by AID supported EFDIR present
T4	'73'	Card capabilities
T5	'BE'	SFI supported
T6	'20'	
T7	'00'	No extended Lc and Le No Logical channels supported
TCK	'XX'	Check byte

b-2) Following receipt of the first block by the UICC simulator, the Terminal shall be made to initiate a command requiring exchange of chained I-Blocks.

b-3) Following receipt of the command, the UICC simulator shall acknowledge reception of the I-Blocks without error and send the rest of I-Blocks (data + '9000' indicating correct execution of the command).

8.3.4.5 Acceptance criteria

In step a-2) the Terminal shall send the chained I-Blocks, except the last one, using the default value of IFSC, i.e. 32 bytes long information field.

In step b-2) the Terminal shall send the chained I-Blocks, except the last one, using the specified value of IFSC, i.e. 254 bytes long information field.

In step a-3) and b-3) the Terminal shall acknowledge reception of the I-Blocks without error by sending R-Blocks with N(R)=sequence number of expected I-Block.

8.3.5 Chaining - IFSD management

8.3.5.1 Definition and applicability

Chaining allows the Terminal or the UICC to transfer information, which is longer than IFSC or IFSD. If information longer than IFSC or IFSD is transferred, the information should be divided into pieces, each has a length ≤ IFSC or IFSD. Each piece should be sent in an I-block using the chaining function.

When a receiver receives a more-data I-block, a R(N(R)) shall be sent. N(R)= N(S) of the expected I-block. At least one chained block should follow.

The IFSD defines the maximum length of the information field of blocks that the terminal can receive.

The default value of the IFSD is 32 bytes and may be adjusted during the card session. The maximum value of the IFSD is 254 bytes.

8.3.5.2 Conformance requirement

When the UICC is the sender, all I-blocks of a chain shall have LEN ≤ IFSD bytes per block.

8.3.5.2.1 Reference

3G TS 31.101 section 7.2.3.

8.3.5.3 Test purpose

To verify that the Terminal correctly handles the Information Field Size in chaining mode.

8.3.5.4 Method of test

8.3.5.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator, and powered on.

ATR shall have been received and eventual PPS procedure successfully completed.

8.3.5.4.2 Procedure

a) Following receipt of the first block by the UICC simulator, the Terminal shall be made to initiate a command requiring exchange of chained I-Blocks.

b) The UICC simulator shall send an I-Block with LEN > IFSD.

c) Following correct receipt of the next block the UICC simulator shall send the rest of I-Blocks (data + ‘9000’ indicating correct execution of the command).

8.3.5.5 Acceptance criteria

In step b), the Terminal shall detect the incorrect LEN and send an R-Block requesting retransmission of the last block..

In step c) the Terminal shall acknowledge reception of the I-Blocks without error by sending R-Blocks with N(R)=sequence number of expected I-Block.

8.3.6 I-Block error correction

8.3.6.1 Definition and applicability

Information blocks are used to transfer command and response APDUs.

The I-blocks are denoted as follows: I(N(S), M) where:

- N(S) is the send-sequence number of the block;
- M is the more-data bit used in the chaining function.

8.3.6.2 Conformance requirement

When an I-block has been sent and a BWT time-out occurs or an invalid block has been received (with the terminal), an R-block is sent, which requests with its N(R) for the expected I-block with N(S)=N(R).

8.3.6.2.1 Reference

3G TS 31.101 section 7.2.3.4.

ISO 7816-3, section 9.7.3. Scenario 8.

8.3.6.3 Test purpose

To verify that the Terminal sends an I-Block again when notified incorrect reception by the UICC (R-Block meaning error).

8.3.6.4 Method of test

8.3.6.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator, and powered on.

ATR shall have been received and eventual PPS procedure successfully completed.

8.3.6.4.2 Procedure

a) Following receipt of the first block by the UICC simulator, the Terminal shall be made to initiate a command requiring sending of chained I-Blocks.

b) The UICC simulator shall assume each transmitted I-Block, including the last non-chained one, is invalid by sending an R-Block requesting retransmission.

8.3.6.5 Acceptance criteria

In step b), the Terminal shall resend each disputed I-Block.

8.3.7 I-Block error detection

8.3.7.1 Definition and applicability

Information blocks are used to transfer command and response APDUs.

The I-blocks are denoted as follows: I(N(S), M) where:

- N(S) is the send-sequence number of the block;
- M is the more-data bit used in the chaining function.

8.3.7.2 Conformance requirement

When an I-block has been sent and a BWT time-out occurs or an invalid block has been received (with the terminal), an R-block is sent, which requests with its N(R) for the expected I-block with N(S)=N(R).

8.3.7.2.1 Reference

3G TS 31.101 section 7.2.3.4.

ISO 7816-3, section 9.7.3. Scenario 9.

8.3.7.3 Test purpose

To verify that the Terminal correctly handles the different types of invalid I-Blocks.

8.3.7.4 Method of test

8.3.7.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator, and powered on.

ATR shall have been received and eventual PPS procedure successfully completed.

8.3.7.4.2 Procedure

a) Following receipt of the first block by the UICC simulator, the Terminal shall be made to initiate a command requiring reception of I-Blocks.

b) The UICC simulator shall send I-Blocks and generate the following errors:

- Parity error.

- NAD ≠ '00'.
- PCB with wrong sequence number.
- PCB of an R-Block.
- PCB of an S-Block.
- LEN error (= 'FF').
- EDC error.

c) Following correct reception of the block sent by the Terminal, the UICC simulator shall retransmit the I-Block without error and complete the command (data + '9000' indicating correct execution of the command).

8.3.7.5 Acceptance criteria

In step b), the Terminal shall detect the invalid block and send an R-Block requesting retransmission of the last block (N(R)=sequence number of last I-Block).

In step c) the Terminal shall acknowledge reception of the I-Block without error.

8.3.8 R-Block error handling

8.3.8.1 Definition and applicability

Receive-ready blocks, R-block, are used to transfer acknowledgements.

The R-block are denoted as follows: R(N(R)), where:

- N(R) is the number of the expected I-block.

8.3.8.2 Conformance requirement

When an R-block was sent and an invalid block is received or BWT time-out, the R-block will be resent.

8.3.8.2.1 Reference

3G TS 31.101 section 7.2.3.4.

ISO 7816-3, section 9.7.3. Scenario 11, 12 13, 23 and 24.

8.3.8.3 Test purpose

To verify that the Terminal handles the different types of invalid R-Blocks and correctly recovers.

8.3.8.4 Method of test

8.3.8.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator, and powered on.

ATR shall have been received and eventual PPS procedure successfully completed.

8.3.8.4.2 Procedure

a) Following receipt of the first block by the UICC simulator, the Terminal shall be made to initiate a command requiring reception of I-Blocks.

b) The UICC simulator shall send an invalid I-Block.

c) Following correct reception of the block sent by the Terminal, the UICC simulator shall assume the received block is invalid by sending an R-Block and generate the following errors:

- Parity error.
- NAD ≠ '00'.
- PCB with wrong sequence number.
- PCB with b6=1.
- PCB of an S-Block.
- LEN error.
- EDC error.

d) Following correct reception of the block sent by the Terminal:

d-1) No error:

The UICC simulator shall retransmit the I-Block without error and complete the command (data + '9000' indicating correct execution of the command).

d-2) Error assumed:

d-2-1) The UICC simulator shall assume the received block is invalid by sending an R-Block requesting retransmission (N(R)= correct sequence number of step c)).

d-2-2) Following correct reception of the block sent by the Terminal, the UICC simulator shall complete the command (data + '9000' indicating correct execution of the command).

8.3.8.5 Acceptance criteria

In step b) and c), the Terminal shall detect the invalid block and send an R-Block requesting retransmission of the last block (N(R)=sequence number of invalid I-Block).

After step d-2-1), the Terminal shall resend the previous R-Block with (N(R)=sequence number of invalid I-Block.

In step d-2-2), the Terminal shall acknowledge reception of the I-Block(s) without error.

8.3.9 Chaining - Abortion

8.3.9.1 Definition and applicability

Supervisory blocks, S-block, are used to send control information.

S-blocks are always used in pairs. A S(request) is always followed by a S(response) block.

- S(ABORT request), a request to abort the chain function;
- S(ABORT response), an acknowledge of the abortion of the chain function;

8.3.9.2 Conformance requirement

When an S(… request) has been sent and either a BWT time-out occurs (with the terminal) or the received response is not a S(… response), the **S(… request)** shall be resent. But if an S(… response) has been sent and either an invalid block is received or a BWT time-out occurs (with the terminal), an R-block shall be sent.

8.3.9.2.1 Reference

3G TS 31.101 section 7.2.3.4.

ISO 7816-3, section 9.7.3. Scenario 26 and 27.

8.3.9.3 Test purpose

To verify that the Terminal correctly handles the abortion procedure in chaining mode.

8.3.9.4 Method of test

8.3.9.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator, and powered on.

ATR shall have been received and eventual PPS procedure successfully completed.

8.3.9.4.2 Procedure

a) Terminal sends chained data:

a-1) Following receipt of the first block by the UICC simulator, the Terminal shall be made to initiate a command requiring sending of chained I-Blocks.

a-2) The UICC simulator shall acknowledge receipt of the first chained I-Block by sending an R-Block without error.

a-3) Following receipt of the second I-Block, the UICC simulator shall send an S(ABORT request).

a-4) The UICC simulator shall acknowledge receipt of the response and give back the Terminal the right to send (R-Block without error) and complete the next command.

b) UICC sends chained data:

b-1) Following receipt of the first block by the UICC simulator, the Terminal shall be made to initiate a command requiring reception of chained I-Blocks.

b-2) The UICC simulator shall transmit the first chained I-Block without error.

b-3) Following correct reception of the block sent by the Terminal, the UICC simulator shall send an S(ABORT request).

b-4) The UICC simulator shall acknowledge receipt of the response without error.

b-5) The UICC simulator shall restart and complete the command (data + ‘9000’ indicating correct execution of the command).

8.3.9.5 Acceptance criteria

After steps a-3) and b-3), the Terminal shall send an S(ABORT response).

After step a-4), the Terminal shall send a block with N(S)=0.

In step b-5) the Terminal shall acknowledge reception of the I-Blocks without error by sending R-Blocks with N(R)=sequence number of expected I-Block.

8.3.10 Block repetition and resynchronization

8.3.10.1 Definition and applicability

Resynchronization of the protocol may be attempted at three consecutive levels. If one level is unsuccessful, then the next level is tried.

- For the terminal, the three levels are:
- Retransmission of blocks.
- Use of S(RESYNCH request).
- Card reset or deactivation.

Supervisory blocks, S-block, are used to send control information.

S-blocks are always used in pairs. A S(request) is always followed by a S(response) block.

- S(RESYNCH request), a request of a resynchronization;
- S(RESYNCH response), an acknowledge of the resynchronization;

8.3.10.2 Conformance requirement

When an S(… request) has been sent and either a BWT time-out occurs (with the terminal) or the received response is not a S(… response), the **S(… request)** shall be resent. But if an S(… response) has been sent and either an invalid block is received or a BWT time-out occurs (with the terminal), an R-block shall be sent.

If the terminal fails to receive an error-free block during a card-session, a maximum of two further attempts is allowed before a S(RESYNCH request) is sent.

8.3.10.2.1 Reference

3G TS 31.101 section 7.2.3.4.

ISO 7816-3, section 9.7.3. Scenario 29, 30, 31, 32 and 34.

8.3.10.3 Test purpose

To verify that the Terminal resynchronizes the UICC if block repetition is unsuccessful and correctly handles an invalid response to an S(... request).

8.3.10.4 Method of test

8.3.10.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator, and powered on.

ATR shall have been received and eventual PPS procedure successfully completed.

8.3.10.4.2 Procedure

a) Following receipt of the first block by the UICC simulator, the Terminal shall be made to initiate a command requiring sending of an I-Block.

b) Following receipt of the first I-Block, the UICC simulator shall send an erroneous block or be unresponsive.

c) Following correct reception of the block sent by the Terminal, the UICC simulator shall send two more erroneous blocks or remain unresponsive two more times.

d-1) No error:

Following correct reception of the block (S(RESYNCH request)) sent by the Terminal, the UICC simulator shall send a S(RESYNCH response) shall complete the next command without error.

d-2) Error assumed:

d-2-1) Following correct reception of the block (S(RESYNCH request)) sent by the Terminal, the UICC simulator shall send an invalid block or assume the received S(RESYNCH request) is erroneous by sending an R-Block requesting retransmission.

d-2-2) Following correct reception of the block (S(RESYNCH request)) sent by the Terminal, the UICC simulator shall send a S(RESYNCH response), then complete the next command without error.

8.3.10.5 Acceptance criteria

After step b), the Terminal shall send an R-Block requesting retransmission.

In step c), the Terminal shall send the same R-Block as in b) two more times, then initiate an S(RESYNCH request).

After step d-2-1), the Terminal shall resend an S(RESYNCH request).

8.3.11 UICC is unresponsive

8.3.11.1 Definition and applicability

Resynchronization of the protocol may be attempted at three consecutive levels. If one level is unsuccessful, then the next level is tried.

- For the terminal, the three levels are:
- Retransmission of blocks.
- Use of S(RESYNCH request).
- Card reset or deactivation.

8.3.11.2 Conformance requirement

After an ATR due to a Warm reset or successful PPS procedure, the communication between the terminal and the UICC can be initiated. But if the terminal fails to receive an error-free block, in the beginning of the protocol, a maximum of two more successive attempts to receive the block is allowed before resetting or a deactivation of the card takes place.

If the terminal fails to receive an error-free block during a card-session, a maximum of two further attempts is allowed before a S(RESYNCH request) is sent.

8.3.11.2.1 Reference

3G TS 31.101 section 7.2.3.4.

ISO 7816-3, section 9.7.3. Scenario 33 and 35.

8.3.11.3 Test purpose

To verify that the Terminal correctly resets or deactivates the UICC at the start of the protocol and during the protocol if resynchronization is unsuccessful.

8.3.11.4 Method of test

8.3.11.4.1 Initial conditions

The Terminal shall be connected to the UICC simulator, and powered on.

ATR shall have been received and eventual PPS procedure successfully completed.

8.3.11.4.2 Procedure

a) At the start of the protocol:

a-1) Following receipt of the first block, the UICC simulator shall be unresponsive.

a-2) Following correct reception of the block sent by the Terminal, the UICC simulator shall remain unresponsive two more times.

b) During the protocol:

b-1) Following receipt of the first block by the UICC simulator, the Terminal shall be made to initiate a command requiring sending of an I-Block.

b-2) Following receipt of the first I-Block, the UICC simulator shall be unresponsive.

b-3) Following correct reception of the block sent by the Terminal, the UICC simulator shall remain unresponsive two more times.

b-4) Following correct reception of the block (S(RESYNCH request)) sent by the Terminal, the UICC simulator shall remain unresponsive three more times.

8.3.11.5 Acceptance criteria

After step a-1), the Terminal shall:

- send an R-Block if the first block it sent was an I-Block.
- repeat the S-Block if the first block it sent was an S-Block.

In step a-2), the Terminal shall send the same block as in a-1) two more times, then reset or deactivate the UICC.

After step b-2), the Terminal shall send an R-Block with (N(R)=sequence number of previous I-Block.

In step b-3), the Terminal shall send the same R-Block as in b-2) two more times, then initiate an S(RESYNCH request).

In step b-4), the Terminal shall resend S(RESYNCH request) two more times, then reset or deactivate the UICC.

9 Application independent procedures

The following tests apply to 3G Terminals using either ID-1 or Plug-in UICC.

9.1 UICC presence detection

9.1.1 Definition and applicability

To ensure that the UICC has not been removed during a card session, the Terminal sends, at frequent intervals, a STATUS command during each call.

This procedure shall be used in addition to a mechanical or other device used to detect the removal of a UICC.

9.1.2 Conformance requirement

A STATUS command shall be issued within all 30 second periods of inactivity on the UICC-Terminal interface during a call. Inactivity in this case is defined as starting at the end of the last communication or the last issued STATUS command. If no response data is received to this STATUS command, then the call shall be terminated as soon as possible but at least within 5 seconds after the STATUS command has been sent. If the DF indicated in response to a STATUS command is not the same as that which was indicated in the previous response, or accessed by the previous command, then the call shall be terminated as soon as possible but at least within 5 seconds after the response data has been received.

9.1.2.1 Reference

3G TS 31.101 section 14.5.2.

9.1.3 Test purpose

To verify that the Terminal:

1. sends STATUS command within all 30 second periods of inactivity during a call.

2. terminates a call within 5 seconds at the latest after having received an invalid response to the STATUS command.

9.1.4 Method of test

9.1.4.1 Initial conditions

The Terminal is connected to the UICC simulator.

All elementary files are coded as default.

9.1.4.2 Procedure

a) A call shall be set up using the generic call setup.

b) The UICC simulator shall monitor the time interval between STATUS commands sent by the Terminal.

c) After 3 minutes, the call shall be cleared.

d) A call shall be set up using the generic call setup.

e) After one minute after the call was successfully set up, the UICC simulator shall respond to a STATUS command with the response data of the MF.

9.1.5 Acceptance criteria

1. During step b), the time interval between STATUS commands shall not be longer than 30 seconds.

2. After step e), the Terminal shall terminate the call within 5 seconds at the latest after having received the wrong response to the STATUS command.

History

Document history		
V 0.2.0	2000-08	Draft presented at T3#15 in T3-000440
V 1.0.0	2000-09	Presented to TSG-T #9 for information (identical in content to v0.2.0)

Rapporteur for 3G TS 31.120:

Torsten Maeser

ORGA Kartensysteme GmbH

Email: TMaeser@orga.com

This document is written in Microsoft Word 97.

The present document is an early draft of the USIM Conformance Test Specification. It is being elaborated during 2000 by 3GPP MCC task 162 under the guidance of 3GPP TSG-T WG3. It is expected to be complete by late November 2000 and then submitted for approval to 3GPP TSG-T #10 (6 - 8 December, Bangkok). For further information, please contact the T3 secretary (Michael.Sanders@etsi.fr) or the 31.120 rapporteur, as listed above.