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Smart Cards;
Test specification for the
Single Wire Protocol (SWP) interface;
Part 2: UICC features
(Release 12)

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The present document is part 2 of a multi-part deliverable covering the Test specification for the Single Wire Protocol (SWP) interface, as identified below:

Part 1: "Terminal features";

Part 2: "UICC features".

Modal verbs terminology

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

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Introduction

The present document defines test cases for the UICC relating to Single Wire Protocol (SWP). SWP is the communication interface between the UICC and a Contactless Frontend (CLF) as specified in ETSI TS 102 613 [1].

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

1 Scope

The present document covers the minimum characteristics which are considered necessary for the UICC in order to provide compliance to ETSI TS 102 613 [1].

The present document specifies the test cases for:

- the physical layer of the interface CLF - UICC;
- the electrical interface of the UICC;
- the initial communication establishment CLF - UICC;
- the data link layer.

Test cases for the terminal relating to ETSI TS 102 613 [1] and test cases for the Host Controller Interface (HCI) covering both terminal and UICC are out of scope of the present document.

2 References

2.1 Normative references

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

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

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

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

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

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

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

[3] ETSI TS 102 600: "Smart Cards; UICC-Terminal interface; Characteristics of the USB interface".

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

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

[6] ISO/IEC 14443-3: "Cards and security devices for personal identification -- Contactless proximity objects -- Part 3: Initialization and anticollision".

[7] Void.

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

[9] ISO/IEC 13239: "Information technology -- Telecommunications and information exchange between systems -- High-level data link control (HDLC) procedures".

2.2 Informative references

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

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

Not applicable.

3 Definition of terms, symbols, abbreviations and formats

3.1 Terms

For the purposes of the present document, the terms given in ETSI TS 102 613 [1] and the following apply:

corrupted frame: SWP frame which is well-formed with respect to the MAC layer, with the exception that the CRC16 in the frame does not match with the CRC16 result calculated over the payload

NOTE: This frame has at least 1 byte payload. Used by the TE to represent the situation where the DUT receives a corrupted frame (unless otherwise specified).

nomenclature used for tests involving SHDLC LLC:

For SHDLC link establishment, following definitions apply:

- Terminal simulator transmits RSET:
  - RSET(): RSET frame without payload.
  - RSET(Ws=w): RSET frame with one byte payload.
  - RSET(Ws=w, SREJ=S): RSET frame with two bytes payload. For the endpoint capabilities byte, SREJ=0 represents the value 0x00, SREJ=1 represents the value 0x01.
- UICC transmits RSET:
  - RSET: RSET frame with any valid payload.
  - RSET(): RSET frame without payload.
  - RSET(Ws=w): RSET frame with one byte payload.
  - RSET(Ws=w, SREJ=S): RSET frame with two bytes payload. For the endpoint capabilities byte, SREJ=0 represents the value 0x00, SREJ=1 represents the value 0x01.

For every calculation on NS0_T, NS0_S or NR in the test procedures use modulo 8.

non-occurrence RQ: RQ which has been extracted from ETSI TS 102 613 [1], but which indicates a situation which should never occur

NOTE: The consequence is that such RQs cannot be explicitly tested.

representative SWP frame exchange procedure: sequence of SWP frames exchanged between TE and DUT

NOTE: Used by the TE to cause SWP communication traffic where needed in test procedures. This sequence provides the following characteristics, unless otherwise specified or more precisely stated in test procedures:

- Amount of data exchanged between TE and DUT at least 500 bytes (with respect to the MAC layer), valid for both directions.
- Some half-duplex SWP communication.
- Some full-duplex SWP communication.
- Frame transmission started by the TE while the DUT yet sends a frame.
- Exchanged data enforces occurrence of some bit stuffing in both directions.
- Some variation of frame length sent from the TE.

The DUT provider is expected to provide sufficient information to allow this procedure to be defined.

representative USB frame exchange procedure: sequence of USB frames exchanged between TE and DUT

NOTE: Used by the TE to cause USB communication traffic where needed in test procedures.

upper layer initialization: any initialization of the upper layer which needs to be performed by the DUT after SWP interface activation

NOTE: If ETSI TS 102 622 [4] is being used, then upper layer initialization refers to the HCI session initialization procedure.

user: logical or physical entity which controls the test equipment in a way that it is able to trigger activities of the DUT

3.2 Symbols

For the purposes of the present document, the symbols given in ETSI TS 102 613 [1] and the following apply:

The characters x, y, z represent any values for the current test, unless otherwise specified.

3.3 Abbreviations

For the purposes of the present document, the abbreviations given in ETSI TS 102 613 [1] and the following apply:

AC	Alternating Current
CLK	ClocK
CLT	ContactLess Tunnelling
CRC	Cyclic Redundancy Code
DUT	Device Under Test
FFS	For Further Study
GND	GrouND
ISO	International Organization for Standardization
NR	Number of next information frame to Receive
RF	Radio Frequency
RNR	Receive Not Ready
RQ	Conformance requirement
RR	Receive Ready
RSET	ReSET
RST	ReSeT
SDL	Specification and Description Language
SHDLC	Simplified High Level Data Link Control
SREJ	Selective Reject
SWIO	Single Wire protocol Input/Output
SWP	Single Wire Protocol

T	Terminal, i.e. the terminal simulator (shortcut used only in test procedure tables)
TE	Test Equipment
UA	Unnumbered Acknowledgment
WS	Window Size

3.4 Formats

3.4.1 Format of the table of optional features

The columns in table 4.1 have the following meaning.

Column	Meaning
Option:	The optional feature supported or not by the implementation.
Status:	See clause 3.4.3, 'Status and Notations'.
Support:	The support columns are to be filled in by the supplier of the implementation. The following common notations, defined in ISO/IEC 9646-7 [5], are used for the support column in table 4.1. • Y or y supported by the implementation; • N or n not supported by the implementation; • N/A, n/a or - no answer required (allowed only if the status is N/A, directly or after evaluation of a conditional status).
Mnemonic:	The mnemonic column contains mnemonic identifiers for each item.

3.4.2 Format of the applicability table

The applicability of every test in table 4.2 a) is formally expressed by the use of Boolean expression defined in the following clause.

The columns in table 4.2 a) have the following meaning.

Column	Meaning
Test case:	The "Test case" column gives a reference to the test case number(s) detailed in the present document and required to validate the implementation of the corresponding item in the "Description" column.
Description:	In the "Description" column a short non-exhaustive description of the requirement is found.
Release:	The "Release" column gives the Release applicable and onwards, for the item in the "Description" column.
Rel-x UICC:	For the given Release, the corresponding "Rel-x UICC" column lists the tests required for a UICC to be declared compliant to this Release.
Support:	The "Support" column is blank in the proforma, and is to be completed by the manufacturer in respect of each particular requirement to indicate the choices, which have been made in the implementation.

3.4.3 Status and Notations

The "Rel-x UICC" columns show the status of the entries as follows:

The following notations, defined in ISO/IEC 9646-7 [5], are used for the status column:

M	mandatory - the capability is required to be supported.
O	optional - the capability may be supported or not.
N/A	not applicable - in the given context, it is impossible to use the capability.
X	prohibited (excluded) - there is a requirement not to use this capability in the given context.
O.i	qualified optional - for mutually exclusive or selectable options from a set. "i" is an integer which identifies a unique group of related optional items and the logic of their selection which is defined immediately following the table.

Ci conditional - the requirement on the capability ("M", "O", "X" or "N/A") depends on the support of other optional or conditional items. "i" is an integer identifying a unique conditional status expression which is defined immediately following the table. For nested conditional expressions, the syntax "IF ... THEN (IF ... THEN ... ELSE...) ELSE ..." is to be used to avoid ambiguities.

References to items:

For each possible item answer (answer in the support column) there exists a unique reference, used, for example, in the conditional expressions. It is defined as the table identifier, followed by a solidus character "/", followed by the item number in the table. If there is more than one support column in a table, the columns are to be discriminated by letters (a, b, etc.), respectively.

EXAMPLE: A.1/4 is the reference to the answer of item 4 in table A.1.

4 Test environment

4.1 Table of optional features

The supplier of the implementation shall state the support of possible options in table 4.1.

Table 4.1: Options

Item	Option	Status	Support	Mnemonic
1	Void			
2	CLT, ISO/IEC 14443-3 [6] Type A	O		O_CLT_A
3	CLT, ISO/IEC 18092 [8]	O		O_CLT_F
4	Void			
5	SREJ	O		O_SREJ
6	Sliding window size of 3	O		O_WS_3
7	Sliding window size of 4 (see note)	O		O_WS_4
8	HCI as per ETSI TS 102 622 [4]	O		O_102_622
9	USB as per ETSI TS 102 600 [3]	O		O_102_600
10	Void			
11	Void			
12	Extended SWP bit durations down to 0,590 µs	O		O_EXTENDED_T_LOWER
13	Extended SWP bit durations up to 10 µs	O		O_EXTENDED_T_UPPER
14	UICC sends upper layer indication that the UICC requires no more activity on this interface.	O		O_UPPL_NO_MORE_ACT
15	Extended Resume SWP	O		O_EXTENDED_RESUME
NOTE: If the UICC supports O_WS_4, then it also shall support O_WS_3.				

4.2 Applicability table

Table 4.2 a) specifies the applicability of each test case to the device under test. See clause 3.4 for the format of table 4.2 a).

Table 4.2 a): Applicability of tests

Test case	Description	Release	Execution requirements	Rel-7 UICC	Rel-8 UICC	Rel-9 UICC	Rel-10 UICC	Rel-11 UICC	Rel-12 UICC	Support
	System architecture tests									
5.2.3.2	Global Interface bytes of the ATR	Rel-7		M	M	M	M	M	M	
5.2.3.3	interaction with ETSI TS 102 221 [2] interface - SWP activation while the UICC receives data	Rel-7		M	M	M	M	M	M	
5.2.3.4	interaction with ETSI TS 102 221 [2] interface - SWP activation while the UICC sends data	Rel-7		M	M	M	M	M	M	
5.2.4.2	interaction with ETSI TS 102 221 [2] interface - ETSI TS 102 221 [2] clock stop	Rel-7		M	M	M	M	M	M	
5.2.4.3	interaction with ETSI TS 102 221 [2] interface - ETSI TS 102 221 [2] reset	Rel-7		M	M	M	M	M	M	
5.2.4.4	interaction with ETSI TS 102 221 [2] interface - SWP deactivation while the UICC receives data	Rel-7		M	M	M	M	M	M	
5.2.4.5	interaction with ETSI TS 102 221 [2] interface - SWP deactivation while the UICC sends data	Rel-7		M	M	M	M	M	M	
5.2.4.6	interaction with ETSI TS 102 221 [2] interface - reset SWP while the UICC receives data	Rel-7		M	M	M	M	M	M	
5.2.4.7	interaction with ETSI TS 102 221 [2] interface - reset SWP while the UICC sends data	Rel-7		M	M	M	M	M	M	
5.2.4.8	interaction with ETSI TS 102 221 [2] interface - activate SWP in ETSI TS 102 221 [2] clock stop	Rel-7		M	M	M	M	M	M	
	Physical characteristics tests									
5.3.2.3.2	initial activation in low power mode	Rel-7		M	M	M	M	M	M	
5.3.2.3.3	initial activation in low power mode with corrupted frames	Rel-7		M	M	M	M	M	M	
5.3.2.3.4	no activation	Rel-7		M	M	M	M	M	M	
5.3.2.3.6	full power mode activation	Rel-7		M	M	M	M	M	M	
5.3.2.3.7	low power mode activation with re-transmission of ACT_SYNC	Rel-7		M	M	M	M	M	M	
5.3.2.3.8	full power mode activation with re-transmission of ACT_SYNC	Rel-7		M	M	M	M	M	M	
5.3.2.3.10	low power mode activation with multiple re-transmission of ACT_SYNC	Rel-7		M	M	M	M	M	M	
5.3.2.3.11	full power mode activation with re-transmission of ACT_READY	Rel-7		M	M	M	M	M	M	
5.3.2.3.12	full power mode activation with multiple re-transmission of ACT_SYNC	Rel-7		M	M	M	M	M	M	
5.3.2.3.13	subsequent activation in low power mode	Rel-7		M	M	M	M	M	M	

Test case	Description	Release	Execution requirements	Rel-7 UICC	Rel-8 UICC	Rel-9 UICC	Rel-10 UICC	Rel-11 UICC	Rel-12 UICC	Support
5.3.2.3.14	subsequent activation in full power mode	Rel-7		M	M	M	M	M	M	
	Electrical characteristics tests									
5.4.1.2.2	ETSI TS 102 221 [2] voltage classes B and C support	Rel-7		M	M	M	M	M	M	
5.4.1.3.2	operation in low power mode	Rel-7		M	M	M	M	M	M	
5.4.1.4.2	S1 communication in voltage class B	Rel-7		M	M	M	M	M	M	
5.4.1.4.3	S1 communication in voltage class C, full power mode	Rel-7		M	M	M	M	M	M	
5.4.1.4.4	S1 communication in low power mode	Rel-7		M	M	M	M	M	M	
5.4.1.5.2.2	S2 communication in voltage class B	Rel-7		M	M	M	M	M	M	
5.4.1.5.2.3	S2 communication in voltage class C, full power mode	Rel-7		M	M	M	M	M	M	
5.4.1.5.2.4	S2 communication in low power mode	Rel-7		M	M	M	M	M	M	
	Physical transmission layer tests									
5.5.1.2	communication with timing variation, default bit duration	Rel-7		M	M	M	M	M	M	
5.5.1.3	communication with timing variation, extended bit duration	Rel-7		C004	C004	C004	C004	C004	C004	
5.5.1.4	S1 rise and fall time	Rel-7		M	M	M	M	M	M	
5.5.1.5	measurement of C6 input capacitance	Rel-7		M	M	M	M	M	M	
5.5.1.6	communication with variation in bit duration	Rel-7		M	M	M	M	M	M	
5.5.2.2	S2 switching management	Rel-7		M	M	M	N/A	N/A	N/A	
5.5.2.3	S2 switching management (variation in bit duration)	Rel-7		N/A	N/A	N/A	M	M	M	
5.5.3.2	SWP interface states management by the UICC	Rel-7		M	M	M	M	M	M	
5.5.3.3	UICC resume - P3 values and delay after transition sequence	Rel-7		N/A	N/A	N/A	M	M	M	
5.5.3.4	UICC Extended resume - P6 values	Rel-9	TR4	N/A	N/A	N/A	C114	C114	C114	
5.5.4.2	power states in low power mode (ACT_POWER_MODE)	Rel-7		M	M	M	M	M	N/A	
5.5.4.3	power states in low power mode (non-ACT)	Rel-7		M	M	M	M	M	N/A	
5.5.4.4	power states in full power mode, without ETSI TS 102 221 [2]	Rel-7		M	M	M	M	M	N/A	
5.5.4.5	power saving mode with ETSI TS 102 221 [2] interface - restart ETSI TS 102 221 [2] interface first	Rel-7		M	M	M	M	M	M	
5.5.4.6	power saving mode with ETSI TS 102 221 [2] interface - restart ETSI TS 102 613 [1] interface first	Rel-7		M	M	M	M	M	M	
5.5.4.7	power saving mode with ETSI TS 102 600 [3] interface - restart ETSI TS 102 600 [3] interface first	Rel-7		C005	C005	C005	C005	C005	C005	
5.5.4.8	power saving mode with ETSI TS 102 600 [3] interface - restart ETSI TS 102 613 [1] interface first	Rel-7		C005	C005	C005	C005	C005	C005	

Test case	Description	Release	Execution requirements	Rel-7 UICC	Rel-8 UICC	Rel-9 UICC	Rel-10 UICC	Rel-11 UICC	Rel-12 UICC	Support
5.5.4.10	power saving mode in SUSPENDED, with ETSI TS 102 221 [2] interface restarted first	Rel-7	TR2	C113	C113	C113	C113	C113	C113	
5.5.4.11	power saving mode in SUSPENDED, with ETSI TS 102 221 [2] interface restarted after ETSI TS 102 613 [1] interface	Rel-7	TR2	C113	C113	C113	C113	C113	C113	
5.5.4.12	power states in low power mode (ACT_POWER_MODE)	Rel-12		N/A	N/A	N/A	N/A	N/A	M	
5.5.4.13	power states in low power mode (non-ACT)	Rel-12		N/A	N/A	N/A	N/A	N/A	M	
5.5.4.14	power states in full power mode, without ETSI TS 102 221 [2]	Rel-12		N/A	N/A	N/A	N/A	N/A	M	
	Data link layer tests									
5.6.2.2.2	interpretation of incorrectly formed frames - ACT LLC	Rel-7		M	M	M	M	M	M	
5.6.2.2.3	interpretation of incorrectly formed frames - SHDLC RSET frames	Rel-7		M	M	M	M	M	M	
5.6.2.2.4	interpretation of incorrectly formed frames - SHDLC I-frames	Rel-7		M	M	M	M	M	M	
5.6.2.2.5	communication with frames - idle bits and wakeup sequence	Rel-7		M	M	M	M	M	M	
5.6.2.3.2	behaviour of UICC with bit stuffing in frame	Rel-7		M	M	M	M	M	M	
5.6.2.4.2	RSET with CRC error	Rel-7		M	M	M	M	M	M	
5.6.3.1.2	support of ACT LLC and ACT LPDU structure	Rel-7		M	M	M	M	M	M	
5.6.3.1.3	support of SHDLC LLC and SHDLC LPDU structure	Rel-7		M	M	M	M	M	M	
5.6.3.2.2	error handling of ACT LLC on reception of corrupted frame, after SWIO activation	Rel-7		M	M	M	M	M	M	
5.6.3.2.3	ignore ACT LLC frame reception after the SHDLC link establishment	Rel-7		M	M	M	M	M	M	
5.6.3.2.4	ignore ACT LLC frame reception in CLT session	Rel-7	TR3	N/A	N/A	N/A	C003	C003	C003	
5.6.3.2.6	closing condition of CLT session whereas SHDLC link has been established before CLT session	Rel-7	TR3	N/A	N/A	N/A	C003	C003	C003	
5.6.3.2.7	closing condition of CLT session whereas SHDLC link has not been established before CLT session	Rel-7	TR3	N/A	N/A	N/A	C003	C003	C003	
5.6.3.2.8	interpretation of corrupted frames - single SHDLC frame	Rel-7		M	M	M	M	M	M	
5.6.3.2.10	interpretation of corrupted frames - CLT frames	Rel-7	TR3	N/A	N/A	N/A	C003	C003	C003	
5.6.3.2.11	first non-ACT frame sent by CLF - initial interface activation	Rel-7		M	M	M	M	M	M	
5.6.3.2.12	first non-ACT frame sent by CLF - subsequent interface activation	Rel-7		M	M	M	M	M	M	
5.6.3.2.13	CLT session during SHDLC communication	Rel-7		N/A	N/A	N/A	C003	C003	C003	
5.6.4.1.2	structure of ACT LPDU - full power mode	Rel-7		M	M	M	M	M	M	
5.6.4.1.3	structure of ACT LPDU - low power mode	Rel-7		M	M	M	M	M	M	

Test case	Description	Release	Execution requirements	Rel-7 UICC	Rel-8 UICC	Rel-9 UICC	Rel-10 UICC	Rel-11 UICC	Rel-12 UICC	Support
5.6.4.1.4	behaviour of UICC on reception of ACT frames - values of INF bit	Rel-7		M	M	M	M	M	M	
5.6.4.1.5	RFU values in ACT_INFORMATION field	Rel-7		M	M	N/A	N/A	N/A	N/A	
5.6.4.1.6	extended bit durations as per ACT_INFORMATION field	Rel-7		C004	C004	C004	C004	C004	C004	
5.6.4.1.7	RFU values in ACT_INFORMATION field	Rel-9		N/A	N/A	M	M	M	M	
	SHDLC LLC definition tests									
5.7.1.2	data passed up to the next layer	Rel-7		C001	C001	C001	C001	C001	C001	
5.7.1.3	error management, UICC sending I-frame	Rel-7		M	M	M	M	M	M	
5.7.1.4	error management	Rel-7		M	M	M	M	M	M	
5.7.6.4.3	initial state at link reset - reset by the terminal simulator	Rel-7		M	M	M	M	M	M	
5.7.7.3.3	link establishment by the terminal simulator	Rel-7		M	M	M	M	M	M	
5.7.7.3.4	discard frames before initialization	Rel-7		M	M	M	M	M	M	
5.7.7.3.6	connection time - reset by terminal simulator	Rel-7		C107	C107	C107	C107	C107	C107	
5.7.7.3.8	requesting unsupported window size - link establishment by terminal simulator	Rel-7		C103	C103	C103	C103	C103	C103	
5.7.7.3.9	requesting unsupported SREJ support - link establishment by terminal simulator	Rel-7		C104	C104	C104	C104	C104	C104	
5.7.7.3.10	requesting unsupported window size and SREJ support - link establishment by terminal simulator	Rel-7		C105	C105	C105	C105	C105	C105	
5.7.7.3.14	discard buffered frames on link re-establishment	Rel-7		C102	C102	C102	C102	C102	C102	
5.7.7.5.2	I-frame transmission	Rel-7		M	M	M	M	M	M	
5.7.7.5.3	I-frame reception - single I-Frame reception	Rel-7		M	M	M	M	M	M	
5.7.7.5.4	I-frame reception - multiple I-Frame reception	Rel-7		M	M	M	M	M	M	
5.7.7.5.6	piggybacking - reception by UICC	Rel-7		N/A	N/A	N/A	N/A	M	M	
5.7.7.6.2	REJ transmission	Rel-7		M	M	M	M	M	M	
5.7.7.6.3	REJ transmission - multiple I-frames received	Rel-7		C101	C101	C101	C101	C101	C101	
5.7.7.6.4	REJ reception	Rel-7		M	M	M	M	M	M	
5.7.7.7.2	retransmission of a single frame	Rel-7		M	M	M	M	M	M	
5.7.7.7.3	retransmission of multiple frames	Rel-7		M	M	M	M	M	M	
5.7.7.8.2	RNR reception	Rel-7		M	M	M	M	M	M	
5.7.7.8.3	empty I-frame transmission	Rel-7		M	M	M	M	M	M	
5.7.7.9.2	SREJ transmission	Rel-7		C102	C102	C102	C102	C102	C102	
5.7.7.9.4	SREJ reception	Rel-7		C102	C102	C102	C102	C102	C102	
	CLT LLC definition tests									
5.8.4.2	padding of CLT PAYLOAD in Type A aligned structure	Rel-7	TR3	N/A	N/A	N/A	C110	C110	C110	
5.8.5.2	CLT commands, ISO/IEC 14443-3 [6] Type A	Rel-7	TR3	N/A	N/A	N/A	C110	C110	C110	
5.8.5.3	CLT commands, ISO/IEC 18092 [8]	Rel-7		C111	C111	C111	C111	C111	C111	
5.8.6.3.1.2	interpretation of CL_PROTO_INF(A)	Rel-7	TR3	N/A	N/A	N/A	C110	C110	C110	
5.8.6.3.2.2	polling command handling with CL_PROTO_INF(F)	Rel-7		N/A	N/A	N/A	C111	C111	C111	
5.8.6.3.2.3	empty CLT(F) Frame	Rel-7		N/A	N/A	N/A	C111	C111	C111	

Test case	Description	Release	Execution requirements	Rel-7 UICC	Rel-8 UICC	Rel-9 UICC	Rel-10 UICC	Rel-11 UICC	Rel-12 UICC	Support
	Timing and performance tests									
	(no test cases present for this clause)									

Table 4.2 b): Conditional items referenced by table 4.2 a)

Conditional item	Condition
C001	IF O_102_622 THEN M ELSE N/A
C002	Void
C003	IF (O_CLT_A OR O_CLT_F) THEN M ELSE N/A
C004	IF (O_EXTENDED_T_LOWER OR O_EXTENDED_T_UPPER) THEN M ELSE N/A
C005	IF O_102_600 THEN M ELSE N/A
C006	Void
C007	Void
C008	Void
C101	IF O_WS_3 THEN M ELSE N/A
C102	IF O_SREJ THEN M ELSE N/A
C103	IF NOT O_WS_4 THEN M ELSE N/A
C104	IF NOT O_SREJ THEN M ELSE N/A
C105	IF NOT O_SREJ AND NOT O_WS_4 THEN M ELSE N/A
C106	Void
C107	IF NOT (O_SREJ AND O_WS_4) THEN M ELSE N/A
C108	IF O_WS_3 OR O_SREJ THEN M ELSE N/A
C109	Void
C110	IF O_CLT_A THEN M ELSE N/A
C111	IF O_CLT_F THEN M ELSE N/A
C112	IF O_UPPL_NO_MORE_ACT THEN M ELSE N/A
C113	IF (O_102_622 AND O_UPPL_NO_MORE_ACT) THEN M ELSE N/A
C114	IF (O_EXTENDED_RESUME AND O_UPPL_NO_MORE_ACT) THEN M ELSE N/A

Table 4.2 c): Execution requirements referenced by table 4.2 a)

Execution requirement	Description
TR1	Void
TR2	The DUT manufacturer has to confirm the expected occurrence of sending the upper layer indication that the UICC requires no more activity on this interface (i.e. the EVT_HCI_END_OF_OPERATION as per ETSI TS 102 622 [4]) within 1 s after the HCI session initialization as described in ETSI TS 102 622 [4].
TR3	If the UICC supports O_CLT_A, the DUT manufacturer has to confirm for CLT LLC transporting data for ISO/IEC 14443-3 [6] Type A based card emulation protocols present on the UICC: - that the UICC responds to the command '3000' received when opening a CLT session or within a CLT session with a response containing a DATA_FIELD not equal to 8, 16 or 24 RF bytes in length, and not requesting a transition to "HALT" or "IDLE" state as per ISO/IEC 14443-3 [6]; and - that the UICC responds to the command '5000' received within a CLT session with CL_GOTO_HALT; and - that the UICC interprets a wrong CRC_A as per ISO/IEC 14443-3 [6] in the context of a CLT session as an error resulting in a CL_GOTO_INIT response; and - that the UICC interprets the command '97' as not valid to open a CLT session.
TR4	The DUT manufacturer has to provide information on how the DUT can be triggered to send I-frames while the SWP interface is suspended. Examples: - An application which is triggered on the ETSI TS 102 221 [2] interface to send an HCI event such as EVT_CONNECTIVITY - A proprietary APDU to trigger the UICC to update CLF register parameters.

NOTE: Clause 4.5.2 should be referenced for the meaning and usage of the execution requirements which are described in table 4.2 c).

4.3 Information to be provided by the DUT supplier

If the DUT supplier claims that the DUT supports ETSI TS 102 622 [4], the representative SWP frame exchange procedure shall be executed using HCI layer. In particular, the DUT shall act as a valid host according to ETSI TS 102 622 [4] and correctly perform the HCI session initialization and support commands/events needed to execute this procedure.

4.4 Test equipment

4.4.0 General requirements

The test equipment shall provide a terminal simulator which is connected to the DUT during test procedure execution, unless otherwise specified.

With respect to the UICC, the terminal simulator shall act as a valid terminal according to ETSI TS 102 613 [1], ETSI TS 102 221 [2], and ETSI TS 102 600 [3] (if this interface is present at the UICC), unless otherwise specified. In particular:

- The terminal simulator shall respect the electrical and signalling conditions for all UICC contacts within the limits given by ETSI TS 102 613 [1], ETSI TS 102 221 [2] and ETSI TS 102 600 [3]). The accuracy of the terminal simulator's settings shall be taken into account when ensuring this.
- The terminal simulator shall follow the behaviour specified in ETSI TS 102 613 [1] regarding resuming the SWP interface after the last information sent by the master was the SHDLC acknowledgement to an indication via an upper layer that the UICC requires no more activity on the SWP interface. Specifically, in this case, the terminal simulator shall resume by switching SWP to the **DEACTIVATED** state as described in *DEACTIVATE* followed by switching SWP to the **ACTIVATED** state as described in *ACTIVATE*.

Some test cases might require the presence of an upper layer, such as HCI (as specified in ETSI TS 102 622 [4]). The test equipment shall provide this layer if required. If message fragmentation is used, all HCP packets, with the possible exception of the last packet, shall contain the maximum amount of data possible for HCP packets.

4.4.1 Measurement/setting uncertainties

The following accuracy applies for measurement and setting of electrical parameter for the test equipment.

Table 4.3 a): Measurement accuracy

Parameter	Tolerance	Remark
I_{CC}	±0,1 mA	
I_H	±25 µA	
I_L	±5 µA	
$T_{S2\_INHIBIT}$, $T_{S2\_ACT\_RES\_V}$, $T_{S2\_ACT\_RES\_D}$, $T_{S2\_ACT\_FRP}$	±20 µs	
C_{LOAD}	FFS	
T2, T3	±100 µs	
Acknowledgements for I-frames	±100 µs	
Enter power saving mode time (clause 5.5.4.1, RQ5)	±100 µs	

Table 4.3 b): Setting uncertainty

Parameter	Tolerance	Remark
V_{IL}, V_{IH}	±15 mV	
T	±25 ns	
tr, tf	FFS	
P3	±25 ns	
P6	0,1 ms	

The test equipment shall take care to avoid misinterpretation of parasitic S2 currents caused by SWIO line and UICC load capacitance.

All voltages shall be measured with respect to GND (contact C5), directly at the UICC's contacts.

In steps where it is specified that no response SWP frame is expected, the test equipment shall wait for 20 ms to check that no response frame is sent, unless otherwise specified.

In order to measure the power consumption of the UICC on Vcc, the test equipment shall average the power consumption over all 1 ms periods - i.e. using a sliding window. The UICC shall be failed if any of the averages over 1 ms periods are above the allowed values for the particular phase being measured.

When determining the logical value or the absolute current value of S2 during the high phase of S1, the test equipment shall exclude S2 values before time M1 and after time M2, where M1 is 40 ns after S1 has reached 90 % of its signal amplitude during the rising edge, and M2 is at the start of the falling edge of S1.

For settings which specify the maximum or minimum allowed values according to ETSI TS 102 613 [1], the requirements of table 4.3 b) are modified as follows:

- For setting a value X which is a minimum allowed value according to ETSI TS 102 613 [1], the test equipment shall set the nearest available value which is guaranteed to not be smaller than X, within the setting uncertainty of the test equipment.
- For setting a value X which is a maximum allowed value according to ETSI TS 102 613 [1], the test equipment shall set the nearest available value which is guaranteed to not be larger than X, within the setting uncertainty of the test equipment.

For example, when setting a value of T (bit duration) in the default range (where the allowed values are from 1 µs to 5 µs) and when the accuracy of the test equipment is 20 ns:

- If a value of 1 µs is required, the test equipment shall set a value of 1 020 ns.
- If a value of 5 µs is required, the test equipment shall set a value of 4 980 ns.

4.4.2 Default conditions for DUT operation

4.4.2.0 General

Unless otherwise specified, the test equipment shall apply the default conditions described in the following clauses during test procedure execution.

4.4.2.1 Temperature

The ambient temperature shall be kept in a range of 25 °C ± 3 °C.

4.4.2.2 ETSI TS 102 221 interface contacts (CLK, RST, I/O) and contact Vcc

When the ETSI TS 102 221 [2] interface is activated, the terminal simulator shall maintain the characteristics on contacts CLK, RST, I/O in the following ranges.

Table 4.4: Default condition for ETSI TS 102 221 [2] contacts operation

Contact	Voltage class	Low level	High level
C2 (RST)	B	0,0 V to 0,07 x Vcc	0,9 x Vcc to Vcc
C3 (CLK)		0,0 V to 0,07 x Vcc	0,9 x Vcc to Vcc
C7 (I/O), UICC input		0,0 V to 0,07 x Vcc	0,9 x Vcc to Vcc
C2 (RST)	C	0,0 V to 0,1 x Vcc	0,9 x Vcc to Vcc
C3 (CLK)		0,0 V to 0,1 x Vcc	0,9 x Vcc to Vcc
C7 (I/O), UICC input		0,0 V to 0,1 x Vcc	0,9 x Vcc to Vcc

In case these interface contacts are not active (i.e. Vcc is powered, but the ETSI TS 102 221 [2] interface is not activated), the terminal simulator shall maintain contacts CLK, RST, I/O between 0,0 V and 0,1 V.

The terminal simulator shall maintain the voltage on Vcc for each voltage class in the following ranges:

- When activated in voltage class B:
  - A range of: 2,90 V to 3,10 V.
- When activated in voltage class C:
  - A range of 1,75 V to 1,85 V.

4.4.2.3 ETSI TS 102 600 interface contacts (IC_DP, IC_DM)

When the ETSI TS 102 600 [3] interface is activated, the terminal simulator shall maintain the characteristics on these contacts in the following ranges.

Table 4.5: Default condition for ETSI TS 102 600 [3] contacts operation

Contact	Voltage class	Low level	High level
C4/ C8 (IC_DP/IC_DM), UICC input	1,8 V	0 V to 0,6 V	1,2 V to 2,1 V
C4/ C8 (IC_DP/IC_DM), UICC input	3,0 V	0 V to 0,5 V	2,0 V to 3,3 V

All tests shall be performed in the J-state, i.e. contact C4 shall be maintained in high level range and C8 in low level range.

In case these interface contacts are not active (i.e. Vcc is powered, but the ETSI TS 102 600 [3] interface is not activated), the terminal simulator shall handle contacts IC_DP and IC_DM as follows:

- For UICCs supporting the ETSI TS 102 600 [3] interface, these contacts shall be maintained between 0,0 V and 0,1 V.
- For UICCs not supporting the ETSI TS 102 600 [3] interface, these contacts shall be maintained between 0,0 V and 0,1 V.

4.4.2.4 ETSI TS 102 613 interface contact (SWIO)

When the SWIO contact is activated, the terminal simulator shall maintain the characteristics on this contact in the following range:

- SWP bit duration T between 1,1 µs and 1,9 µs:
  - The variation of T between two consecutive bits shall not exceed 5 % of T of the first bit.

- S1 signal waveshape applied:
  - For a logical 1: T_{H1} = 75 % of T.
  - For a logical 0: T_{H0} = 25 % of T.
  - For a transition sequence: T - T_{H0}, with T_{H0} = 25 % of T.
  - Rise and fall time between 5 ns and 0,02 % of T.
- S1 signal levels applied for voltage class B:
  - State L between 0,0 V and 0,3 V.
  - State H between 1,40 V and 1,98 V.
- S1 signal levels applied for voltage class C:
  - State L between 0,0 V and 0,15 x Vcc.
  - State H between 0,85 x Vcc and Vcc.

The P4 time shall be 100 µs minimum.

4.4.2.5 Status of UICC interfaces

The terminal simulator may activate the contacts CLK, RST, I/O of the ETSI TS 102 221 [2] interface and exchange data over this interface at any time after activation of contact Vcc.

NOTE: In low power mode, the contacts CLK, RST, I/O of the ETSI TS 102 221 [2] interface will never be activated.

The terminal simulator shall not activate the ETSI TS 102 600 [3] interface.

4.4.2.6 Characteristics of LLCs

4.4.2.6.1 ACT LLC

In ACT_POWER_MODE frames, the FR bit shall be set to 0.

4.4.2.6.2 SHDLC LLC

For SHDLC link establishment, the terminal simulator shall send RSET().

I-frames sent by the terminal simulator shall contain at least 1 byte and shall contain valid values according to the upper layer, if applicable.

When the test equipment is checking for an acknowledgement of an I-frame:

- For UICCs supporting release 10 or later:
  - When establishing the initial conditions: the test equipment shall wait for up to 14 ms (see note 1). If the DUT does not acknowledge, the test equipment shall resend the I-Frame up to 3 times until it gets an acknowledgement, using 14 ms as timeout. If the DUT still does not acknowledge, an inconclusive verdict shall be reported.
  - When the representative SWP frame exchange procedure is used: the test equipment shall wait for up to 14 ms (see note 1). If the DUT does not acknowledge, the test equipment shall resend the I-Frame up to 3 times until it gets an acknowledgement, using 14 ms as timeout. If the DUT still does not acknowledge, this is a failure of the DUT.

- Otherwise:
  - the DUT shall be considered as failing if it does not acknowledge an I-Frame in less than 15 ms (see note 2).

NOTE 1: 14 ms was chosen in order to be less than P5 (SWP inactivity timeout).

NOTE 2: 15 ms was chosen as a value which is larger than the SHDLC timings T1 and T2.

- For UICCs supporting release 9 or earlier, the behaviour of the test equipment is not specified in the current version of the present document.

4.4.2.6.3 CLT LLC

4.4.2.6.3.1 CLT LLC for ISO/IEC 14443-3 type A

When the terminal simulator is required to communicate using CLT for ISO/IEC 14443-3 [6] type A, it shall behave as specified below:

Test case requirement	Terminal simulator behaviour
Initial condition: The CLT session has been opened	CLT frame indicating CL_PROTO_INF(A) with byte aligned structure and DATA_FIELD set to '3000' has been sent, and valid CLT response frame from UICC has been received.
Send CLT frame to open a CLT session	Send CLT frame indicating CL_PROTO_INF(A) with byte aligned structure and DATA_FIELD set to '3000'
Send valid CLT frame with ADMIN_FIELD = No administrative command	Send CLT frame with ADMIN_FIELD = No administrative command, Type A aligned structure and DATA_FIELD set to '30010A4005'
Send CLT frame which is not valid to open a CLT session.	Send CLT frame with ADMIN_FIELD = No administrative command, Type A aligned structure and DATA_FIELD set to '30010A4005'
Check that UICC sends valid CLT response frame	Check that UICC sends CLT frame with CLT_CMD field set to 00000 and with at least 1 byte of data in the CLT PAYLOAD field.

4.4.2.6.3.2 CLT LLC for ISO/IEC 18092

FFS.

4.4.3 Minimum/maximum conditions for DUT operation

4.4.3.0 General

Unless otherwise specified, the test equipment shall apply the minimum/maximum conditions as described in the following clauses during test procedure execution.

4.4.3.1 Temperature

- Minimum ambient temperature: A range of -25 °C to -23 °C.
- Maximum ambient temperature: A range of +83 °C to +85 °C.

4.4.3.2 Contact Vcc

When activated in voltage class B:

- Minimum: A range of 2,70 V to 2,80 V.
- Maximum: A range of 3,20 V to 3,30 V.

When activated in voltage class C:

- Minimum: A range of 1,62 V to 1,67 V.

- Maximum: A range of 1,93 V to 1,98 V.

4.5 Test execution

4.5.1 Parameter variations

Unless otherwise specified, all tests shall be carried out once for each of the following parameter variations in addition to the parameter variations specified individually for each test case.

Table 4.6: Global parameter variations

Voltage class and power mode	Vcc
B	Default
	Minimum
	Maximum
C, full power	Default
	Minimum
	Maximum
C, low power	Default
	Minimum
	Maximum

4.5.2 Execution requirements

Table 4.2 a), Applicability of tests, specifies "execution requirements" for several test cases. For these test cases, it has not been possible to specify the corresponding test procedure in such a way that it can be guaranteed that the test procedure can be executed against every possible DUT.

Some sample scenarios of test requirements are listed below:

- The test case requires certain state to be present on the DUT in order to test a particular feature, but there is no mandatory requirement in the core specification (ETSI TS 102 613 [1]) for this state to be present.
- The test case requires the DUT to perform a particular operation in order to test that feature, but the core specification (ETSI TS 102 613 [1]) does not provide a standardized mechanism to trigger that operation to be executed by the DUT.

The test requirements have been split into various categories, as indicated by table 4.2 c):

- Static Requirements (SRx): information about, for example, particular gates or registry parameters which can be used in the test procedure execution.
- Trigger Requirements (TRx): mechanisms for triggering the DUT to perform certain operations.
- Initial Condition Requirements (ICRx): information about how to establish initial condition states.

The DUT supplier should make every effort to provide appropriate information or mechanisms to allow these execution requirements to be satisfied for the DUT.

It is recognized that this might not always be possible. For example, if the configuration of the DUT does not allow for the required state to be present; or if it is not possible to provide a particular trigger mechanism for the DUT. In these cases, it is acceptable that the test case is not carried out. However, it should be recognized that the consequence is that the particular feature will not be tested.

4.6 Pass criterion

A test shall only be considered only as successful, if the test procedure was carried out successfully under all parameter variations with the DUT respecting all conformance requirements referenced in the test procedure.

NOTE: Within the test procedures, the RQs are referenced in the step where they are observable. In some cases, this is different from the step where they occur with respect to the DUT.

5 Test cases

5.1 Principle of the Single Wire Protocol

Reference: ETSI TS 102 613 [1], clause 4.

There are no conformance requirements for the UICC for the referenced clause.

5.2 System architecture

5.2.1 General overview

Reference: ETSI TS 102 613 [1], clause 5.1.

There are no conformance requirements for the UICC for the referenced clause.

5.2.2 ETSI TS 102 221 support

5.2.2.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 5.2.

RQ1	A UICC supporting the SWP interface shall remain compliant with ETSI TS 102 221 [2].
NOTE:	Test cases for RQ1 are out of scope of the present document. The compliancy to ETSI TS 102 221 [2] might be validated by executing tests given in test specifications related to ETSI TS 102 221 [2].

5.2.3 Configurations

5.2.3.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 5.3.

RQ1	The UICC shall indicate support of SWP interface in the Global Interface bytes of the ATR as defined in ETSI TS 102 221 [2].
RQ2	If the SWP interface is activated while a session on the ETSI TS 102 600 [3] interface is in progress, actions on the SWP interface shall not disturb the terminal-UICC exchange on the ETSI TS 102 600 [3] interface.
RQ3	If the SWP interface is activated while a session on the ETSI TS 102 600 [3] interface is in progress, actions on the ETSI TS 102 600 [3] interface shall not disturb the terminal-UICC exchange on the SWP interface.
RQ4	If the SWP interface is activated while a session on the ETSI TS 102 221 [2] interface is in progress, actions on the SWP interface shall not disturb the terminal-UICC exchange on the ETSI TS 102 221 [2] interface.
RQ5	If the SWP interface is activated while a session on the ETSI TS 102 221 [2] interface is in progress, actions on the ETSI TS 102 221 [2] interface shall not disturb the terminal-UICC exchange on the SWP interface.
NOTE 1: Development of test cases involving the ETSI TS 102 600 [3] interface are FFS. NOTE 2: In RQ4 and RQ5, the term "session" is interpreted as "card session" as per ETSI TS 102 221 [2].	

5.2.3.2 Test case 1: Global Interface bytes of the ATR

5.2.3.2.1 Test execution

The test procedure shall only be executed in voltage class B and voltage class C, full power mode.

The test procedure shall be executed once for each of the following parameters:

- There are no test case-specific parameters for this test case.

5.2.3.2.2 Initial conditions

- None of the UICC contacts is activated.

5.2.3.2.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Activate contacts Vcc, CLK, RST, I/O as per ETSI TS 102 221 [2] and apply a cold reset.	
2	UICC → T	Send ATR.	RQ1

5.2.3.3 Test case 2: interaction with ETSI TS 102 221 interface - SWP activation while the UICC receives data

5.2.3.3.1 Test execution

The test procedure shall only be executed in voltage class B and voltage class C, full power mode.

The test procedure shall be executed once for each of the following parameters:

- There are no test case-specific parameters for this test case.

5.2.3.3.2 Initial conditions

- None of the UICC contacts is activated.

5.2.3.3.3 Test procedure

Procedure (a), executed on ETSI TS 102 221 [2] interface.

Step	Direction	Description	RQ
1	T → UICC	Activate ETSI TS 102 221 [2] interface.	
2	UICC → T	UICC sends the ATR.	
3	T → UICC	Execute PPS procedure as per ETSI TS 102 221 [2].	
4	T → UICC	After sending 1st byte of PPS, start procedure (b).	RQ4
5	T ← → UICC	Continue PPS procedure as per ETSI TS 102 221 [2].	RQ4

Procedure (b), executed on SWP interface.

Step	Direction	Description	RQ
1	T ← → UICC	SWP interface activation.	RQ5

5.2.3.4 Test case 3: interaction with ETSI TS 102 221 interface - SWP activation while the UICC sends data

5.2.3.4.1 Test execution

This test procedure shall only be executed in voltage class B and voltage class C, full power mode.

The test procedure shall be executed once for each of the following parameters:

- There are no test case-specific parameters for this test case.

5.2.3.4.2 Initial conditions

- None of the UICC contacts is activated.

5.2.3.4.3 Test procedure

Procedure (a), executed on ETSI TS 102 221 [2] interface.

Step	Direction	Description	RQ
1	T → UICC	Activate ETSI TS 102 221 [2] interface.	
2	UICC → T	UICC starts to send the ATR.	
3	T → UICC	After receiving 1st byte of ATR, start procedure (b).	RQ4
4	UICC → T	UICC continues to send the ATR.	RQ4
5	T ← → UICC	Execute PPS procedure as per ETSI TS 102 221 [2].	

Procedure (b), executed on SWP interface.

Step	Direction	Description	RQ
1	T ← → UICC	SWP interface activation.	RQ5

5.2.4 Interaction with other interfaces

5.2.4.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 5.4 and clause 5.3.

RQ1	Signalling on a contact assigned to one interface shall not affect the state of other contacts assigned to another interface. This also applies to the activation sequence of the UICC.
RQ2	Operation of the SWP interface after activation shall be independent from operation of other interfaces (e.g. the ETSI TS 102 221 [2] or ETSI TS 102 600 [3] interface) that may be implemented on the UICC.
RQ3	Any reset signalling (RST signal on contact C2 as specific to the ETSI TS 102 221 [2] interface or logical reset on ETSI TS 102 600 [3] interface) shall only affect the UICC protocol stack related to these interfaces. SWP-related processes shall not be affected by another interface reset signal.
RQ4	A logical reset signalling on the data link layer (SHDLC RSET) over the SWP interface shall not affect any of the other interfaces.
RQ5	Activation and deactivation of SWP interface shall not affect any of the other interfaces.
NOTE: Development of test cases involving the ETSI TS 102 600 [3] interface is FFS.	

5.2.4.2 Test case 1: interaction with ETSI TS 102 221 interface - ETSI TS 102 221 clock stop

5.2.4.2.1 Test execution

This test procedure shall only be executed in voltage class B and voltage class C, full power mode.

The test procedure shall be executed once for each of the following parameters:

- There are no test case-specific parameters for this test case.

5.2.4.2.2 Initial conditions

- The ETSI TS 102 221 [2] interface is activated, ATR is sent and PPS is successfully completed.
- The SHDLC link is established.

5.2.4.2.3 Test procedure

Step	Direction	Description	RQ
1	T ← → UICC	Run the representative SWP frame exchange procedure during all steps.	
2	T ← → UICC	At reception of the first I-frame, suspend the clock signal on the ETSI TS 102 221 [2] interface.	RQ1
3	T ← → UICC	Continue the representative SWP frame exchange procedure.	RQ1
4	T ← → UICC	At reception of the fifth I-frame of the representative SWP frame exchange procedure, restart the clock signal on the ETSI TS 102 221 [2] interface.	RQ1
5	T ← → UICC	Finish the representative SWP frame exchange procedure.	RQ1

5.2.4.3 Test case 2: interaction with ETSI TS 102 221 interface - ETSI TS 102 221 reset

5.2.4.3.1 Test execution

The test procedure shall only be executed in voltage class B and voltage class C, full power mode.

The test procedure shall be executed once for each of the following parameters:

- There are no test case-specific parameters for this test case.

5.2.4.3.2 Initial conditions

- The ETSI TS 102 221 [2] interface is activated, ATR is sent and PPS is successfully completed.
- The SHDLC link is established.

5.2.4.3.3 Test procedure

Procedure (a), executed on SWP interface.

Step	Direction	Description	RQ
1	T ← → UICC	Run the representative SWP frame exchange procedure during all steps.	
2	T ← → UICC	At reception of the first I-frame, start procedure (b).	RQ2
3	T ← → UICC	Finish the representative SWP frame exchange procedure.	RQ1, RQ3

Procedure (b), executed on ETSI TS 102 221 [2] interface.

Step	Direction	Description	RQ
1	User → UICC	Issue a warm reset on the ETSI TS 102 221 [2] interface.	
2	UICC → T	Sends ATR.	RQ3
3	T → UICC	Select $EF_{DIR.}$	
4	UICC → T	Send response with status word indicating normal processing (as defined in ETSI TS 102 221 [2]).	RQ1

5.2.4.4 Test case 3: interaction with ETSI TS 102 221 interface - SWP deactivation while the UICC receives data

5.2.4.4.1 Test execution

The test procedure shall only be executed in voltage class B and voltage class C, full power mode.

The test procedure shall be executed once for each of the following parameters:

- There are no test case-specific parameters for this test case.

5.2.4.4.2 Initial conditions

- None of the UICC contacts is activated.

5.2.4.4.3 Test procedure

Procedure (a), executed on ETSI TS 102 221 [2] interface.

Step	Direction	Description	RQ
1	T → UICC	Activate ETSI TS 102 221 [2] interface and SWP interface.	
2	UICC → T	Send the ATR.	
3	T → UICC	Execute PPS procedure as per ETSI TS 102 221 [2].	
4	T → UICC	After sending 1st byte of PPS, start procedure (b).	RQ5
5	T ←→ UICC	Continue PPS procedure as per ETSI TS 102 221 [2].	RQ5
6	T → UICC	Select $EF_{DIR.}$	
7	UICC → T	Send response with status word indicating normal processing (as defined in ETSI TS 102 221 [2]).	RQ5

Procedure (b), executed on SWP interface.

Step	Direction	Description	RQ
1	T → UICC	Put SWP into **DEACTIVATED** state.	

5.2.4.5 Test case 4: interaction with ETSI TS 102 221 interface - SWP deactivation while the UICC sends data

5.2.4.5.1 Test execution

The test procedure shall only be executed in voltage class B and voltage class C, full power mode.

The test procedure shall be executed once for each of the following parameters:

- There are no test case-specific parameters for this test case.

5.2.4.5.2 Initial conditions

- None of the UICC contacts is activated.

5.2.4.5.3 Test procedure

Procedure (a), executed on ETSI TS 102 221 [2] interface.

Step	Direction	Description	RQ
1	T → UICC	Activate ETSI TS 102 221 [2] interface and SWP interface.	
2	UICC → T	Send the ATR.	
3	T → UICC	Start executing PPS procedure as per ETSI TS 102 221 [2].	
4	T → UICC	After receiving 1st byte of PPS, start procedure (b).	RQ5
5	T ← → UICC	Continue PPS procedure as per ETSI TS 102 221 [2].	RQ5
6	T → UICC	Select $EF_{DIR.}$	
7	UICC → T	Send response with status word indicating normal processing (as defined in ETSI TS 102 221 [2]).	RQ5

Procedure (b), executed on SWP interface.

Step	Direction	Description	RQ
1	T → UICC	Put SWP into **DEACTIVATED** state.	

5.2.4.6 Test case 5: interaction with ETSI TS 102 221 interface - reset SWP while the UICC receives data

5.2.4.6.1 Test execution

The test procedure shall only be executed in voltage class B and voltage class C, full power mode.

The test procedure shall be executed once for each of the following parameters:

- There are no test case-specific parameters for this test case.

5.2.4.6.2 Initial conditions

- None of the UICC contacts is activated.

5.2.4.6.3 Test procedure

Procedure (a), executed on ETSI TS 102 221 [2] interface.

Step	Direction	Description	RQ
1	T → UICC	Activate ETSI TS 102 221 [2] interface and SWP interface.	
2	UICC → T	Send the ATR.	
3	T → UICC	Execute PPS procedure as per ETSI TS 102 221 [2].	
4	T → UICC	After sending 1st byte of PPS, start procedure (b).	RQ4
5	T ←→ UICC	Continue PPS procedure as per ETSI TS 102 221 [2].	RQ4

Procedure (b), executed on SWP interface.

Step	Direction	Description	RQ
1	T → UICC	Send RSET.	
2	UICC ←→ T	Complete link establishment.	RQ2
3	T → UICC	Send an I-frame.	
4	UICC → T	Acknowledge the previously sent I-frame.	RQ2

5.2.4.7 Test case 6: interaction with ETSI TS 102 221 interface - reset SWP while the UICC sends data

5.2.4.7.1 Test execution

The test procedure shall only be executed in voltage class B and voltage class C, full power mode.

The test procedure shall be executed once for each of the following parameters:

- There are no test case-specific parameters for this test case.

5.2.4.7.2 Initial conditions

- None of the UICC contacts is activated.

5.2.4.7.3 Test procedure

Procedure (a), executed on ETSI TS 102 221 [2] interface.

Step	Direction	Description	RQ
1	T → UICC	Activate ETSI TS 102 221 [2] interface and SWP interface.	
2	UICC → T	Send the ATR.	
3	T → UICC	Start executing PPS procedure as per ETSI TS 102 221 [2].	
4	T → UICC	After receiving 1st byte of PPS, start procedure (b).	RQ4
5	T ← → UICC	Continue PPS procedure as per ETSI TS 102 221 [2].	RQ4

Procedure (b), executed on SWP interface.

Step	Direction	Description	RQ
1	T → UICC	Send RSET.	
2	UICC ←→ T	Complete link establishment.	RQ2
3	T → UICC	Send an I-frame.	
4	UICC → T	Acknowledge the previously sent I-frame.	RQ2

5.2.4.8 Test case 7: interaction with ETSI TS 102 221 interface - activate SWP in ETSI TS 102 221 clock stop

5.2.4.8.1 Test execution

The test procedure shall only be executed in voltage class B and voltage class C, full power mode.

The test procedure shall be executed once for each of the following parameters:

- There are no test case-specific parameters for this test case.

5.2.4.8.2 Initial conditions

- None of the UICC contacts is activated.

5.2.4.8.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Activate ETSI TS 102 221 [2] interface.	
2	UICC → T	Send the ATR.	
3	T → UICC	Set the ETSI TS 102 221 [2] interface in clock stop mode.	
4	T → UICC	Activate SWIO (contact C6).	RQ1
5	UICC ←→ T	Complete SWP interface activation.	RQ1, RQ2
6	T← → UICC	Perform SHDLC link establishment.	RQ1, RQ2
7	T → UICC	Send an I-frame.	
8	UICC → T	Acknowledge the previously sent I-frame.	RQ2

5.3 Physical characteristics

5.3.1 Temperature range for card operations

5.3.1.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 6.1.

RQ1	All parameter values for the SWP interface shall apply for the standard temperature range for storage and full operation as defined in ETSI TS 102 221 [2].
NOTE 1:	Tests for RQ1, SWP operation, with the parameter temperature are carried out by a selected number of test procedures in other clauses, where the variation of the temperature parameter is explicitly stated in the test execution.
NOTE 2:	Tests for RQ1, storage temperature, are out of scope of the present document.

5.3.2 Contacts

5.3.2.1 Provision of contacts

5.3.2.1.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 6.2.1.

RQ1	The UICC shall use SWIO (contact C6) for data exchange (i.e. SWP) between UICC and the CLF.
NOTE:	Tests for SWP interface operation with SWIO (contact C6) are carried out within all test procedures which perform communication over SWIO.

5.3.2.2 Contact activation and deactivation

5.3.2.2.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 6.2.2.

There are no conformance requirements for the UICC for the referenced clause.

5.3.2.3 Interface activation

5.3.2.3.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clauses 6.2.3 and 9.3.1.

The following conformance requirements apply to initial SWP interface activation:

RQ1	6.2.3	The UICC shall indicate that it is ready to exchange data via SWP by resuming SWP.
RQ2	6.2.3	In case the UICC does not detect the SWP **ACTIVATED** state, the UICC shall set S2 to state L not later than $T_{S2\_INHIBIT}$ after the UICC has put S2 in state H.
RQ3	6.2.3	If the action in RQ2 is taken, the UICC shall not respond to further attempts from the CLF to communicate via SWP and shall wait for UICC deactivation or shall retrieve information about SWP capability of the terminal via any other UICC interface.
RQ4	6.2.3	The UICC shall send the first ACT_SYNC frame and wait for the first frame from the CLF.
RQ5	6.2.3	When the UICC has received an ACT_POWER_MODE frame from the CLF, the UICC shall take the following action: If the UICC has received a correct ACT_POWER_MODE and the FR bit of this frame is 1, then the UICC shall repeat the last ACT frame it had sent.
RQ6	6.2.3	When the UICC has received an ACT_POWER_MODE frame from the CLF, the UICC shall take the following action: If the UICC has received a correct ACT_POWER_MODE and the FR bit of this frame is 0 then the UICC shall respond with an ACT_READY frame.
RQ7	6.2.3	If the UICC has received a corrupted frame, the UICC shall not respond.

The following conformance requirements apply to subsequent SWP interface activation:

RQ8	6.2.3	The initial interface activation sequence as specified in RQ1 to RQ7 shall also be applied after the transition of S1 to state H from the state DEACTIVATED.
RQ9	6.2.3	The UICC shall not send an ACT_INFORMATION field in any of the ACT frames.

The following conformance requirements apply to initial and/or subsequent SWP interface activation as specified:

RQ10	6.2.3	For initial interface activation, the UICC shall resume SWP for sending 1st ACT_SYNC frame within a maximum of 700 µs ($T_{S2\_ACT\_RES\_V}$).
RQ11	6.2.3	The UICC responds to ACT_POWER_MODE frames (calculated from last bit of EOF to SWP resume) within a maximum of 2 000 µs ($T_{S2\_ACT\_FRP}$).
RQ12	6.2.3	The UICC re-enters **SUSPENDED** in case the CLF did not respond to resume within a maximum of 100 ms ($T_{S2\_INHIBIT}$).
RQ13	6.2.3	For subsequent interface activation, the UICC shall resume SWP for sending 1st ACT_SYNC frame within 500 µs ($T_{S2\_ACT\_RES\_D}$).

The following conformance requirements apply to initial and/or subsequent SWP interface activation as specified:

RQ14	6.2.3	If the UICC was activated according to ETSI TS 102 221 [2], an additional activation of the SWP interface shall be considered as selected application on the UICC.
RQ15	9.3.1	After successful activation of the SWP interface, the UICC shall support the establishment of the SHDLC link by the CLF.

5.3.2.3.2 Test case 1: initial activation in low power mode

5.3.2.3.2.1 Test execution

The test procedure shall only be executed in low power mode.

The test procedure shall be executed once for each of the following parameters:

- $T_{S1\_HIGH\_V}$:
  1) between 1 000 µs and 1 020 µs; and
  2) between 5 000 µs and 5 050 µs.

5.3.2.3.2.2 Initial conditions

- None of the UICC contacts is activated.

5.3.2.3.2.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Activate Vcc (contact C1).	
2	T → UICC	Activate SWIO (contact C6) (see note).	
3	UICC → T	Resume SWP.	RQ1, RQ10
4	T → UICC	Put the SWP into **ACTIVATED** state.	
5	UICC → T	Send ACT_SYNC frame.	RQ4
6	T ← → UICC	Perform SHDLC link establishment.	RQ15
NOTE: SWP in **SUSPENDED** state.			

5.3.2.3.3 Test case 2: initial activation in low power mode with corrupted frames

5.3.2.3.3.1 Test execution

The test procedure shall only be executed in low power mode.

The test procedure shall be executed once for each of the following parameters:

- There are no test case-specific parameters for this test case.

5.3.2.3.3.2 Initial conditions

- None of the UICC contacts is activated.

5.3.2.3.3.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Activate Vcc (contact C1).	
2	T → UICC	Activate SWIO (contact C6) (see note).	
3	UICC → T	Resume SWP.	RQ1, RQ10
4	T → UICC	Put the SWP Interface into **ACTIVATED** state.	
5	UICC → T	Send ACT_SYNC frame.	RQ4
6	T → UICC	Send corrupted frame.	
7	UICC	No response.	RQ7
8	T ← → UICC	Perform SHDLC link establishment.	RQ15
NOTE: SWP interface in **SUSPENDED** state.			

5.3.2.3.4 Test case 3: no activation

5.3.2.3.4.1 Test execution

The test procedure shall only be executed in voltage class B (full power mode) and voltage class C, low power mode.

The test procedure shall be executed once for each of the following parameters:

- There are no test case-specific parameters for this test case.

5.3.2.3.4.2 Initial conditions

- None of the UICC contacts is activated.

5.3.2.3.4.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Activate Vcc (contact C1).	
2	T → UICC	Activate SWIO (contact C6) (see note).	
3	UICC → T	Resume SWP.	RQ1, RQ10
4	T → UICC	Keep the SWP in **SUSPENDED** state.	
5	UICC → T	Set S2 to state L.	RQ2, RQ12
NOTE: SWP in **SUSPENDED** state.			

5.3.2.3.5 Void

5.3.2.3.6 Test case 5: full power mode activation

5.3.2.3.6.1 Test execution

The test procedure shall only be executed in voltage class B and voltage class C, full power mode.

The test procedure shall be executed once for the parameters in each row of the following table:

Activate ETSI TS 102 221 [2] interface in step 2	TS1_HIGH_V timing
No	Between 1 000 µs and 1 020 µs
Yes	N/A
No	Between 5 000 µs and 5 050 µs
No	Between 49 000 µs and 51 000 µs

5.3.2.3.6.2 Initial conditions

- None of the UICC contacts is activated.

5.3.2.3.6.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Activate Vcc (contact C1).	
2	T ←→ UICC conditional	If Test execution clause indicates to do so, activate ETSI TS 102 221 [2] interface.	
3	T → UICC	Activate SWIO (contact C6) (see note).	
4	UICC → T	Resume SWP.	RQ1, RQ10
5	T → UICC	Put the SWP into **ACTIVATED** state.	
6	UICC → T	Send ACT_SYNC frame.	RQ4
7	T → UICC	Send ACT_POWER_MODE frame.	
8	UICC → T	Send ACT_READY frame.	RQ6, RQ11
9	T ← → UICC	Perform SHDLC link establishment.	RQ15
NOTE: SWP in **SUSPENDED** state.			

5.3.2.3.7 Test case 6: low power mode activation with re-transmission of ACT_SYNC

5.3.2.3.7.1 Test execution

The test procedure shall only be executed in low power mode.

The test procedure shall be executed once for each of the following parameters:

- There are no test case-specific parameters for this test case.

5.3.2.3.7.2 Initial conditions

- None of the UICC contacts is activated.

5.3.2.3.7.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Activate Vcc (contact C1).	
2	T → UICC	Activate SWIO (contact C6) (see note).	
3	UICC → T	Resume SWP.	RQ1, RQ10
4	T → UICC	Put the SWP into **ACTIVATED** state.	
5	UICC → T	Send ACT_SYNC frame.	RQ4
6	T → UICC	Send ACT_POWER_MODE frame with FR=1 and low power mode indication.	
7	UICC → T	Send ACT_SYNC frame.	RQ5, RQ11
8	T ← → UICC	Perform SHDLC link establishment.	RQ15
NOTE: SWP in **SUSPENDED** state.			

5.3.2.3.8 Test case 7: full power mode activation with re-transmission of ACT_SYNC

5.3.2.3.8.1 Test execution

The test procedure shall only be executed in voltage class B and voltage class C, full power mode.

The test procedure shall be executed once for each of the following parameters:

- There are no test case-specific parameters for this test case.

5.3.2.3.8.2 Initial conditions

- None of the UICC contacts is activated.

5.3.2.3.8.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Activate Vcc (contact C1).	
2	T → UICC	Activate SWIO (contact C6) (see note).	
3	UICC → T	Resume SWP.	RQ1, RQ10
4	T → UICC	Put the SWP into **ACTIVATED** state.	
5	UICC → T	Send ACT_SYNC frame.	RQ4
6	T → UICC	Sends ACT_POWER_MODE frame with FR=1 and full power mode indication.	
7	UICC → T	Send ACT_SYNC frame.	RQ5, RQ11
8	T ← → UICC	Perform SHDLC link establishment.	RQ15
NOTE: SWP in **SUSPENDED** state.			

5.3.2.3.9 Void

5.3.2.3.10 Test case 9: low power mode activation with multiple re-transmission of ACT_SYNC

5.3.2.3.10.1 Test execution

The test procedure shall only be executed in low power mode.

The test procedure shall be executed once for each of the following parameters:

- There are no test case-specific parameters for this test case.

5.3.2.3.10.2 Initial conditions

- None of the UICC contacts is activated.

5.3.2.3.10.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Activate Vcc (contact C1).	
2	T → UICC	Activate SWIO (contact C6) (see note).	
3	UICC → T	Resume SWP.	RQ1, RQ10
4	T → UICC	Put the SWP into **ACTIVATED** state.	
5	UICC → T	Send ACT_SYNC frame.	RQ4
6	T → UICC	Sends ACT_POWER_MODE frame with FR=1 and low power mode indication.	
7	UICC → T	Send ACT_SYNC frame.	RQ5, RQ11
8	T → UICC	Sends ACT_POWER_MODE frame with FR=1 and low power mode indication.	
9	UICC → T	Send an ACT_SYNC frame.	RQ5, RQ11
10	T ← → UICC	Perform SHDLC link establishment.	RQ15
NOTE: SWP in **SUSPENDED** state.			

5.3.2.3.11 Test case 10: full power mode activation with re-transmission of ACT_READY

5.3.2.3.11.1 Test execution

The test procedure shall only be executed in voltage class B and voltage class C, full power mode.

The test procedure shall be executed once for each of the following parameters:

- There are no test case-specific parameters for this test case.

5.3.2.3.11.2 Initial conditions

- None of the UICC contacts is activated.

5.3.2.3.11.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Activate Vcc (contact C1).	
2	T → UICC	Activate SWIO (contact C6) (see note).	
3	UICC → T	Resume SWP.	RQ1, RQ10
4	T → UICC	Put the SWP into **ACTIVATED** state.	
5	UICC → T	Send ACT_SYNC frame.	RQ4
6	T → UICC	Sends ACT_POWER_MODE frame with FR=0 and full power mode indication.	
7	UICC → T	Send ACT_READY frame.	RQ6, RQ11
8	T → UICC	Send ACT_POWER_MODE frame with FR=1 and full power mode indication.	
9	UICC → T	Send ACT_READY frame.	RQ5, RQ11
10	T ← → UICC	Perform SHDLC link establishment.	RQ15
NOTE: SWP in **SUSPENDED** state.			

5.3.2.3.12 Test case 11: full power mode activation with multiple re-transmission of ACT_SYNC

5.3.2.3.12.1 Test execution

The test procedure shall only be executed in voltage class B and voltage class C, full power mode.

The test procedure shall be executed once for each of the following parameters:

- There are no test case-specific parameters for this test case.

5.3.2.3.12.2 Initial conditions

- None of the UICC contacts is activated.

5.3.2.3.12.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Activate Vcc (contact C1).	
2	T → UICC	Activate SWIO (contact C6) (see note).	
3	UICC → T	Resume SWP.	RQ1, RQ10
4	T → UICC	Put the SWP into **ACTIVATED** state.	
5	UICC → T	Send ACT_SYNC frame.	RQ4
6	T → UICC	Send ACT_POWER_MODE frame with FR=1 and full power mode indication.	
7	UICC → T	Send ACT_SYNC frame.	RQ5, RQ11
8	T → UICC	Send ACT_POWER_MODE frame with FR=1 and full power mode indication.	
9	UICC → T	Send ACT_SYNC frame.	RQ5, RQ11
10	T ← → UICC	Perform SHDLC link establishment.	RQ15
NOTE: SWP in **SUSPENDED** state.			

5.3.2.3.13 Test case 12: subsequent activation in low power mode

5.3.2.3.13.1 Test execution

The test procedure shall only be executed in low power mode.

The test procedure shall be executed once for each of the following parameters:

- There are no test case-specific parameters for this test case.

5.3.2.3.13.2 Initial conditions

- SWP resides in **DEACTIVATED** state, and previously an initial SWP interface activation in low power mode has been successful.

5.3.2.3.13.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Initiate subsequent SWP interface activation (see note).	
2	UICC → T	Resume SWP.	RQ13
3	T → UICC	Put the SWP into **ACTIVATED** state.	
4	UICC → T	Send ACT_SYNC frame.	RQ4 RQ9
5	T ← → UICC	Perform SHDLC link establishment.	RQ15
NOTE: SWP in **SUSPENDED** state.			

5.3.2.3.14 Test case 13: subsequent activation in full power mode

5.3.2.3.14.1 Test execution

The test procedure shall only be executed in voltage class B and voltage class C, full power mode.

The test procedure shall be executed once for each of the following parameters:

- Time for which the terminal keeps SWP in **DEACTIVATED** state:
  - Between 100 µs and 120 µs
  - Between 1 000 µs and 1 200 µs
  - Between 10 ms and 12 ms
  - Between 100 ms and 120 ms

NOTE: The values above are not derived from any value in the core specification and have been selected as reasonable values to harmonise test implementations and execution.

5.3.2.3.14.2 Initial conditions

- SWP resides in **SUSPENDED** state, and previously an initial SWP interface activation in full power mode has been successful.

5.3.2.3.14.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Put the SWP into **DEACTIVATED** state.	
2	T	Keep SWP in **DEACTIVATED** state for time as indicated in the test execution clause.	
3	T → UICC	Initiate subsequent SWP interface activation immediately after the end of step 2 (see note).	
4	UICC → T	Resume SWP.	RQ13
5	T → UICC	Put the SWP into **ACTIVATED** state.	
6	UICC → T	Send ACT_SYNC frame.	RQ4 RQ9
7	T ← → UICC	Perform SHDLC link establishment.	RQ15
NOTE: SWP in **SUSPENDED** state.			

5.3.2.3.15 Void

5.3.2.4 Behaviour of a UICC in a terminal not supporting SWP

5.3.2.4.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 6.2.4.

RQ1	When the UICC detects that the contact C6 is not connected to Vcc it shall connect the C6 contact with a low impedance to Gnd within 2 s after detecting that the terminal does not indicate the support of SWP interface.
NOTE:	RQ1 is not tested, since the value of the low impedance is not specified neither in ETSI TS 102 613 [1] nor ETSI TS 102 221 [2].

5.3.2.4.2 Void

5.3.2.4.3 Void

5.3.2.5 Behaviour of a terminal connected to a UICC not supporting SWP

Reference: ETSI TS 102 613 [1], clause 6.2.5.

There are no conformance requirements for the UICC for the referenced clause.

5.3.2.6 Inactive contacts

Reference: ETSI TS 102 613 [1], clause 6.2.6.

There are no conformance requirements for the UICC for the referenced clause.

5.4 Electrical characteristics

5.4.1 Operating conditions

5.4.1.1 Operating conditions

Reference: ETSI TS 102 613 [1], clause 7.1.

There are no conformance requirements for the UICC for the referenced clause.

5.4.1.2 Supply voltage classes

5.4.1.2.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 7.1.1.

RQ1	The UICC shall support the voltage classes B and C, as defined in ETSI TS 102 221 [2].

5.4.1.2.2 Test case 1: ETSI TS 102 221 voltage classes B and C support

5.4.1.2.2.1 Test execution

The test procedure shall only be executed in voltage class B and voltage class C, full power mode.

The test procedure shall be executed once for each of the following parameters:

- There are no test case-specific parameters for this test case.

5.4.1.2.2.2 Initial conditions

- None of the UICC contacts is activated.

5.4.1.2.2.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Activate ETSI TS 102 221 [2] interface.	
2	UICC → T	Send ATR. If the first TA for T=15 is present in the ATR, it shall indicate support of at least voltage classes B and C.	RQ1
3	T → UICC	Activate contact SWIO.	
4	UICC → T	Send ACT_SYNC frame.	RQ1

5.4.1.3 Vcc (C1) low power mode definition

5.4.1.3.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 7.1.2.

RQ1	When operating in low power mode, the UICC shall not draw more than 5 mA from Vcc, averaged over 1 ms.
RQ2	In low power mode, the UICC shall operate with Vcc in the range of 1,62 V to 1,98 V.

5.4.1.3.2 Test case 1: operation in low power mode

5.4.1.3.2.1 Test execution

The test procedure shall only be executed in voltage class C, low power mode.

The test procedure shall be executed at default, minimum, and maximum ambient temperature.

The test procedure shall be executed once for each of the following parameters:

- There are no test case-specific parameters for this test case.

5.4.1.3.2.2 Initial conditions

- None of the UICC contacts is activated.

5.4.1.3.3.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Activate Vcc (contact C1).	
2	T → UICC	Activate SWIO (contact C6).	
3	UICC → T	Send ACT_SYNC frame.	RQ1
4	T ← → UICC	Perform SHDLC link establishment and run the representative SWP frame exchange procedure.	RQ1, RQ2
5	T → UICC	Put SWP into **DEACTIVATED** state.	RQ1
6	T → UICC	Maintain **DEACTIVATED** state for at least 10 ms.	RQ1
7	T ← → UICC	Perform subsequent SWP interface activation.	RQ1, RQ2

5.4.1.4 Signal S1

5.4.1.4.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 7.1.3.

RQ1	In voltage class B the UICC shall consider S1 to be in state H when S1 is in the range between 1,13 V and 2,28 V.
RQ2	In voltage class B the UICC shall consider S1 to be in state L when S1 is in the range between -0,3 V and 0,48 V.
RQ3	In voltage class C the UICC shall consider S1 to be in state H when S1 is in the range between 0,7 x Vcc and Vcc + 0,3 V.
RQ4	In voltage class C the UICC shall consider S1 to be in state L when S1 is in the range between -0,3 V and 0,25 x Vcc.

5.4.1.4.2 Test case 1: S1 communication in voltage class B

5.4.1.4.2.1 Test execution

The test procedure shall only be executed in voltage class B.

The test procedure shall be executed at default, minimum, and maximum ambient temperature.

The test procedure shall be executed once for each of the following parameters:

- Vcc at default, and S1 signal applied with:
  - V_{IL} = 0,15 V and V_{IH} = 1,70 V;
  - V_{IL} = V_{ILmin} and V_{IH} = 1,70 V;
  - V_{IL} = V_{ILmax} and V_{IH} = 1,70 V;
  - V_{IL} = 0,15 V and V_{IH} = $V_{IHmin;}$
  - V_{IL} = 0,15 V and V_{IH} = V_{IHmax}.
- Vcc at minimum, and S1 signal applied with:
  - V_{IL} = 0,15 V and V_{IH} = 1,70 V;
  - V_{IL} = V_{ILmin} and V_{IH} = 1,70 V;
  - V_{IL} = V_{ILmax} and V_{IH} = 1,70 V;
  - V_{IL} = 0,15 V and V_{IH} = $V_{IHmin;}$
  - V_{IL} = 0,15 V and V_{IH} = V_{IHmax}.

- Vcc at maximum, and S1 signal applied with:
  - V_{IL} = 0,15 V and V_{IH} = 1,70 V;
  - V_{IL} = V_{ILmin} and V_{IH} = 1,70 V;
  - V_{IL} = V_{ILmax} and V_{IH} = 1,70 V;
  - V_{IL} = 0,15 V and V_{IH} = $V_{IHmin;}$
  - V_{IL} = 0,15 V and V_{IH} = V_{IHmax}.

5.4.1.4.2.2 Initial conditions

- None of the UICC contacts is activated.

5.4.1.4.2.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Activate Vcc (contact C1).	
2	T → UICC	Activate SWIO (contact C6).	
3	UICC → T	Send ACT_SYNC frame.	RQ1, RQ2
4	T → UICC	Send ACT_POWER_MODE frame.	RQ1, RQ2
5	UICC → T	Respond ACT_READY frame.	RQ1, RQ2
6	T ←→ UICC	Perform SHDLC link establishment.	RQ1, RQ2

5.4.1.4.3 Test case 2: S1 communication in voltage class C, full power mode

5.4.1.4.3.1 Test execution

The test procedure shall only be executed in voltage class C, full power mode.

The test procedure shall be executed at default, minimum, and maximum ambient temperature.

The test procedure shall be executed once for each of the following parameters:

- Vcc at default, and S1 signal applied with:
  - V_{IL} = 0,10 x Vcc and V_{IH} = 0,85 x Vcc;
  - V_{IL} = V_{ILmin} and V_{IH} = 0,85 x Vcc;
  - V_{IL} = V_{ILmax} and V_{IH} = 0,85 x Vcc;
  - V_{IL} = 0,10 x Vcc and V_{IH} = $V_{IHmin;}$
  - V_{IL} = 0,10 x Vcc and V_{IH} = V_{IHmax};
- Vcc at minimum, and S1 signal applied with:
  - V_{IL} = 0,10 x Vcc and V_{IH} = 0,85 x Vcc;
  - V_{IL} = V_{ILmin} and V_{IH} = 0,85 x Vcc;
  - V_{IL} = V_{ILmax} and V_{IH} = 0,85 x Vcc;
  - V_{IL} = 0,10 x Vcc and V_{IH} = $V_{IHmin;}$

- V_{IL} = 0,10 x Vcc and $V_{IH} = V_{IHmax}$.

- Vcc at maximum, and S1 signal applied with:
  - V_{IL} = 0,10 x Vcc and V_{IH} = 0,85 x Vcc;
  - $V_{IL} = V_{ILmin}$ and V_{IH} = 0,85 x Vcc;
  - $V_{IL} = V_{ILmax}$ and V_{IH} = 0,85 x Vcc;
  - V_{IL} = 0,10 x Vcc and $V_{IH} = V_{IHmin;}$
  - V_{IL} = 0,10 x Vcc and $V_{IH} = V_{IHmax}$.

5.4.1.4.3.2 Initial conditions

- None of the UICC contacts is activated.

5.4.1.4.3.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Activate Vcc (contact C1).	
2	T → UICC	Activate SWIO (contact C6).	
3	UICC → T	Send ACT_SYNC frame.	RQ3, RQ4
4	T → UICC	Send ACT_POWER_MODE frame indicating full power mode.	RQ3, RQ4
5	UICC → T	Respond ACT_READY frame.	RQ3, RQ4
6	T ←→ UICC	Perform SHDLC link establishment.	RQ3, RQ4

5.4.1.4.4 Test case 3: S1 communication in low power mode

5.4.1.4.4.1 Test execution

The test procedure shall only be executed in voltage class C, low power mode.

The test procedure shall be executed at default, minimum, and maximum ambient temperature.

The test procedure shall be executed once for each of the following parameters:

- Vcc at default, and S1 signal applied with:
  - V_{IL} = 0,10 x Vcc and V_{IH} = 0,85 x Vcc;
  - $V_{IL} = V_{ILmin}$ and V_{IH} = 0,85 x Vcc;
  - $V_{IL} = V_{ILmax}$ and V_{IH} = 0,85 x Vcc;
  - V_{IL} = 0,10 x Vcc and $V_{IH} = V_{IHmin;}$
  - V_{IL} = 0,10 x Vcc and $V_{IH} = V_{IHmax}$;
- Vcc at minimum, and S1 signal applied with:
  - V_{IL} = 0,10 x Vcc and V_{IH} = 0,85 x Vcc;
  - $V_{IL} = V_{ILmin}$ and V_{IH} = 0,85 x Vcc;
  - $V_{IL} = V_{ILmax}$ and V_{IH} = 0,85 x Vcc;

- V_{IL} = 0,10 x Vcc and $V_{IH} = V_{IHmin;}$
- V_{IL} = 0,10 x Vcc and $V_{IH} = V_{IHmax}$;

- Vcc at maximum, and S1 signal applied with:
  - V_{IL} = 0,10 x Vcc and V_{IH} = 0,85 x Vcc;
  - $V_{IL} = V_{ILmin}$ and V_{IH} = 0,85 x Vcc;
  - $V_{IL} = V_{ILmax}$ and V_{IH} = 0,85 x Vcc;
  - V_{IL} = 0,10 x Vcc and $V_{IH} = V_{IHmin;}$
  - V_{IL} = 0,10 x Vcc and $V_{IH} = V_{IHmax}$.

5.4.1.4.4.2 Initial conditions

- None of the UICC contacts is activated.

5.4.1.4.4.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Activate Vcc (contact C1).	
2	T → UICC	Activate SWIO (contact C6).	
3	UICC → T	Send ACT_SYNC frame.	RQ3, RQ4
4	T ←→ UICC	Perform SHDLC link establishment.	RQ3, RQ4

5.4.1.5 Signal S2

5.4.1.5.1 Signal S2

Reference: ETSI TS 102 613 [1], clause 7.1.4.

There are no conformance requirements for the UICC for the referenced clause.

5.4.1.5.2 Operating current for S2

5.4.1.5.2.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 7.1.4.1.

RQ1	For supply voltage class B, when transmitting state L on S2, the UICC shall not draw less current than 0 µA and not draw more current than 20 µA from SWIO, with S1 measured on the UICC contacts between 1,13 V and 2,28 V.
RQ2	For supply voltage class B, when transmitting state H on S2, the UICC shall not draw less current than 600 µA and not draw more current than 1 000 µA from SWIO, with S1 measured on the UICC contacts between 1,13 V and 2,28 V.
RQ3	For supply voltage class C, when transmitting state L on S2, the UICC shall not draw less current than 0 µA and not draw more current than 20 µA from SWIO, with S1 measured on the UICC contacts between 0,7 x Vcc and Vcc + 0,3 V.
RQ4	For supply voltage class C, when transmitting state H on S2, the UICC shall not draw less current than 600 µA and not draw more current than 1 000 µA from SWIO, with S1 measured on the UICC contacts between 0,7 x Vcc and Vcc + 0,3 V.

5.4.1.5.2.2 Test case 1: S2 communication in voltage class B

5.4.1.5.2.2.1 Test execution

The test procedure shall only be executed in voltage class B.

The test procedure shall be executed at default, minimum, and maximum ambient temperature.

The test procedure shall be executed once for each of the following parameters:

- Vcc at default, and S1 signal applied with:
  - V_{IL} = 0,15 V and V_{IH} = 1,70 V;
  - V_{IL} = 0,15 V and V_{IH} = $V_{IHmin;}$
  - V_{IL} = 0,15 V and V_{IH} = V_{IHmax};
- Vcc at minimum, and S1 signal applied with:
  - V_{IL} = 0,15 V and V_{IH} = 1,70 V;
  - V_{IL} = 0,15 V and V_{IH} = $V_{IHmin;}$
  - V_{IL} = 0,15 V and V_{IH} = V_{IHmax};
- Vcc at maximum, and S1 signal applied with:
  - V_{IL} = 0,15 V and V_{IH} = 1,70 V;
  - V_{IL} = 0,15 V and V_{IH} = $V_{IHmin;}$
  - V_{IL} = 0,15 V and V_{IH} = V_{IHmax}.

5.4.1.5.2.2.2 Initial conditions

- None of the UICC contacts is activated.

5.4.1.5.2.2.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Activate Vcc (contact C1).	
2	T → UICC	Activate SWIO (contact C6).	
3	UICC → T	Send ACT_SYNC frame.	RQ1, RQ2
4	T → UICC	Send ACT_POWER_MODE frame.	RQ1
5	UICC → T	Respond ACT_READY frame.	RQ1, RQ2
6	T → UICC	Put SWP in **SUSPENDED** state.	RQ1
7	T → UICC	Maintain **SUSPENDED** state for at least 2 ms.	RQ1
8	T ←→ UICC	Perform SHDLC link establishment.	RQ1, RQ2

5.4.1.5.2.3 Test case 2: S2 communication in voltage class C, full power mode

5.4.1.5.2.3.1 Test execution

The test procedure shall only be executed in voltage class C, full power mode.

The test procedure shall be executed at default, minimum, and maximum ambient temperature.

The test procedure shall be executed once for each of the following parameters:

- Vcc at default, and S1 signal applied with:
  - V_{IL} = 0,10 x Vcc and V_{IH} = 0,85 x Vcc;
  - V_{IL} = 0,10 x Vcc and V_{IH} = $V_{IHmin;}$
  - V_{IL} = 0,10 x Vcc and V_{IH} = V_{IHmax}.
- Vcc at minimum, and S1 signal applied with:
  - V_{IL} = 0,10 x Vcc and V_{IH} = 0,85 x Vcc;
  - V_{IL} = 0,10 x Vcc and V_{IH} = $V_{IHmin;}$
  - V_{IL} = 0,10 x Vcc and V_{IH} = V_{IHmax}.
- Vcc at maximum, and S1 signal applied with:
  - V_{IL} = 0,10 x Vcc and V_{IH} = 0,85 x Vcc;
  - V_{IL} = 0,10 x Vcc and V_{IH} = $V_{IHmin;}$
  - V_{IL} = 0,10 x Vcc and V_{IH} = V_{IHmax}.

5.4.1.5.2.3.2 Initial conditions

- None of the UICC contacts is activated.

5.4.1.5.2.3.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Activate Vcc (contact C1).	
2	T → UICC	Activate SWIO (contact C6).	
3	UICC → T	Send ACT_SYNC frame.	RQ3, RQ4
4	T → UICC	Send ACT_POWER_MODE frame indicating full power mode.	RQ3
5	UICC → T	Respond ACT_READY frame.	RQ3, RQ4
6	T → UICC	Put SWP in **SUSPENDED** state.	RQ3
7	T → UICC	Maintain **SUSPENDED** state for at least 2 ms.	RQ3
8	T ←→ UICC	Perform SHDLC link establishment.	RQ3, RQ4

5.4.1.5.2.4 Test case 3: S2 communication in low power mode

5.4.1.5.2.4.1 Test execution

The test procedure shall only be executed in voltage class C, low power mode.

The test procedure shall be executed at default, minimum, and maximum ambient temperature.

The test procedure shall be executed once for each of the following parameters:

- Vcc at default, and S1 signal applied with:
  - V_{IL} = 0,10 x Vcc and V_{IH} = 0,85 x Vcc;
  - V_{IL} = 0,10 x Vcc and V_{IH} = $V_{IHmin;}$
  - V_{IL} = 0,10 x Vcc and V_{IH} = V_{IHmax}.
- Vcc at minimum, and S1 signal applied with:
  - V_{IL} = 0,10 x Vcc and V_{IH} = 0,85 x Vcc;
  - V_{IL} = 0,10 x Vcc and V_{IH} = $V_{IHmin;}$
  - V_{IL} = 0,10 x Vcc and V_{IH} = V_{IHmax}.
- Vcc at maximum, and S1 signal applied with:
  - V_{IL} = 0,10 x Vcc and V_{IH} = 0,85 x Vcc;
  - V_{IL} = 0,10 x Vcc and V_{IH} = $V_{IHmin;}$
  - V_{IL} = 0,10 x Vcc and V_{IH} = V_{IHmax}.

5.4.1.5.2.4.2 Initial conditions

- None of the UICC contacts is activated.

5.4.1.5.2.4.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Activate Vcc (contact C1).	
2	T → UICC	Activate SWIO (contact C6).	
3	UICC → T	Send ACT_SYNC frame.	RQ3, RQ4
4	T → UICC	Put SWP in **SUSPENDED** state.	RQ3
5	T → UICC	Maintain **SUSPENDED** state for at least 2 ms.	RQ3
6	T ←→ UICC	Perform SHDLC link establishment.	RQ3, RQ4

5.5 Physical transmission layer

5.5.1 S1 Bit coding and sampling time

5.5.1.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 8.1.

RQ1	The UICC shall interpret a signal waveform received on S1 having a duration T constituted by two sequential rising edges with the state H for a time T_{H1} between 0,70 ×T and 0,80 × T as bit with the logical value 1. The timing reference point for T and T_{H1} shall be 50 % of the S1 signal amplitude.
RQ2	The UICC shall interpret a signal waveform received on S1 having a duration T constituted by two sequential rising edges with the state H for a time T_{H0} from 0,20 ×T to 0,30 ×T as bit with the logical value 0. The timing reference point for T and T_{H0} shall be 50 % of the S1 signal amplitude.
RQ3	For the signal waveforms as per RQ1 and RQ2, the UICC shall accept signal edges with a fall time (tf) between 5 ns and 0,05 × T with T ≤ 5 000 ns and between 5 ns and 250 ns with T > 5 000 ns, where the timing reference points for the fall time are 10 % and 90 % of the S1 signal amplitude.
RQ4	For the signal waveforms as per RQ1 and RQ2, the UICC shall accept signal edges with a rise time (tr) between 5 ns and 0,05 × T with T ≤ 5 000 ns and between 5 ns and 250 ns with T > 5 000 ns, where the timing reference points for the rise time are 10 % and 90 % of the S1 signal amplitude.
RQ5	The UICC shall be capable to communicate with bit rates varying with each bit transmitted on S1 between the minimum and maximum bit duration supported (see also RQ7 and RQ8).
RQ6	The input capacitance of the UICC (C_{LOAD}) on the contact C6 shall not exceed 10 pF.
RQ7	The UICC shall interpret bits with a duration T between 1 µs and 5 µs.
RQ8	The UICC shall interpret bits with extended bit durations in the indicated range (see clause 9.4 of ETSI TS 102 613 [1]).
RQ9	For a transition from **DEACTIVATED** state or for SWIO contact activation (preceding the SWP interface activation procedure), the UICC shall accept a rise time tr of the signal S1 in the range of 5 ns to 250 ns.
RQ10	For a transition to **DEACTIVATED** state, the UICC shall accept a fall time tf of the signal S1 in the range of 5 ns to 250 ns.
RQ11	The UICC shall accept a transition sequence, consisting of the falling edge, the state L period and the rising edge of an idle bit (see RQ2). The value of T shall result from the length of the state L period, where the timing reference point shall be 50 % of the S1 signal amplitude.
RQ12	The UICC shall accept a transition sequence as described in RQ11 with the definitions as described in RQ3 and RQ4 for the fall time tf for the leading edge and the rise time tr for the trailing edge.

5.5.1.2 Test case 1: communication with timing variation, default bit duration

5.5.1.2.1 Test execution

The test procedure shall be executed at default, minimum, and maximum ambient temperature.

The test procedure shall be executed once for each of the following parameter sets.

T	T_{H1}	T_{H0}
3 µs	75 %	25 %
1 µs	70 %	30 %
	80 %	20 %
	75 %	25 %
5 µs	70 %	30 %
	80 %	20 %
	75 %	25 %

5.5.1.2.2 Initial conditions

- None of the UICC contacts is activated.

5.5.1.2.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Activate Vcc (contact C1).	
2	T → UICC	Activate SWIO (contact C6).	
3	UICC → T	Resume SWP.	
4	T → UICC	Send a transition sequence.	
5	UICC → T	Send ACT_SYNC frame.	RQ11
6	T → UICC UICC → T	If the terminal performs initial SWP interface activation in full power mode, complete initial SWP interface activation.	RQ1, RQ2, RQ7
7	T → UICC UICC → T	Establish SHDLC link.	RQ1, RQ2, RQ7
8	T → UICC UICC → T	Run the representative SWP frame exchange procedure. The frame exchange shall be performed in such a way, that the referenced RQs can be fully validated.	RQ1, RQ2, RQ7

5.5.1.3 Test case 2: communication with timing variation, extended bit duration

5.5.1.3.1 Test execution

The test procedure shall be executed at default, minimum, and maximum ambient temperature.

If the DUT supports O_EXTENDED_T_LOWER but not O_EXTENDED_T_UPPER, the test procedure shall be executed once for each of the following parameter sets:

T	T_{H1}	T_{H0}
0,590 µs	70 %	30 %
	80 %	20 %
	75 %	25 %

If the DUT supports O_EXTENDED_T_UPPER but not O_EXTENDED_T_LOWER, the test procedure shall be executed once for each of the following parameter sets:

T	T_{H1}	T_{H0}
10 µs	70 %	30 %
	80 %	20 %
	75 %	25 %

If the DUT supports O_EXTENDED_T_LOWER and O_EXTENDED_T_UPPER, the test procedure shall be executed once for each of the following parameter sets:

T	T_{H1}	T_{H0}
0,590 µs	70 %	30 %
	80 %	20 %
	75 %	25 %
10 µs	70 %	30 %
	80 %	20 %
	75 %	25 %

5.5.1.3.2 Initial conditions

- None of the UICC contacts is activated.

5.5.1.3.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Activate Vcc (contact C1).	
2	T → UICC	Activate SWIO (contact C6).	
3	UICC → T	Resume SWP.	
4	T → UICC	Send a transition sequence.	
5	UICC → T	Send ACT_SYNC frame.	RQ11
6	T → UICC UICC → T	If the terminal performs initial SWP interface activation in full power mode, complete initial SWP interface activation.	RQ1, RQ2, RQ7, RQ8
7	T → UICC UICC → T	Establish SHDLC link	RQ1, RQ2, RQ7, RQ8
8	T → UICC UICC → T	Run the representative SWP frame exchange procedure. The frame exchange shall be performed in such a way, that the referenced RQs can be fully validated.	RQ1, RQ2, RQ7, RQ8

5.5.1.4 Test case 3: S1 rise and fall time

5.5.1.4.1 Test execution

The test procedure shall only be executed in voltage class B and voltage class C, full power mode.

The test procedure shall be executed once for each of the following parameter sets:

T	tr	tf
3 µs	78 ns	78 ns
1 µs	28 ns	28 ns
	5 ns	28 ns
	28 ns	5 ns
	50 ns	28 ns
	28 ns	50 ns
5 µs	128 ns	128 ns
	5 ns	128 ns
	128 ns	5 ns
	250 ns	128 ns
	128 ns	250 ns

5.5.1.4.2 Initial conditions

- None of the UICC contacts is activated.

5.5.1.4.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Activate Vcc (contact C1).	
2	T → UICC	Activate SWIO (contact C6).	
3	UICC → T	Resume SWP.	RQ9
4	T → UICC	Send a transition sequence.	
5	UICC → T	Send ACT_SYNC frame.	RQ12
6	T → UICC UICC ← T	Complete initial SWP interface activation.	RQ3, RQ4
7	T → UICC UICC → T	Perform SHDLC link establishment.	RQ3, RQ4
8	T → UICC	Put SWP into **DEACTIVATED** state.	
9	T → UICC	Initiate subsequent interface activation.	
10	UICC → T	Resume SWP.	RQ9, RQ10

5.5.1.5 Test case 4: measurement of C6 input capacitance

5.5.1.5.1 Test execution

The test procedure shall be executed once for each of the following parameters:

- There are no test case-specific parameters for this test case.

5.5.1.5.2 Initial conditions

- None of the UICC contacts is activated.

5.5.1.5.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Activate Vcc (contact C1).	
2		Measure C_{LOAD}.	RQ6
NOTE: Clause 5.5.1.5.4 gives an example for the implementation of this test.			

5.5.1.5.4 Example for C6 input capacitance test implementation (informative)

In this example, the test equipment provides means for capacitance measurement, e.g. by connecting temporarily an LCR-meter instead of the terminal simulator. But regardless, the test equipment has to act as valid terminal.

The capacitance measurement is done at several settings for the frequency of the AC signal (sine wave), e.g. 4 MHz, 16 MHz, 28 MHz.

With the initial condition: "None of the UICC contacts is activated", the test procedure is as follows:

Step	Direction	Description	RQ
1	T → UICC	Activate Vcc (contact C1).	
2	T → UICC	Activate SWIO (contact C6).	
3	UICC → T	Send ACT_SYNC frame.	
4		Wait for at least 1 ms.	
5		Measure the capacitance C_{LOAD} on SWIO (contact C6), with an AC signal (sine wave) applied having a signal range between V_{IHmin} and V_{IHmax}.	RQ6
6	T → UICC	Put SWP into **DEACTIVATED** state.	
7		Wait for at least 1 ms.	
8		Measure the capacitance C_{LOAD} on SWIO (contact C6), with an AC signal (sine wave) applied having a signal range between 0 V and V_{ILmax}.	RQ6

5.5.1.6 Test case 5: communication with variation in bit duration

5.5.1.6.1 Test execution

The bit duration between bits transmitted on S1 shall be varied such that RQ5 can be fully validated, including extended bit duration if supported by the UICC.

5.5.1.6.2 Initial conditions

- None of the UICC contacts is activated.

5.5.1.6.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Activate Vcc (contact C1).	
2	T → UICC	Activate SWIO (contact C6).	
3	UICC → T	Resume SWP.	
4	T → UICC	Send a transition sequence.	
5	UICC → T	Send ACT_SYNC frame.	RQ5
6	T → UICC UICC → T	If the terminal performs initial SWP interface activation in full power mode, complete initial SWP interface activation.	RQ5
7	T → UICC UICC → T	Establish SHDLC link.	RQ5
8	T → UICC	Send I-frame.	
9	UICC → T	Acknowledge the received I-frame.	RQ5

5.5.2 S2 switching management

5.5.2.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 8.2.

RQ1	The UICC shall only perform switching of S2 when S1 is in state L, or when resuming SWP.

5.5.2.2 Test case 1: S2 switching management

5.5.2.2.1 Test execution

The test procedure shall be executed once for each of the following parameters:

- There are no test case-specific parameters for this test case.

5.5.2.2.2 Initial conditions

- The SHDLC link is established.

5.5.2.2.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC UICC → T	Run the representative SWP frame exchange procedure. The frame exchange shall be performed in such a way, that the referenced RQ can be fully validated.	RQ1

5.5.2.3 Test case 2: S2 switching management (variation in bit duration)

5.5.2.3.1 Test execution

The test procedure shall be executed once for each of the following bit durations which is supported by the DUT:

- 0,590 µs (only if O_EXTENDED_T_LOWER is supported)
- 0,800 µs (only if O_EXTENDED_T_LOWER is supported)
- 1 µs
- 1,5 µs
- 2 µs
- 2,5 µs
- 3 µs
- 3,5 µs
- 4 µs
- 4,5 µs
- 5 µs
- 7 µs (only if O_EXTENDED_T_UPPER is supported)
- 10 µs (only if O_EXTENDED_T_UPPER is supported)

5.5.2.3.2 Initial conditions

- The SHDLC link is established.

5.5.2.3.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC UICC → T	Run the representative SWP frame exchange procedure. The frame exchange shall be performed in such a way, that the referenced RQ can be fully validated.	RQ1

5.5.3 SWP interface states management

5.5.3.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 8.3.

RQ1	For a transition from SWP **SUSPENDED** state to SWP **ACTIVATED** state initiated by the UICC, the UICC shall draw a current (S2 in state H). (The slave resumes by drawing a current).
RQ2	In case the state transition from SWP **SUSPENDED** state to SWP **ACTIVATED** state was initiated by the UICC, the delay after the transition sequence until the 1st bit of the SOF is sent by the UICC shall not exceed 4 bits.
RQ3	The UICC shall be capable of receiving frames in the **ACTIVATED** state.
RQ4	The UICC shall be able to accept transition sequences sent by the terminal, in the case that extended resume is supported by the UICC.

5.5.3.2 Test case 1: SWP interface states management by the UICC

5.5.3.2.1 Test execution

The test procedure shall only be executed in voltage class B and voltage class C, full power mode.

The test procedure shall be executed once for each of the following parameters:

- There are no test case-specific parameters for this test case.

5.5.3.2.2 Initial conditions

- None of the UICC contacts is activated.

5.5.3.2.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Activate Vcc (contact C1).	
2	T→ UICC	Activate SWIO (contact C6).	
3	UICC → T	Resume SWP.	RQ1
4	T→ UICC	Send a transition sequence.	
5	UICC → T	Send ACT_SYNC frame.	RQ2
6	T → UICC	Send ACT_POWER_MODE frame.	
7	UICC → T	Send ACT_READY frame.	RQ3

5.5.3.3 Test case 2: UICC resume - P3 values and delay after transition sequence

5.5.3.3.1 Test execution

The test procedure shall be executed once for each of the following parameters:

- There are no test case-specific parameters for this test case.

5.5.3.3.2 Initial conditions

- None of the UICC contacts is activated.

5.5.3.3.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Activate Vcc (contact C1).	
2	T → UICC	Activate SWIO (contact C6).	
3	UICC → T T → UICC	Perform initial SWP interface activation.	
4	T → UICC UICC → T	Establish SHDLC link.	RQ2
5	User → UICC	Trigger the UICC to send an I-frame.	
6	UICC → T	Send I-frame.	
7	T	Do not acknowledge I-frame. Ensure that SWP interface is in SUSPENDED state. Before UICC resends I-frame, apply P3 = 500 ns (see note).	
8	UICC → T	Resend I-frame.	RQ2
9	T → UICC	Acknowledge I-frame.	
10	User → UICC	Trigger the UICC to send an I-frame.	
11	UICC → T	Send I-frame.	
12	T	Do not acknowledge I-frame. Ensure that SWP interface is in SUSPENDED state. Before UICC resends I-frame, apply P3 = 1,2 µs.	
13	UICC → T	Resend I-frame.	RQ2
14	T → UICC	Acknowledge I-frame.	
15	User → UICC	Trigger the UICC to send an I-frame.	
16	UICC → T	Send I-frame.	
17	T	Do not acknowledge I-frame. Ensure that SWP interface is in SUSPENDED state. Before UICC resends I-frame, apply P3 = 5 µs.	
18	UICC → T	Resend I-frame.	RQ2
19	T → UICC	Acknowledge I-frame.	
NOTE: ETSI TS 102 613 [1] does not specify any minimum value for P3. This is the smallest P3 value which is applied in the current version of this specification, which has been identified as a realistic value for the terminal simulator to achieve. Smaller values may occur in the field due to the full duplex nature of the interface.			

5.5.3.4 Test case 3: UICC Extended resume - P6 values

5.5.3.4.1 Test execution

The test procedure shall only be executed in voltage class B and voltage class C, full power mode.

The test procedure shall be executed once for each of the following parameters:

- There are no test case-specific parameters for this test case.

5.5.3.4.2 Initial conditions

- None of the UICC contacts is activated.

5.5.3.4.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Activate ETSI TS 102 221 [2] interface.	
2	UICC → T	Send ATR.	
3	UICC → T T → UICC	Perform initial SWP interface activation and SHDLC link establishment.	
4	UICC → T T → UICC	Perform HCI session initialization as per ETSI TS 102 622 [4].	
5	UICC → T	Send I-frame containing EVT_HCI_END_OF_OPERATION as per ETSI TS 102 622 [4]. If the UICC has not sent the I-frame containing EVT_HCI_END_OF_OPERATION within 1 s after step 4, abort the test procedure since the execution requirement is not fulfilled.	
6	T → UICC	Send SHDLC acknowledgement.	
7	T	Ensure that SWP interface is in SUSPENDED state for at least P7 = 20 ms.	
8	User → UICC	Trigger the UICC to send an I-frame (see TR4x).	
9	UICC → T	Resume SWP.	
10	T	Send a transition sequence 19 ms after the UICC resumed SWP.	RQ4
11	UICC → T	Send I-frame.	
12	T → UICC	Acknowledge I-frame.	

5.5.4 Power mode states/transitions and Power saving mode

5.5.4.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 8.4.

RQ1	Rel-7 to Rel-11	When the terminal activates Vcc (contact C1) the UICC shall enter the initial power state with the current consumption of the UICC complying with the value in ETSI TS 102 221 [2] for "power consumption of the UICC during ATR at 4 MHz external clock frequency".
RQ8	Rel-12 upwards	When the terminal activates Vcc (contact C1) under Class C operating conditions as defined in ETSI TS 102 221 [2], a UICC supporting ETSI TS 102 613 [1] shall enter the initial power state with the current consumption value defined for low power mode defined in clause 7.1.2. Otherwise, the UICC shall enter the initial power state as defined in ETSI TS 102 221 [2] "Application related electrical parameters".
RQ2		The UICC shall enter low power mode when this mode is indicated in a power mode frame during initial SWP interface activation or when the UICC receives the first non-ACT frame without having received a power mode frame during initial SWP interface activation.
RQ3		The UICC shall enter full power mode when this mode is indicated in a power mode frame during initial SWP interface activation, or if the conditions for full power mode on another interface are fulfilled.
RQ4	Rel-7 to Rel-11	During the initial power state, the UICC may already increase its current consumption to the value defined for low power mode as soon as it detects the SWP ACTIVATED state.
RQ5		The UICC shall enter the power saving mode when all of the following conditions for activated interfaces are given: • clock stop mode according to ETSI TS 102 221 [2] if this interface is activated (if UICC is in full power mode); • suspend mode according to ETSI TS 102 600 [3] if this interface is activated (if UICC is in full power mode); • one of the following conditions is met: o SWP contact deactivated (if UICC is in full power mode or in low power mode). The UICC shall enter the power saving mode no later than 10 ms after the SWP is in state **DEACTIVATED**. o The last information received on SWP was the SHDLC acknowledgment to the indication by the upper layer that the UICC requires no more activity on this interface (if UICC is in full power mode or in low power mode). The UICC shall enter the power saving mode not later than 10 ms after the SWP is in state **SUSPENDED**.
RQ6		When the UICC is in power saving mode it shall not exceed the current defined for clock stop mode in ETSI TS 102 221 [2] or the limit given for suspend mode in ETSI TS 102 600 [3] whatever the interface is activated.

RQ7		The UICC shall exit the power saving mode when at least one of the UICC interfaces is resumed from these conditions.
NOTE 1: The second part of RQ3 ("conditions for full power mode on another interface") is not tested, as it relates to the other interface and not to the SWP interface.		
NOTE 2: RQ7 is tested by checking the power consumption of the UICC after exiting the power saving mode (see table below).		

Requirements shall be verified as per table 5.1 (for Rel-7 to Rel-11) and as per table 5.2 (for Rel-12 and upwards).

Table 5.1 specifies the phases and UICC conformance values for each of the RQs for Rel-7 to Rel-11 UICCs.

Table 5.1: UICC conformance values (Rel-7 to Rel-11)

RQ	Start of phase	End of phase	UICC conformance value		Reference
			Class B	Class C	
RQ1	Vcc activated	End of first transition sequence	6 mA	4 mA	ETSI TS 102 221 [2]
RQ4	End of first transition sequence	End of first frame from CLF	6 mA	5 mA	ETSI TS 102 613 [1], clause 8.4
RQ2	End of first frame from CLF	While activated and not in power saving mode	N/A	5 mA	ETSI TS 102 613 [1], clause 8.4
RQ3	End of first frame from CLF	While activated and not in power saving mode	10 mA	10 mA	ETSI TS 102 221 [2]
RQ5, RQ6	Conditions in RQ5. Note particularly that power saving mode only applies at the given time after the conditions are fulfilled	Conditions in RQ6	100 µA	100 µA	ETSI TS 102 221 [2]
			100 µA	100 µA	ETSI TS 102 600 [3]
RQ7 full power mode	Conditions in RQ7. The UICC conformance value is based on full power mode which is re-entered by the UICC after exiting power saving mode	While activated and not in power saving mode	10 mA	10 mA	ETSI TS 102 221 [2]
RQ7 low power mode	Conditions in RQ7. The UICC conformance value is based on low power mode which is re-entered by the UICC after exiting power saving mode	While activated and not in power saving mode	N/A	5 mA	ETSI TS 102 613 [1], clause 8.4

Table 5.2 specifies the phases and UICC conformance values for each of the RQs for Rel-12 upwards UICCs.

Table 5.2: UICC conformance values (Rel-12 upwards)

RQ	Start of phase	End of phase	UICC conformance value		Reference
			Class B	Class C	
RQ8	Vcc activated	End of first frame from CLF	10 mA	5 mA	ETSI TS 102 613 [1], clause 8.4
RQ2	End of first frame from CLF	While activated and not in power saving mode	N/A	5 mA	ETSI TS 102 613 [1], clause 8.4
RQ3	End of first frame from CLF	While activated and not in power saving mode	10 mA	10 mA	ETSI TS 102 221 [2]
RQ5, RQ6	Conditions in RQ5. Note particularly that power saving mode only applies at the given time after the conditions are fulfilled	Conditions in RQ6, see note 1	100 µA or 200 µA	100 µA or 200 µA	ETSI TS 102 221 [2]
			100 µA or 200 µA	100 µA or 200 µA	ETSI TS 102 600 [3]
RQ7	Conditions in RQ7	While activated and not in power saving mode	10 mA	10 mA or 5 mA, see note 2	ETSI TS 102 613 [1], clause 8.4
NOTE 1: The limit for clock stop mode and suspend mode is determined in $EF_{UMPC,}$ "Additional information", see ETSI TS 102 221 [2]. If bit 1 is set to '0' the limit is 100 µA; if bit is set to '1' the limit is 200 µA.					
NOTE 2: When the UICC is in low power mode, 5 mA applies. When the UICC is in full power mode, 10 mA applies.					

Test case implementations shall not select any application on the ETSI TS 102 221 [2] interface; this ensures that the values given in the table for full power mode (10 mA) remain valid.

In the Test procedure tables in the test cases, the relevant RQs are mentioned in each step where they may occur. However, the RQ may only occur in part of that step; the table above shall be used to identify the period of time where the RQ is relevant.

5.5.4.2 Test case 1: power states in low power mode (ACT_POWER_MODE)

5.5.4.2.1 Test execution

The test procedure shall only be executed voltage class C, low power mode.

The test procedure shall be executed once for each of the following parameters:

- There are no test case-specific parameters for this test case.

5.5.4.2.2 Initial conditions

- None of the UICC contacts is activated.

5.5.4.2.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Activate Vcc (contact C1).	RQ1
2	T → UICC	Activate SWIO (contact C6).	RQ1, RQ4
3	UICC → T	Send ACT_SYNC frame.	RQ4
4	T → UICC	Send ACT_POWER_MODE frame indicating low power mode with FR bit set to 1.	RQ2, RQ4
5	UICC → T	Send ACT_SYNC frame.	RQ2

5.5.4.3 Test case 2: power states in low power mode (non-ACT)

5.5.4.3.1 Test execution

The test procedure shall only be executed in voltage class C, low power mode.

The test procedure shall be executed once for each of the following parameters:

- There are no test case-specific parameters for this test case.

5.5.4.3.2 Initial conditions

- None of the UICC contacts is activated.

5.5.4.3.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Activate Vcc (contact C1)	RQ1
2	T → UICC	Activate SWIO (contact C6)	RQ1, RQ4
3	UICC → T	Send ACT_SYNC frame	RQ4
4	T → UICC	Send RSET() frame	RQ2, RQ4
5	UICC → T	Send UA or RSET frame	RQ2

5.5.4.4 Test case 3: power states in full power mode, without ETSI TS 102 221

5.5.4.4.1 Test execution

The test procedure shall only be executed in voltage class B and voltage class C, full power mode.

The test procedure shall be executed once for each of the following parameters:

- There are no test case-specific parameters for this test case.

The contacts CLK, RST, I/O of the ETSI TS 102 221 [2] interface shall not be activated.

5.5.4.4.2 Initial conditions

- None of the UICC contacts is activated.

5.5.4.4.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Activate Vcc (contact C1).	RQ1
2	T → UICC	Activate SWIO (contact C6).	RQ1, RQ4
3	UICC → T	Send ACT_SYNC frame.	RQ4
4	T → UICC	Send ACT_POWER_MODE frame.	RQ3, RQ4
5	UICC → T	Send ACT_READY frame.	RQ3

5.5.4.5 Test case 4: power saving mode with ETSI TS 102 221 interface - restart ETSI TS 102 221 interface first

5.5.4.5.1 Test execution

The test procedure shall only be executed in voltage class B and voltage class C, full power mode.

The test procedure shall be executed for all of the following sequences, each of which activates the UICC and puts it into power saving mode in a particular order (see step 1). For each sequence, each part shall be executed sequentially.

- ISO reset + ATR - CLK stop - SWP activation and upper layer initialization - SWP deactivation
- ISO reset + ATR - SWP activation and upper layer initialization - CLK stop - SWP deactivation
- ISO reset + ATR - SWP activation and upper layer initialization - deactivation - CLK stop
- ISO reset + ATR - PPS - CLK stop - SWP activation and upper layer initialization - SWP deactivation
- ISO reset + ATR - SWP activation and upper layer initialization - PPS - CLK stop - SWP deactivation
- ISO reset + ATR - SWP activation and upper layer initialization - PPS - SWP deactivation - CLK stop
- SWP activation and upper layer initialization - ISO reset + ATR - CLK stop - SWP deactivation
- SWP activation and upper layer initialization - ISO reset + ATR - SWP deactivation - CLK stop
- SWP activation and upper layer initialization - ISO reset + ATR - PPS - CLK stop - SWP deactivation
- SWP activation and upper layer initialization - ISO reset + ATR- PPS - SWP deactivation - CLK stop

5.5.4.5.2 Initial conditions

The UICC is deactivated.

5.5.4.5.3 Test procedure

Step	Direction	Description	RQ
1	T ← → UICC	Execute the sequence specified in the Test execution clause.	
2	UICC	Power saving mode.	RQ5, RQ6
3	T → UICC	On the ETSI TS 102 221 [2] interface, restart the clock. Wait at least 744 clock cycles after restarting the clock.	
4	T → UICC	Send a C-APDU on the ETSI TS 102 221 [2] interface.	RQ7
5	UICC → T	Send an R-APDU on the ETSI TS 102 221 [2] interface.	RQ7
6	T → UICC	Initiate subsequent SWP interface activation.	RQ7
7	UICC → T	Send ACT_SYNC frame.	RQ7

5.5.4.6 Test case 5: power saving mode with ETSI TS 102 221 interface - restart ETSI TS 102 613 interface first

5.5.4.6.1 Test execution

The test procedure shall only be executed in voltage class B and voltage class C, full power mode.

The test procedure shall be executed for all of the following sequences, each of which activates the UICC and puts it into power saving mode in a particular order (see step 1). For each sequence, each part shall be executed sequentially.

- ISO reset +ATR - CLK stop - SWP activation and upper layer initialization - SWP deactivation
- ISO reset +ATR - SWP activation and upper layer initialization - CLK stop - SWP deactivation
- ISO reset +ATR - SWP activation and upper layer initialization - deactivation - CLK stop
- ISO reset +ATR - PPS - CLK stop - SWP activation and upper layer initialization - SWP deactivation
- ISO reset +ATR - SWP activation and upper layer initialization - PPS - CLK stop - SWP deactivation
- ISO reset + ATR - SWP activation and upper layer initialization - PPS - SWP deactivation - CLK stop
- SWP activation and upper layer initialization - ISO reset +ATR - CLK stop - SWP deactivation
- SWP activation and upper layer initialization - ISO reset +ATR - SWP deactivation - CLK stop
- SWP activation and upper layer initialization - ISO reset +ATR - PPS - CLK stop - SWP deactivation
- SWP activation and upper layer initialization - ISO reset +ATR- PPS - SWP deactivation - CLK stop

5.5.4.6.2 Initial conditions

The UICC is deactivated.

5.5.4.6.3 Test procedure

Step	Direction	Description	RQ
1	T ← → UICC	Execute the sequence specified in the Test execution clause.	
2	UICC	Power saving mode.	RQ5, RQ6
3	T → UICC	Initiate subsequent SWP interface activation.	
4	UICC → T	Send ACT_SYNC frame. RQ7 shall be validated for 10 ms after the SWIO is put high.	RQ7
5	T → UICC	On the ETSI TS 102 221 [2] interface, restart the clock. Wait at least 744 clock cycles after restarting the clock.	
6	T → UICC	Send a C-APDU on the ETSI TS 102 221 [2] interface.	RQ7
7	UICC → T	Send an R-APDU on the ETSI TS 102 221 [2] interface.	RQ7

5.5.4.7 Test case 6: power saving mode with ETSI TS 102 600 interface - restart ETSI TS 102 600 interface first

5.5.4.7.1 Test execution

The test procedure shall only be executed in voltage class B and voltage class C, full power mode.

The test procedure shall be executed once for each of the following parameters:

- There are no test case-specific parameters for this test case.

5.5.4.7.2 Initial conditions

- The SHDLC link is established.
- The ETSI TS 102 600 [3] interface is activated.

5.5.4.7.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Enter Suspend state on ETSI TS 102 600 [3] interface.	
2	T → UICC	Put SWP into **DEACTIVATED** state.	
3	UICC	Power saving mode.	RQ5, RQ6
4	T → UICC	Resume the ETSI TS 102 600 [3] interface.	
5	T → UICC	Send a C-APDU on the ETSI TS 102 600 [3] interface.	RQ7
6	UICC → T	Send an R-APDU on the ETSI TS 102 600 [3] interface.	RQ7
7	T → UICC	Initiate subsequent SWP interface activation.	RQ7
8	UICC → T	Send ACT_SYNC frame.	RQ7

5.5.4.8 Test case 7: power saving mode with ETSI TS 102 600 interface - restart ETSI TS 102 613 interface first

5.5.4.8.1 Test execution

The test procedure shall only be executed in voltage class B and voltage class C, full power mode.

The test procedure shall be executed once for each of the following parameters:

- There are no test case-specific parameters for this test case.

5.5.4.8.2 Initial conditions

- The SHDLC link is established.
- The ETSI TS 102 600 [3] interface is activated.

5.5.4.8.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Enter Suspend state on ETSI TS 102 600 [3] interface.	
2	T → UICC	Put SWP into **DEACTIVATED** state.	
3	UICC	Power saving mode.	RQ5, RQ6
4	T → UICC	Initiate subsequent SWP interface activation.	
5	UICC → T	Send ACT_SYNC frame. RQ7 shall be validated for 10 ms after the SWIO is put high.	RQ7
6	T → UICC	Resume the ETSI TS 102 600 [3] interface.	
7	T → UICC	Send a C-APDU on the ETSI TS 102 600 [3] interface.	RQ7
8	UICC → T	Send an R-APDU on the ETSI TS 102 600 [3] interface.	RQ7

5.5.4.9 Void

5.5.4.10 Test case 9: power saving mode in SUSPENDED, with ETSI TS 102 221 interface restarted first

5.5.4.10.1 Test execution

The test procedure shall only be executed in voltage class B and voltage class C, full power mode.

The test procedure shall be executed once for each of the following parameters:

- There are no test case-specific parameters for this test case.

5.5.4.10.2 Initial conditions

- SWIO (contact C6) is not activated.
- The ETSI TS 102 221 [2] interface is activated, ATR is sent and PPS is successfully completed.

5.5.4.10.3 Test procedure

Step	Direction	Description	RQ
1	UICC → T T → UICC	Perform initial SWP interface activation and SHDLC link establishment.	
2	UICC → T T → UICC	Perform HCI session initialization as per ETSI TS 102 622 [4])	
3	UICC → T	Send I-frame containing EVT_HCI_END_OF_OPERATION as per ETSI TS 102 622 [4]. If the UICC has not sent the I-frame containing EVT_HCI_END_OF_OPERATION within 1 s after step 2, abort the test procedure since the execution requirement is not fulfilled.	
4	T → UICC	Send SHDLC acknowledgement.	
5	T → UICC	Set the ETSI TS 102 221 [2] interface into clock stop mode.	
6	UICC	Power saving mode.	RQ5, RQ6
7	T → UICC	On the ETSI TS 102 221 [2] interface, restart the clock. Wait at least 744 clock cycles after restarting the clock.	
8	T → UICC	Send a C-APDU on the ETSI TS 102 221 [2] interface.	RQ7
9	UICC → T	Send an R-APDU on the ETSI TS 102 221 [2] interface.	RQ7
10	T → UICC	Resume SWP by switching SWP to the **DEACTIVATED** state as described in *DEACTIVATE* followed by switching SWP to the **ACTIVATED** state as described in *ACTIVATE*.	RQ7
11	UICC → T	Send ACT_SYNC frame.	RQ7

5.5.4.11 Test case 10: power saving mode in SUSPENDED, with ETSI TS 102 221 interface restarted after ETSI TS 102 613 interface

5.5.4.11.1 Test execution

The test procedure shall only be executed in voltage class B and voltage class C, full power mode.

The test procedure shall be executed once for each of the following parameters:

- There are no test case-specific parameters for this test case.

5.5.4.11.2 Initial conditions

- SWIO (contact C6) is not activated.
- The ETSI TS 102 221 [2] interface is activated, ATR is sent and PPS is successfully completed.

5.5.4.11.3 Test procedure

Step	Direction	Description	RQ
1	UICC → T T → UICC	Perform initial SWP interface activation and SHDLC link establishment.	
2	UICC → T T → UICC	Perform HCI session initialization as per ETSI TS 102 622 [4])	
3	UICC → T	Send I-frame containing EVT_HCI_END_OF_OPERATION as per ETSI TS 102 622 [4]. If the UICC has not sent the I-frame within 1 s after step 2, abort the test procedure since the execution requirement is not fulfilled.	
4	T → UICC	Send SHDLC acknowledgement.	
5	T → UICC	Set the ETSI TS 102 221 [2] interface into clock stop mode.	
6	UICC	Power saving mode.	RQ5, RQ6
7	T → UICC	Resume SWP by switching SWP to the **DEACTIVATED** state as described in *DEACTIVATE* followed by switching SWP to the **ACTIVATED** state as described in *ACTIVATE*.	
8	UICC → T	Send ACT_SYNC frame.	RQ7
9	T → UICC	On the ETSI TS 102 221 [2] interface, restart the clock. Wait at least 744 clock cycles after restarting the clock.	
10	T → UICC	Send a C-APDU on the ETSI TS 102 221 [2] interface.	RQ7
11	UICC → T	Send an R-APDU on the ETSI TS 102 221 [2] interface.	RQ7

5.5.4.12 Test case 11: power states in low power mode (ACT_POWER_MODE)

5.5.4.12.1 Test execution

The test procedure shall only be executed voltage class C, low power mode.

The test procedure shall be executed once for each of the following parameters:

- There are no test case-specific parameters for this test case.

5.5.4.12.2 Initial conditions

- None of the UICC contacts is activated.

5.5.4.12.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Activate Vcc (contact C1).	RQ8
2	T → UICC	Activate SWIO (contact C6).	RQ8
3	UICC → T	Send ACT_SYNC frame.	RQ8
4	T → UICC	Send ACT_POWER_MODE frame indicating low power mode with FR bit set to 1.	RQ2, RQ8
5	UICC → T	Send ACT_SYNC frame.	RQ2

5.5.4.13 Test case 12: power states in low power mode (non-ACT)

5.5.4.13.1 Test execution

The test procedure shall only be executed in voltage class C, low power mode.

The test procedure shall be executed once for each of the following parameters:

- There are no test case-specific parameters for this test case.

5.5.4.13.2 Initial conditions

- None of the UICC contacts is activated.

5.5.4.13.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Activate Vcc (contact C1)	RQ8
2	T → UICC	Activate SWIO (contact C6)	RQ8
3	UICC → T	Send ACT_SYNC frame	RQ8
4	T → UICC	Send RSET() frame	RQ2, RQ8
5	UICC → T	Send UA or RSET frame	RQ2

5.5.4.14 Test case 13: power states in full power mode, without ETSI TS 102 221

5.5.4.14.1 Test execution

The test procedure shall only be executed in voltage class B and voltage class C, full power mode.

The test procedure shall be executed once for each of the following parameters:

- There are no test case-specific parameters for this test case.

The contacts CLK, RST, I/O of the ETSI TS 102 221 [2] interface shall not be activated.

5.5.4.14.2 Initial conditions

- None of the UICC contacts is activated.

5.5.4.14.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Activate Vcc (contact C1).	RQ8
2	T → UICC	Activate SWIO (contact C6).	RQ8
3	UICC → T	Send ACT_SYNC frame.	RQ8
4	T → UICC	Send ACT_POWER_MODE frame.	RQ3, RQ8
5	UICC → T	Send ACT_READY frame.	RQ3

5.6 Data link layer

5.6.1 Overview

Reference: ETSI TS 102 613 [1], clause 9.1.

There are no conformance requirements for the UICC for the referenced clause.

5.6.2 Medium Access Control (MAC) layer

5.6.2.1 Bit order

5.6.2.1.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 9.2.1.

RQ1	The UICC shall send payload data with MSB first.
RQ2	The UICC shall interpret payload data received from the CLF with MSB first.
NOTE:	RQ1 and RQ2 are validated implicitly in other test cases within the present document.

5.6.2.1.2 Void

5.6.2.2 Structure

5.6.2.2.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 9.2.2.

RQ1	The UICC shall correctly interpret error free frames sent by CLF with at least one idle bit between the frames.
RQ2	Between frames, idle bits (logical value 0) are sent. There is at least one idle bit between frames.
RQ3	A wakeup sequence, consisting of a bit with logical value 1, shall be inserted immediately before the SOF FLAG for each frame sent from the slave to the master.
RQ4	The UICC shall reject incorrectly formed frames sent by CLF (this includes incorrect frame structures).
RQ5	The UICC shall send correctly formed frames to the CLF.

5.6.2.2.2 Test case 1: interpretation of incorrectly formed frames - ACT LLC

5.6.2.2.2.1 Test execution

The test procedure shall only be executed in voltage class B and voltage class C, full power mode.

The test procedure shall be executed once for each of the following parameters:

- Incorrectly formed ACT LLC frame:
  - ACT_POWER_MODE frame with wrong CRC16.
  - ACT_POWER_MODE frame, no SOF.
  - ACT LLC frame with ACT_POWER_MODE in the LLC control field, no CRC16.
  - ACT LLC frame with ACT_POWER_MODE in the LLC control field, followed by 7 bits with value 0, CRC16 calculated for a ACT_POWER_MODE frame indicating full power mode.
  - Frame with no Payload and no CRC16.

5.6.2.2.2.2 Initial conditions

- None of the UICC contacts is activated.

5.6.2.2.2.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Activate Vcc (contact C1).	
2	T → UICC	Activate SWIO (contact C6).	
3	UICC → T	Send ACT_SYNC frame.	RQ3, RQ5
4	T → UICC	Send incorrectly formed ACT LLC frame.	
5	UICC → T	No response.	RQ4
6	T → UICC	Send ACT_POWER_MODE frame.	
7	UICC → T	Respond with ACT_READY frame.	RQ1, RQ3, RQ5

5.6.2.2.3 Test case 2: interpretation of incorrectly formed frames - SHDLC RSET frames

5.6.2.2.3.1 Test execution

The test procedure shall be executed once for each of the following parameters.

- Incorrectly formed SHDLC LLC RSET frame:
  - RSET() frame with wrong CRC16.
  - RSET() frame, no SOF.
  - Frame with no Payload and no CRC16.

5.6.2.2.3.2 Initial conditions

- The SHDLC link is established and no further communication is expected.

5.6.2.2.3.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Send incorrectly formed SHDLC LLC RSET() frame.	
2	UICC → T	No response.	RQ4
3	T → UICC	Send RSET().	
4	T ← → UICC	Complete SHDLC link re-establishment.	RQ1, RQ3, RQ5

5.6.2.2.4 Test case 3: interpretation of incorrectly formed frames - SHDLC I-frames

5.6.2.2.4.1 Test execution

The test procedure shall be executed once for each of the following parameters:

- Incorrectly formed SHDLC LLC I-frame:
  - I-Frame with wrong CRC16.
  - I-Frame, no SOF.
  - Frame with no Payload and no CRC16.

5.6.2.2.4.2 Initial conditions

- The SHDLC link is established without SREJ support, and no further communication is expected.

5.6.2.2.4.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Send corrupted frame followed immediately by I-frame (NS0_S+2,x), where NS0_S is the sequence number of the last I-frame sent by the terminal simulator which was successfully acknowledged by the UICC.	
2	UICC → T	Send REJ(NS0_S+1).	RQ3, RQ4, RQ5

5.6.2.2.5 Test case 4: communication with frames - idle bits and wakeup sequence

5.6.2.2.5.1 Test execution

The test procedure shall be executed once for each of the following parameters:

- There are no test case-specific parameters for this test case.

5.6.2.2.5.2 Initial conditions

- None of the UICC contacts is activated.

5.6.2.2.5.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Activate Vcc (contact C1).	
2	T → UICC	Activate SWIO (contact C6).	
3	UICC → T T → UICC	Perform SWP interface activation and SHDLC link establishment.	RQ2, RQ3
4	User → UICC	Trigger the UICC to send 9 I-frames. Where possible, the UICC should be triggered in such a way that the I-frames will be sent in as close succession as possible.	
5	UICC → T T → UICC	UICC sends I-Frames as indicated in step 4. Terminal simulator acknowledges these I-frames.	RQ2, RQ3
6	T → UICC	Send 4 consecutive I-frames, with at least two occurrences of consecutive I-frames transmitted with a single idle bit between the frames.	
7	UICC → T	UICC acknowledges these frames. If UICC sends RNR, the Terminal simulator shall wait for the RR for a maximum of 100 ms. The Terminal simulator shall resume the traffic with the I-frame indicated in the RR. If the Terminal simulator has no data to send, it shall send an empty I-frame. If the RR is not received within 100 ms, this is a failure of the UICC.	RQ1

5.6.2.3 Bit stuffing

5.6.2.3.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 9.2.3.

RQ1	Zero bit stuffing shall be employed by the transmitting entity when sending the payload and the CRC on SWP. After five consecutive bits with the logical value 1, a bit with the logical value 0 is inserted.
RQ2	If the last five bits of the CRC contain the logical value 1, then no bit with the logical value 0 shall be added.
RQ3	In a received frame, the UICC shall recognize stuffed bits and discard them.

5.6.2.3.2 Test case 1: behaviour of UICC with bit stuffing in frame

5.6.2.3.2.1 Test execution

The test procedure shall be executed once for each of the following parameters:

- There are no test case-specific parameters for this test case.

5.6.2.3.2.2 Initial conditions

- The SHDLC link is established and no further communication is expected.

5.6.2.3.2.3 Test procedure

Step	Direction	Description	RQ
1	T ← → UICC	Run the representative SWP frame exchange procedure. The following patterns (specified before bit stuffing has been applied) shall be generated in both directions (to the UICC and from the UICC), and using a separate I-frame for each pattern: • '011111111110'b during the SWP frame payload; • '011111'b at the end of the SWP frame payload; • '0111110'b where the second "1" is the last bit of the SWP frame payload and the third "1" is the first bit of the CRC; • '011111'b at the end of the CRC; • '0111110'b at the end of the CRC. For I-frames transmitted by the UICC, validate that the correct bits are transmitted. For I-frames transmitted by the simulator, validate that the UICC acknowledges these I-frames.	RQ1 RQ2, RQ3
NOTE: The pattern of '111110b' at the start of the SWP frame payload is implicitly tested in every RSET frame.			

5.6.2.4 Error detection

5.6.2.4.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 9.2.4.

RQ1	Frames transmitted by UICC shall use the 16 bit frame checking sequence as given in ISO/IEC 13239 [9] on bits between SOF and EOF, which are both excluded, to compute the CRCs.
RQ2	The UICC shall detect errors on received frames using the 16 bit frame checking sequence as given in ISO/IEC 13239 [9] on bits between SOF and EOF, which are both excluded.

5.6.2.4.2 Test case 1: RSET with CRC error

5.6.2.4.2.1 Test execution

The test procedure shall be executed once for each of the following parameters:

- There are no test case-specific parameters for this test case.

5.6.2.4.2.2 Initial conditions

- SWP interface is activated.

5.6.2.4.2.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Send RSET() with CRC error.	
2	UICC	No response.	RQ2
3	T → UICC	Send RSET().	
4	UICC → T	Respond UA or RSET.	RQ1

5.6.3 Supported LLC layers

5.6.3.1 Supported LLC layers

5.6.3.1.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 9.3.

RQ1	The UICC shall support the SHDLC LLC layer.
RQ2	The UICC shall support the ACT LLC layer.
RQ3	LPDUs shall be structured according to ETSI TS 102 613 [1].

5.6.3.1.2 Test case 1: support of ACT LLC and ACT LPDU structure

5.6.3.1.2.1 Test execution

The test procedure shall only be executed in voltage class B and voltage class C, full power mode.

The test procedure shall be executed once for each of the following parameters:

- There are no test case-specific parameters for this test case.

5.6.3.1.2.2 Initial conditions

- None of the UICC contacts is activated.

5.6.3.1.2.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Activate Vcc (contact C1).	
2	T → UICC	Activate SWIO (contact C6).	
3	UICC → T	Send ACT_SYNC frame.	RQ2, RQ3
4	T → UICC	Send ACT_POWER_MODE frame.	
5	UICC → T	Send ACT_READY frame.	RQ2, RQ3

5.6.3.1.3 Test case 2: support of SHDLC LLC and SHDLC LPDU structure

5.6.3.1.3.1 Test execution

The test procedure shall only be executed in voltage class B and voltage class C, full power mode.

The test procedure shall be executed once for each of the following parameters:

- There are no test case-specific parameters for this test case.

5.6.3.1.3.2 Initial conditions

- The SWP interface is activated.

5.6.3.1.3.3 Test procedure

Step	Direction	Description	RQ
1	T ← → UICC	Perform SHDLC link establishment.	
2	T ← → UICC	Run the representative SWP frame exchange procedure. Exchange of I-frames and S-frames in both directions shall be included.	RQ1, RQ3

5.6.3.2 Interworking of the LLC layers

5.6.3.2.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clauses 9.3.1 and 11.6.2.

RQ1	9.3.1	After the SWIO activation or after the transition of S1 to state H from **DEACTIVATED** state, the ACT LLC shall be used by the UICC.
RQ2	9.3.1	After the UICC and the CLF have established the SHDLC link, the UICC shall not send ACT LLC frames.
RQ3	9.3.1	After the UICC and the CLF have opened a CLT session, the UICC shall not send ACT LLC frames.
RQ4	9.3.1	After the UICC and the CLF have established the SHDLC link, the UICC shall ignore received ACT LLC frames.
RQ5	9.3.1	After the UICC and the CLF have opened a CLT session, the UICC shall ignore received ACT LLC frames.
RQ6	9.3.1	To enter the SHDLC LLC for the first time after SWP interface activation, the link establishment procedure (as described in ETSI TS 102 613 [1]) shall apply.
RQ7	9.3.1	Once the SHDLC link is established, a CLT session shall not invalidate the SHDLC context and the endpoint capabilities negotiated during the SHDLC link establishments.
RQ8	9.3.1	During a CLT session, if an SHDLC LLC frame is received by the UICC, then the UICC shall consider the CLT session as closed.
RQ9	9.3.1	On receiving a corrupted SWP frame, the UICC shall use the error recovery procedure defined for LLC of the last correctly received SWP frame.
RQ10	9.3.1	Immediately after SWIO activation or after the transition of S1 to state H from **DEACTIVATED** state, the error handling of the ACT LLC shall apply.
RQ11	9.3.1	The UICC shall not send the first non-ACT frame after SWP interface activation.
RQ12	11.6.2	The UICC shall not send a CLT frame before having received a CLT frame with the ADMIN_FIELD set to CL_PROTO_INF(A) or CL_PROTO_INF(F).
NOTE 1: RQ2 and RQ3 are non-occurrence RQs. NOTE 2: Development of test cases for RQ2 and RQ3 is FFS. NOTE 3: Test cases for RQ6 are given also in clause 5.7 of the present document. NOTE 4: RQ9 is tested in clause 5.6.2.2.4 in the context of the SHDLC LLC.		

5.6.3.2.2 Test case 1: error handling of ACT LLC on reception of corrupted frame, after SWIO activation

5.6.3.2.2.1 Test execution

The test procedure shall only be executed in voltage class B and voltage class C, full power mode.

The test procedure shall be executed once for each of the following parameters:

- There are no test case-specific parameters for this test case.

5.6.3.2.2.2 Initial conditions

- None of the UICC contacts is activated.

5.6.3.2.2.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Activate Vcc (contact C1).	
2	T → UICC	Activate SWIO (contact C6).	
3	UICC → T	Send ACT_SYNC frame.	RQ1
4	T → UICC	Send corrupted frame.	
5	UICC → T	No response.	RQ10,
6	T → UICC	Send ACT_POWER_MODE frame with FR=0.	
7	UICC → T	Send ACT_READY frame.	
8	T → UICC	Send corrupted frame.	
9	UICC → T	No response.	RQ9
10	T → UICC	Put SWP in **DEACTIVATED** state.	
11	T → UICC	Initiate subsequent interface activation.	
12	UICC → T	Send ACT_SYNC frame.	RQ1
13	T → UICC	Send corrupted frame.	
14	UICC → T	No response.	RQ10
15	T ← → UICC	Perform SHDLC link establishment.	RQ10

5.6.3.2.3 Test case 2: ignore ACT LLC frame reception after the SHDLC link establishment

5.6.3.2.3.1 Test execution

The test procedure shall be executed once for each of the following parameters:

- There are no test case-specific parameters for this test case.

5.6.3.2.3.2 Initial conditions

- The SHDLC link is established and no further communication is expected.

5.6.3.2.3.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Send ACT_POWER_MODE frame.	
2	UICC	No response or response not based on ACT LLC.	RQ4
3	T → UICC	Send I-frame.	
4	UICC → T	Acknowledge I-frame.	RQ4

5.6.3.2.4 Test case 3: ignore ACT LLC frame reception in CLT session

5.6.3.2.4.1 Test execution

The test procedure shall be executed once for each of the following parameters:

- CLT LLC transporting ISO/IEC 14443-3 [6] type A data, if available, and CLT LLC transporting ISO/IEC 18092 [8] data, if available.

5.6.3.2.4.2 Initial conditions

- The CLT session has been opened and last frame exchange was a UICC response based on CLT LLC.

5.6.3.2.4.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Send ACT_POWER_MODE frame.	
2	UICC	No response or response not based on ACT LLC.	RQ5
3	T → UICC	Send valid CLT frame with ADMIN_FIELD = No administrative command.	
4	UICC → T	Send valid CLT response frame.	RQ5

5.6.3.2.5 Void

5.6.3.2.6 Test case 5: closing condition of CLT session whereas SHDLC link has been established before CLT session

5.6.3.2.6.1 Test execution

The test procedure shall be executed once for each of the following parameters:

- CLT LLC transporting ISO/IEC 14443-3 [6] type A data, if available, and CLT LLC transporting ISO/IEC 18092 [8] data, if available.

5.6.3.2.6.2 Initial conditions

- The SHDLC link was established before opening of CLT session.
- The CLT session has been opened and last frame exchange was a UICC response based on CLT LLC.

5.6.3.2.6.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Send I-frame.	
2	UICC → T	Acknowledge I-frame.	
3	T → UICC	Send CLT frame which is not valid to open a CLT session.	
4	UICC → T	No response or response not based on CLT session.	RQ8, RQ12

5.6.3.2.7 Test case 6: closing condition of CLT session whereas SHDLC link has not been established before CLT session

5.6.3.2.7.1 Test execution

The test procedure shall be executed once for each of the following parameters:

- CLT LLC transporting ISO/IEC 14443-3 [6] type A data, if available, and CLT LLC transporting ISO/IEC 18092 [8] data, if available.

5.6.3.2.7.2 Initial conditions

- The SHDLC link was not established before opening of CLT session.
- The CLT session has been opened and last frame exchange was a UICC response based on CLT LLC.

5.6.3.2.7.3 Test procedure

Step	Direction	Description	RQ
1	T ← →UICC	Perform SHDLC link establishment.	
2	T → UICC	Send CLT frame which is not valid to open a CLT session.	
3	UICC → T	No response or response not based on CLT session.	RQ8, RQ12

5.6.3.2.8 Test case 7: interpretation of corrupted frames - single SHDLC frame

5.6.3.2.8.1 Test execution

The test procedure shall be executed once for each of the following parameters:

- There are no test case-specific parameters for this test case.

5.6.3.2.8.2 Initial conditions

- The SHDLC link is established and no further communication is expected.

5.6.3.2.8.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Send corrupted frame.	
2	UICC → T	No response.	RQ9
3	T → UICC	Send I-frame.	
4	UICC → T	Acknowledge I-frame.	RQ9

5.6.3.2.9 Void

5.6.3.2.10 Test case 9: interpretation of corrupted frames - CLT frames

5.6.3.2.10.1 Test execution

The test procedure shall be executed once for each of the following parameters:

- CLT LLC transporting ISO/IEC 14443-3 [6] type A data, if available, and CLT LLC transporting ISO/IEC 18092 [8] data, if available.

5.6.3.2.10.2 Initial conditions

- The CLT session has been opened and last frame exchange was a UICC response based on CLT LLC.

5.6.3.2.10.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Send corrupted frame.	
2	UICC → T	No response.	RQ9
3	T → UICC	Send valid CLT frame with ADMIN_FIELD = No administrative command.	
4	UICC → T	Send valid CLT response frame.	RQ9

5.6.3.2.11 Test case 10: first non-ACT frame sent by CLF - initial interface activation

5.6.3.2.11.1 Test execution

The test procedure shall be executed once for each of the following parameters:

- There are no test case-specific parameters for this test case.

5.6.3.2.11.2 Initial conditions

- None of the UICC contacts is activated.

5.6.3.2.11.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Activate Vcc (contact C1).	
2	T → UICC	Activate SWIO (contact C6).	
3	UICC → T T → UICC	Perform initial SWP interface activation.	
4	-	Wait for 1 second. The UICC shall not send any frames.	RQ11
5	UICC → T T → UICC	Perform SHDLC link establishment.	RQ11

5.6.3.2.12 Test case 11: first non-ACT frame sent by CLF - subsequent interface activation

5.6.3.2.12.1 Test execution

The test procedure shall only be executed in full power mode.

The test procedure shall be executed once for each of the following parameters:

- Voltage class B;
- Voltage class C.

5.6.3.2.12.2 Initial conditions

- SWP resides in **DEACTIVATED** state, and previously an initial SWP interface activation has been successful.

5.6.3.2.12.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Activate SWIO (contact C6).	
2	UICC → T T → UICC	Perform subsequent SWP interface activation.	
3	-	Wait for 1 second. The UICC shall not send any frames.	RQ11
4	UICC → T T → UICC	Perform SHDLC link establishment.	RQ11

5.6.3.2.13 Test case 12: CLT session during SHDLC communication

5.6.3.2.13.1 Test execution

The test procedure shall be executed once for each of the following parameters:

- CLT LLC transporting ISO/IEC 14443-3 [6] type A data, if available, and CLT LLC transporting ISO/IEC 18092 [8] data, if available.

5.6.3.2.13.2 Initial conditions

- The SWP interface is activated.

5.6.3.2.13.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Send RSET(4, SREJ).	
2	UICC → T	Complete the SHDLC link establishment.	
3	T ← → UICC	Exchange the SHDLC frames according to upper layer, at least as needed to enter a CLT session.	
4	T	Wait until no further communication is expected over the SHDLC link.	
5	T → UICC	Send CLT frame to open a CLT session.	
6	UICC → T	Send valid CLT response frame.	
7	T → UICC	Send I-frame(NS0_S,x).	
8	UICC → T	Acknowledge I-frame(NS0_S,x).	RQ7
9	T → UICC	Send I-frame(NS0_S+2,x).	
10	UICC → T	If (O_SREJ) is supported send SREJ(NS0_S+1), else send REJ(NS0_S+1).	RQ7
11	T → UICC	If (O_SREJ) is supported send I-frame (NS0_S+1,x) else send I-frame (NS0_S+1,x) and I-frame (NS0_S+2,x).	
12	UICC → T	Acknowledge I-frame(NS0_S+1,x) and I-frame(NS0_S+2,x).	RQ7
13	T → UICC	Send I-frame(NS0_S+3, x).	
14	UICC → T	Acknowledge I-frame(NS0_S+3,x).	RQ7
15	User → UICC	Trigger the UICC to send 9 I-frames.	
16	T ← → UICC	UICC sends I-Frames as indicated in step 15. Terminal simulator acknowledges these frames just before T1 expires and using the maximum allowed value for NR, using RR frames unless the upper layer requires the transmission of I-frames.	RQ7

5.6.4 ACT LLC definition

5.6.4.1 ACT LLC definition

5.6.4.1.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 9.4.

NOTE: Test cases for conformance requirements for clause 9.4 are also given in clause 5.3.2.3.

RQ1		The ACT LPDU shall be structured according to ETSI TS 102 613 [1].
RQ2		When a UICC receives an ACT frame, it shall ignore the INF bit.
RQ3		A frame sent from the UICC to the CLF shall have the FR bit set to 0.
RQ4		ACT_READY frames shall have an ACT_DATA field length of zero bytes.
RQ5		ACT_SYNC frames shall have an ACT_DATA field length of two bytes.
RQ6		The UICC shall not use RFU values in the ACT_CTRL field when transmitting frames.
RQ7	Rel-7 Rel-8	Bits b8 to b3 of ACT_INFORMATION field shall all have the value 0.
RQ8		Extended SWP bit duration down to 0,590 µs shall be supported if b2 of ACT_INFORMATION field is 1.
RQ9		Extended SWP bit durations up to 10 µs shall be supported if b1 of ACT_INFORMATION field is 1.
RQ10	Rel-9	Bits b8 to b4 of ACT_INFORMATION field shall all have the value 0.
RQ11	Rel-9	Extended resume shall be supported if b3 of ACT_INFORMATION field is 1.
NOTE: RQ11 testing is FFS.		

5.6.4.1.2 Test case 1: structure of ACT LPDU - full power mode

5.6.4.1.2.1 Test execution

The test procedure shall only be executed in voltage class B and voltage class C, full power mode.

The test procedure shall be executed once for each of the following parameters:

- There are no test case-specific parameters for this test case.

5.6.4.1.2.2 Initial conditions

- None of the UICC contacts is activated.

5.6.4.1.2.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Activate Vcc (contact C1).	
2	T→ UICC	Activate SWIO (contact C6).	
3	UICC → T	Send ACT_SYNC frame.	RQ1, RQ3, RQ5, RQ6.
4	T → UICC	Send ACT_POWER_MODE frame.	
5	UICC → T	Send ACT_READY frame.	RQ1, RQ3, RQ4, RQ6

5.6.4.1.3 Test case 2: structure of ACT LPDU - low power mode

5.6.4.1.3.1 Test execution

The test procedure shall only be executed in voltage class C, low power mode.

The test procedure shall be executed once for each of the following parameters:

- There are no test case-specific parameters for this test case.

5.6.4.1.3.2 Initial conditions

- None of the UICC contacts is activated.

5.6.4.1.3.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Activate Vcc (contact C1).	
2	T → UICC	Activate SWIO (contact C6).	
3	UICC → T	Send ACT_SYNC frame.	RQ1, RQ3, RQ5, RQ6
4	T → UICC	Send ACT_POWER_MODE frame with FR=1.	
5	UICC → T	Send ACT_SYNC frame.	RQ1, RQ3, RQ5, RQ6

5.6.4.1.4 Test case 3: behaviour of UICC on reception of ACT frames - values of INF bit

5.6.4.1.4.1 Test execution

The test procedure shall only be executed in voltage class B and in voltage class C, full power mode.

The test procedure shall be executed once for each of the following parameters.

- ACT_POWER_MODE frame:
  - INF=0;
  - INF=1.

5.6.4.1.4.2 Initial conditions

- None of the UICC contacts is activated.

5.6.4.1.4.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Activate Vcc (contact C1).	
2	T → UICC	Activate SWIO (contact C6).	
3	UICC → T	Send ACT_SYNC frame.	
4	T → UICC	Send ACT_POWER_MODE frame.	
5	UICC → T	Send ACT_READY frame.	RQ2

5.6.4.1.5 Test case 4: RFU values in ACT_INFORMATION field

5.6.4.1.5.1 Test execution

The test procedure shall only be executed in full power mode.

The test procedure shall only be executed for releases 7 and 8.

The test procedure shall be executed once for each of the following parameters:

- Voltage class B;
- Voltage class C.

5.6.4.1.5.2 Initial conditions

- None of the UICC contacts is activated.

5.6.4.1.5.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Activate Vcc (contact C1).	
2	T → UICC	Activate SWIO (contact C6).	
3	UICC → T	Send ACT_SYNC frame (with ACT_INFORMATION field).	RQ7

5.6.4.1.6 Test case 5: extended bit durations as per ACT_INFORMATION field

5.6.4.1.6.1 Test execution

The test procedure shall only be executed in voltage class B and in voltage class C, full power mode.

The test procedure shall be executed once for each of the following parameters:

- For ACT_POWER_MODE and ACT_READY, apply the following bit duration:
  - If the DUT supports O_EXTENDED_T_UPPER but not O_EXTENDED_T_LOWER:
    - 10 µs.
  - If the DUT supports O_EXTENDED_T_LOWER but not O_EXTENDED_T_UPPER:
    - 0,590 µs.
  - If the DUT supports O_EXTENDED_T_LOWER and O_EXTENDED_T_UPPER:
    - 10 µs and 0,590 µs.

5.6.4.1.6.2 Initial conditions

- None of the UICC contacts is activated.

5.6.4.1.6.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Activate Vcc (contact C1).	
2	T → UICC	Activate SWIO (contact C6).	
3	UICC → T	Send ACT_SYNC frame (with ACT_INFORMATION field).	
4	T → UICC	Send ACT_POWER_MODE frame.	
5	UICC → T	Send ACT_READY frame.	RQ8, RQ9

5.6.4.1.7 Test case 6: RFU values in ACT_INFORMATION field

5.6.4.1.7.1 Test execution

The test procedure shall only be executed in full power mode.

The test procedure shall be executed from release 9 onwards only.

The test procedure shall be executed once for each of the following parameters:

- Voltage class B;
- Voltage class C.

5.6.4.1.7.2 Initial conditions

- None of the UICC contacts is activated.

5.6.4.1.7.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Activate Vcc (contact C1).	
2	T → UICC	Activate SWIO (contact C6).	
3	UICC → T	Send ACT_SYNC frame (with ACT_INFORMATION field).	RQ10

5.6.4.2 SYNC_ID verification process

5.6.4.2.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 9.4.1.

RQ1	The UICC shall send an ACT_SYNC frame containing 'verification data' when the SWP interface is activated.
NOTE:	For RQ1,the presence of the SYNC_ID is covered by RQ5 in clause 5.6.4.1. Further use of verification data is up to upper layer and is out of scope of the present document.

5.7 SHDLC LLC definition

5.7.1 SHDLC overview

5.7.1.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 10.1.

RQ1	The SHDLC layer in an endpoint shall ensure that data passed up to the next layer has been received exactly as transmitted (i.e. error free, without loss and in the correct order).
RQ2	If an endpoint receives a corrupted frame, it shall discard the frame.

5.7.1.2 Test Case 1: data passed up to the next layer

5.7.1.2.1 Test execution

The test procedure shall be executed once for each of the following parameters:

- There are no test-case specific parameters for this test.

The data sent by the terminal simulator shall have the following characteristics:

- The message in the EVT_POST_DATA shall be fragmented into 9 I-frames.

5.7.1.2.2 Initial conditions

- SHDLC link is established.
- A pipe (PIPE_LOOP_BACK) has been created to the HCI host's loopback gate, and is currently open.

5.7.1.2.3 Test procedure

Step	Direction	Description	RQ
1	T ← → UICC	Send from the terminal simulator an EVT_POST_DATA message containing referenced sent data on PIPE_LOOP_BACK. Send back from the UICC a corresponding EVT_POST_DATA message containing the referenced data on PIPE_LOOP_BACK in the expected order.	RQ1

5.7.1.3 Test Case 2: error management, UICC sending I-Frame

5.7.1.3.1 Test execution

The test procedure shall only be executed in voltage class B and in voltage class C, full power mode.

The test procedure shall be executed once for each of the following parameters:

- There are no test-case specific parameters for this test.

5.7.1.3.2 Initial Conditions

- SHDLC link is established and idle, i.e. no further communication is expected.

5.7.1.3.3 Test procedure

Step	Direction	Description	RQ
1	T→ UICC	Send a corrupted RNR frame.	
2	User → UICC	Trigger the UICC to send an I-frame.	
3	UICC → T	Send I(NS0_T,x).	RQ2
4	T → UICC	Send a corrupted RR(NS0_T+1) frame.	
5	T	Wait at least T2 time and does not acknowledge the received frame.	
6	UICC → T	Send I(NS0,x).	RQ2

5.7.1.4 Test Case 3: error management

5.7.1.4.1 Test execution

The test procedure shall be executed once for each of the following parameters:

- There are no test-case specific parameters for this test.

5.7.1.4.2 Initial Conditions

- SHDLC link is established and idle, i.e. no further communication is expected.

5.7.1.4.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Send a corrupted I-frame.	
2	T ← → UICC	The terminal simulator waits at least 20 ms and do not retransmit it. The UICC does not send any frame.	RQ2
3	T → UICC	Send a corrupted RSET frame.	
4	T ← → UICC	The terminal simulator waits at least T3 time and do not retransmit it. UICC does not send any frame.	RQ2

5.7.2 Endpoints

5.7.2.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 10.2.

There are no conformance requirements for the UICC for the referenced clause.

5.7.3 SHDLC frames types

5.7.3.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 10.3.

There are no conformance requirements for the UICC for the referenced clause.

5.7.4 Control Field

5.7.4.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 10.4.

All conformance requirements for the referenced clause are included in clause 5.7.7.3.1 of the present document.

5.7.4.2 I-Frames coding

5.7.4.2.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 10.4.1.

There are no conformance requirements for the UICC for the referenced clause.

5.7.4.3 S-Frames coding

5.7.4.3.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 10.4.2.

RQ1	Optional type of frame shall not be used before capability negotiation is defined during initialization.
RQ2	Only one SREJ shall remain outstanding on each link direction at any one time.
RQ3	An endpoint shall not send a S-frame with an information field.
RQ4	An SREJ shall be transmitted for each erroneous frame; each frame is treated as a separate error.
NOTE 1: RQ1, RQ2 and RQ4 for the referenced clause are included in clause 5.7.7.9.1 of the present document. NOTE 2: RQ3 is a non-occurrence RQ.	

5.7.4.4 U-Frames coding

5.7.4.4.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 10.4.3.

RQ1	An endpoint shall only send U-Frames using modifiers specified in ETSI TS 102 613 [1].
NOTE: RQ1 is not tested, as it is a non-occurrence RQ.	

5.7.5 Changing sliding window size and endpoint capabilities

5.7.5.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 10.5.

All conformance requirements for the referenced clause are included in clause 5.7.7.3.1 of the present document.

5.7.5.2 RSET frame payload

5.7.5.2.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 10.5.1.

All conformance requirements for the referenced clause are included in clause 5.7.7.3.1 of the present document.

5.7.5.3 UA frame payload

5.7.5.3.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 10.5.2.

All conformance requirements for the referenced clause are included in clause 5.7.7.3.1 of the present document.

5.7.5.3.2 Void

5.7.6 SHDLC context

5.7.6.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 10.6.

There are no conformance requirements for the UICC for the referenced clause.

5.7.6.2 Constants

5.7.6.2.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 10.6.1.

RQ1	I-frames shall be acknowledged within T1.
RQ2	If the I-frames are not acknowledged, an endpoint shall retransmit these frames not sooner than T2.
RQ3	An endpoint shall retry to setup link if the targeted endpoint did not answer with a UA or a RSET frame to a RSET frame within T3 (5 ms).
NOTE 1: RQ1 for the referenced clause is included in clause 5.7.7.5.1 of the present document. NOTE 2: RQ2 for the referenced clause is included in clause 5.7.7.7.1 of the present document. NOTE 3: RQ3 for the referenced clause is included in clause 5.7.7.3.1 of the present document.	

5.7.6.3 Variables

5.7.6.3.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 10.6.2.

All conformance requirements for the referenced clause are included in clause 5.7.7.5.1 of the present document.

5.7.6.4 Initial Reset state

5.7.6.4.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 10.6.3.

RQ1	The following initial states shall apply in every endpoint after successful link establishment: N(S) = N(R) = DN(R) = 0.
NOTE: RQ1 is only tested in a standardized manner for the scenario in which the terminal initiates SHDLC link establishment. For the scenario in which the UICC initiates SHDLC link establishment, see Annex C.	

5.7.6.4.2 Void

5.7.6.4.3 Test case 2: initial state at link reset - reset by the terminal simulator

5.7.6.4.3.1 Test execution

The test procedure shall only be executed in voltage class B and in voltage class C, full power mode.

Run this test procedure with each of the following initial conditions:

- The SWP interface is activated and SHDLC link is not established.
- SHDLC link is established and idle, i.e. no further communication is expected.

5.7.6.4.3.2 Initial conditions

The initial conditions shall be established as specified in the test execution clause.

5.7.6.4.3.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Send RSET(Ws=2, SREJ=0).	
2	UICC → T	Send UA.	
3	Conditional User → UICC	If the UICC does not immediately send I-frames after SHDLC link establishment, trigger the UICC to send an I-frame. If the trigger involves sending I-frames to the UICC, only one I-frame shall be sent.	
4	UICC → T	Send I-frame(0,NR). If the trigger in step 3 involved sending an I-frame to the UICC, NR = 1, else NR = 0.	RQ1
5	T → UICC	Send RR(1).	
6	Conditional	If the UICC continue to send I-frames, acknowledge them.	
7	T → UICC	Send I-frame(NS,NR).	
8	UICC → T	Acknowledge the previously sent I-frame.	RQ1

5.7.7 SHDLC sequence of frames

5.7.7.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 10.7.

There are no conformance requirements for the UICC for the referenced clause.

5.7.7.2 Nomenclature

5.7.7.2.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 10.7.1.

There are no conformance requirements for the UICC for the referenced clause.

5.7.7.3 Link establishment with default sliding window size

5.7.7.3.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clauses 10.7.2, 10.7.4, 10.4, 10.5, 10.1 and 10.5.2.

RQ1	10.7.2	An endpoint establishing an SHDLC link shall initiate link establishment by sending a RSET frame.
RQ2	10.7.2	If an endpoint supports the sliding window size and SREJ value in the RSET frame, it shall acknowledge that frame with a UA frame.
RQ3	10.7.2	An endpoint receiving a RSET frame without window size and/or endpoint capabilities field shall interpret the RSET frame as if it contained the default values.
RQ4	10.7.2	Before link establishment, all SHDLC frames except RSET from other endpoint shall be discarded.
RQ5	10.7.2	If the link is re-established, all buffered frames (received out of order or stored in the retransmission queue) shall be discarded.
RQ6	10.7.2	If the link is re-established, an endpoint shall inform the upper layer of a link reset.
RQ7	10.7.2	An endpoint shall support a link re-establishment which is initiated by the peer endpoint.
RQ8	10.4	An endpoint's default size of sliding window shall be four frames.
RQ9	10.5	If the initial sliding window size is too large or SREJ support is requested and the receiving endpoint cannot handle (at least one) of those features, it shall not acknowledge the RSET frame. Instead, the receiver shall send a RSET frame with an appropriate sliding window size and/or SREJ frame support bit.
RQ10	10.5	An endpoint shall obey to window size reconfiguration and/or SREJ support if the requested window size is lower than its default configuration or the peer endpoint does not support SREJ frames.
RQ11	10.5.1	The number provided for the endpoint sliding window size shall be between 2 to 4 inclusive.
RQ12	10.5.1	In case this RSET frame is sent in response to a received RSET frame, the endpoint size value shall not be higher than the previously provided value.
RQ13	10.5.1	If an RSET frame is received without the second optional byte the default value of SREJ not supported should be used.
RQ14	10.6.1	An endpoint shall retry to setup link if the targeted endpoint did not answer with a UA or a RSET frame to a RSET frame within T3 (5 ms).
RQ15	10.7.4	Once the link is established, an endpoint shall be able to receive data.
RQ16	10.5.2	The endpoint shall not include a payload in UA frames.
RQ17	10.5	If one or more of the indicated endpoint capabilities are not supported by the receiving endpoint, it shall answer with a RSET frame indicating only the supported endpoint capabilities. In this case the RSET response may contain the same window size.
RQ18	10.5.1	A RSET frame response shall not indicate the same window size and the same endpoint capabilities as the received RSET frame; in such a case a UA frame shall be sent.
NOTE 1: Tests for RQ6 are out of scope of the present document. NOTE 2: Part of RQ5 related to discarding frame in the retransmission buffer when the link is re-establish will not be tested. NOTE 3: RQ1, RQ2, RQ10, RQ14, RQ15 and RQ18 are only tested in a standardized manner for the scenario in which the terminal initiates SHDLC link establishment. For the scenario in which the UICC initiates SHDLC link establishment, see Annex C.		

5.7.7.3.2 Void

5.7.7.3.3 Test Case 2: link establishment by the terminal simulator

5.7.7.3.3.1 Test execution

For every RSET frame in the table below which contains a window size and endpoint capabilities which are supported by the endpoint under test:

RSET()
RSET(2)
RSET(3)
RSET(4)
RSET(2, SREJ=0)
RSET(2, SREJ=1)
RSET(3, SREJ=0)
RSET(3, SREJ=1)
RSET(4, SREJ=0)
RSET(4, SREJ=1)

Run the test procedure with the following initial conditions:

- The SWP interface is activated and SHDLC link is not established.
- The SHDLC link is established and idle, i.e. no further communication is expected.

5.7.7.3.3.2 Initial conditions

The initial conditions shall be established as specified in the test execution clause.

5.7.7.3.3.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Send the RSET frame indicated in the test execution clause.	
2	UICC → T	Send UA.	RQ2, RQ3, RQ7, RQ13, RQ16, RQ18
3	T → UICC	Send an I-frame.	
4	UICC → T	Acknowledges the previously sent I-frame.	RQ15
NOTE 1: If UICC sends I-frames between steps 2 and 3, they shall be acknowledged by the simulator. NOTE 2: RQ3 is only validated when RSET() is sent in step 1.			

5.7.7.3.4 Test case 3: discard frames before initialization

5.7.7.3.4.1 Test execution

Run the test procedure for the each of the following frames in step 1:

- UA;
- I-frame(0,0);
- RNR(0);
- SREJ(0).

5.7.7.3.4.2 Initial conditions

- The SWP interface is activated and SHDLC link is not established.

5.7.7.3.4.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Do not send a RSET frame and send the defined frame.	
2	T	Wait for 20 ms.	
3	Conditional	If the UICC sends a RSET frame, perform step 4 and stop. If the UICC sends a different frame, the UICC fails the test. If the UICC does not send any frame, perform steps 5 and 6.	RQ4
4	T → UICC	Send UA frame.	
5	T → UICC	Send RSET(Ws=4, SREJ=1).	
6	UICC → T T → UICC	Complete SHDLC link establishment.	RQ4

5.7.7.3.5 Void

5.7.7.3.6 Test case 5: connection time - reset by terminal simulator

5.7.7.3.6.1 Test execution

Run the test procedure with each of the following initial conditions:

- The SWP interface is activated and SHDLC link is not established.
- SHDLC link is established and idle, i.e. no further communication is expected.

5.7.7.3.6.2 Initial conditions

The initial conditions shall established as specified in the test execution clause.

5.7.7.3.6.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Send RSET frame with unsupported features.	
2	UICC → T	Send RSET.	
3	T	Do not send a UA frame.	
4	UICC → T	Send RSET after at least T3 time after execution of step 2.	RQ14

5.7.7.3.7 Void

5.7.7.3.8 Test case 7: requesting unsupported window size - link establishment by terminal simulator

5.7.7.3.8.1 Test execution

The test procedure shall be executed once for each of the following parameters:

- Run the test procedure for the following values of RSET frame in step 1:
  - RSET();
  - RSET(WS=4, SREJ=0).

5.7.7.3.8.2 Initial conditions

- SHDLC link is established.

5.7.7.3.8.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Send the defined RSET frame.	
2	UICC → T	Send RSET(Wsy) or RSET(Wsy,SREJ=0) Where y = host provider announced size.	RQ3, RQ8, RQ9, RQ11, RQ12
3	T → UICC	Send UA.	

5.7.7.3.9 Test Case 8: requesting unsupported SREJ support - link establishment by terminal simulator

5.7.7.3.9.1 Test execution

The test procedure shall be executed once for each of the following parameters:

- There are no test-case specific parameters for this test.

5.7.7.3.9.2 Initial conditions

- SHDLC link is established.

5.7.7.3.9.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Send RSET(WS=2, SREJ=1) frame.	
2	UICC → T	Send RSET(WS=2, SREJ=0) frame or RSET(WS=2).	RQ9, RQ11, RQ12, RQ17
3	T → UICC	Respond UA.	

5.7.7.3.10 Test Case 9: requesting unsupported window size and SREJ support - link establishment by terminal simulator

5.7.7.3.10.1 Test execution

The test procedure shall be executed once for each of the following parameters:

- There are no test-case specific parameters for this test.

5.7.7.3.10.2 Initial conditions

- SHDLC link is established.

5.7.7.3.10.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Send RSET(WS=4, SREJ=1) frame.	
2	UICC → T	Send RSET(Wsy, SREJ=0) frame Where y = host provider announced size.	RQ9, RQ11, RQ12, RQ17
3	T → UICC	Respond UA.	

5.7.7.3.11 Void

5.7.7.3.12 Void

5.7.7.3.13 Void

5.7.7.3.14 Test case 13: discard buffered frames on link re-establishment

5.7.7.3.14.1 Test execution

The test procedure shall be executed once for each of the following parameters:

- There are no test-case specific parameters for this test.

5.7.7.3.14.2 Initial conditions

- The SHDLC link is established with SREJ support.
- SHDLC link is idle, i.e. no further communication expected.

5.7.7.3.14.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Send I-frame(NS0_S,x).	
2	UICC → T	Acknowledges I-frame(NS0_S,x).	
3	T → UICC	Send I-frame(NS0_S+2,x).	
4	UICC → T	Send SREJ(NS0_S+1).	
5	T → UICC	Re-establish SHDLC link.	
6	T ← → UICC	The terminal simulator sends I-frames (0,NR) to I-frame(NS0_S+1,NR). UICC acknowledges these I-frames.	RQ5

5.7.7.4 Link establishment with custom sliding window size

5.7.7.4.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 10.7.3.

There are no conformance requirements for the UICC for the referenced clause.

5.7.7.5 Data flow

5.7.7.5.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clauses 10.7.4, 10.6.1, 10.6.2 and 10.8.2.

RQ1	10.7.4	An endpoint shall acknowledge frame reception regularly.
RQ2	10.7.4	The acknowledgement timeout shall not be too long.
RQ3	10.7.4	If the number of unacknowledged I-frames on the link equals the negotiated window size, then the endpoint shall not transmit any further I-frames until reception of an acknowledgement.
RQ4	10.6.1	I-frames shall be acknowledged within T1.
RQ5	10.6.2	An endpoint shall increment its value of the N(S) field after emission of an I-Frame.
RQ6	10.6.2, 10.8.2	N(R) shall be set as described in ETSI TS 102 613 [1].
RQ7	10.6.2	During full duplex data transmission or by emission of a S type frame, all received frames with a sequence number lower than N(R) are acknowledged.
NOTE 1: RQ2 is covered by RQ1 and therefore will not be mentioned explicitly in test procedures. NOTE 2: Conformance to T1 in RQ4 is not tested. However, the provisions of clause 4.4.2.6.2 apply for checking for acknowledgements.		

5.7.7.5.2 Test case 1: I-frame transmission

5.7.7.5.2.1 Test execution

The test procedure shall only be executed in voltage class B and in voltage class C, full power mode.

Run this test procedure for:

- Every supported window size.
- I-frame acknowledgement method by the terminal simulator:
  - Every I-frame acknowledged individually.
  - Acknowledge just before T1 expires and using the maximum allowed value for NR.

5.7.7.5.2.2 Initial conditions

- SHDLC link is established with the window size indicated in the test execution clause.
- SHDLC link is idle, i.e. no further communication is expected.

5.7.7.5.2.3 Test procedure

Step	Direction	Description	RQ
1	User → UICC	Trigger the UICC to send 9 I-frames.	
2	UICC → T T → UICC	UICC send I-Frames as indicated in step 1. Terminal simulator acknowledges these frames using the acknowledgement mechanism indicated in the test execution clause, using RR frames unless the upper layer requires the transmission of I-frames.	RQ3, RQ5, RQ6, RQ7

5.7.7.5.3 Test case 2: I-frame reception - single I-Frame reception

5.7.7.5.3.1 Test execution

The test procedure shall be executed once for each of the following parameters:

- There are no test-case specific parameters for this test.

5.7.7.5.3.2 Initial conditions

- SHDLC link is established and idle, i.e. no further communication is expected.

5.7.7.5.3.3 Test procedure

Step	Direction	Description	RQ
1	User → UICC	Prepare the terminal simulator to send 10 I-frames, without retransmission, waiting the acknowledgement of the previously sent I-frame before sending the next I-frame.	
2	T → UICC UICC → T	The terminal simulator sends I-frames as indicated in step 1. UICC acknowledges these I-frames. If UICC sends RNR, the terminal simulator shall wait for the RR for a maximum of 100 ms. The terminal simulator shall resume the traffic with the I-frame indicated in the RR. If the terminal simulator has no data to send, it shall send an empty I-frame. If the RR is not received within 100 ms, this is a failure of the UICC.	RQ1, RQ6

5.7.7.5.4 Test case 3: I-frame reception - multiple I-Frame reception

5.7.7.5.4.1 Test execution

Run this test procedure for every supported window size.

5.7.7.5.4.2 Initial conditions

- SHDLC link is established with the window size indicated in the test execution clause.
- SHDLC link is idle, i.e. no further communication is expected.

5.7.7.5.4.3 Test procedure

Step	Direction	Description	RQ
1	User → UICC	Prepare the terminal simulator to send 10 I-frames. The terminal simulator shall send each I-frame as soon as possible, without waiting for the acknowledgement of the previously sent I-frame, while still complying to the current window boundaries.	
2	UICC → T T → UICC	Terminal simulator sends I-Frames as indicated in step 1. UICC acknowledges these frames. If UICC sends RNR, the terminal simulator shall wait for the RR for a maximum of 100 ms. The terminal simulator shall resume the traffic with the I-frame indicated in the RR. If the terminal simulator has no data to send, it shall send an empty I-frame. If the RR is not received within 100 ms, this is a failure of the UICC.	RQ1, RQ6

5.7.7.5.5 Void

5.7.7.7.6 Test case 5: piggybacking - reception by UICC

5.7.7.7.6.1 Test execution

The test procedure shall be executed once for each of the following parameters:

- There are no test-case specific parameters for this test.

5.7.7.7.6.2 Initial conditions

- SHDLC link is established.
- SHDLC link is idle, i.e. no further communication is expected.

5.7.7.7.6.3 Test procedure

Step	Direction	Description	RQ
1	User → UICC	Trigger the UICC to send an I-frame.	
2	UICC → T	Send I-frame(NS0, NR0).	
3	T → UICC	Do not send RR. Send I-frame(NR0, NS0+1) within T1.	
4	UICC → T	Acknowledge I-frame(NR0, NS0+1). Do not send I-frame(NS0,x) (within next 50 ms).	RQ1, RQ6, RQ7

5.7.7.6 Reject (go N back)

5.7.7.6.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 10.7.5.

RQ1	10.7.5	If an endpoint detects missing I-frame sequence numbers and if SREJ is not supported or if several frames got lost, the endpoint shall send a REJ frame as soon as possible.
RQ2	10.7.5	When an endpoint receives a REJ frame with a sequence number which identifies an unacknowledged I-frame previously sent within the sliding window size it shall restart the stream at the first missing frame.
RQ3	10.7.5	After sending REJ, an endpoint shall accept the peer endpoint restarting the stream at the first missing frame.

5.7.7.6.2 Test case 1: REJ transmission

5.7.7.6.2.1 Test execution

Run the test procedure for the following parameters:

- For UICCs which do not support SREJ, run the test procedure for every window size in the following table which is supported by the UICC.

UICC support	**Procedure parameters**	
Supported window size	**SREJ negotiated**	**I-frame to send in step 3**
2	No, SREJ = 0	I-frame(NS0_S+2,x)
2	No, no SREJ byte in RSET frame	I-frame(NS0_S+2,x)
3	No, SREJ = 0	I-frame(NS0_S +2,x)
3	No, no SREJ byte in RSET frame	I-frame(NS0_S +3,x)
4	No, SREJ = 0	I-frame(NS0_S +2,x)
4	No, SREJ = 0	I-frame(NS0_S +3,x)
4	No, no SREJ byte in RSET frame	I-frame(NS0_S +4,x)

- For UICCs which support SREJ, run the test procedure for every window size in the following table which is supported by the UICC.

UICC support	**Procedure parameters**	
Supported window size	**SREJ negotiated**	**I-frame to send in step 3**
3	Yes, SREJ = 1	I-frame(NS0_S +WS,x)
4	Yes, SREJ = 1	I-frame(NS0_S +WS,x)
2	No, SREJ = 0	I-frame(NS0_S +2,x)
2	No, no SREJ byte in RSET frame	I-frame(NS0_S +2,x)
3	No, SREJ = 0	I-frame(NS0_S +2,x)
3	No, no SREJ byte in RSET frame	I-frame(NS0_S +3,x)
4	No, SREJ = 0	I-frame(NS0_S +2,x)
4	No, no SREJ byte in RSET frame	I-frame(NS0_S +4,x)

5.7.7.6.2.2 Initial conditions

- SHDLC link is established with SREJ support as indicated in the test execution clause.
- SHDLC link is idle, i.e. no further communication is expected.

5.7.7.6.2.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Sends I-frame(NS0_S,x).	
2	UICC → T	Acknowledges I-frame(NS0_S,x).	
3	T → UICC	Sends the I-frame indicated in the test execution clause.	
4	UICC → T	Sends REJ(NS0_S+1).	RQ1
5	T ←→ UICC	Terminal simulator sends 10 I-frames starting at I-frame(NS0_S+1,x). UICC acknowledges I-frames. If UICC sends RNR, the terminal simulator shall wait for the RR for a maximum of 100 ms. The terminal simulator shall resume the traffic with the I-frame indicated in the RR. If the terminal simulator has no data to send, it shall send an empty I-frame. If the RR is not received within 100 ms, this is a failure of the UICC.	RQ3

5.7.7.6.3 Test case 2: REJ transmission - multiple I-frames received

5.7.7.6.3.1 Test execution

The test procedure shall be executed once for each of the following parameters:

- There are no test-case specific parameters for this test.

5.7.7.6.3.2 Initial conditions

- SHDLC link is established without SREJ support.
- SHDLC link is idle, i.e. no further communication is expected.

5.7.7.6.3.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Send I-frame(NS0_S,x).	
2	UICC → T	Acknowledge I-frame(NS0_S,x).	
3	T → UICC	Send I-frame(NS0_S+WS-1,x) followed immediately by I-frame(NS0_S+WS,x).	
4	UICC → T	UICC send REJ(NS0_S+1). The UICC is allowed to send additional REJ(NS0_S+1), in response to any additional I-frame(NS0_S+x,x).	RQ1
5	T ←→ UICC	Terminal simulator send 10 I-frames starting at I-frame(NS0_S+1,x) UICC acknowledge I-frames. If UICC sends RNR, the terminal simulator shall wait for the RR for a maximum of 100 ms. The terminal simulator shall resume the traffic with the I-frame indicated in the RR. If the terminal simulator has no data to send, it shall send an empty I-frame. If the RR is not received within 100 ms, this is a failure of the UICC.	RQ3

5.7.7.6.4 Test case 3: REJ reception

5.7.7.6.4.1 Test execution

The test procedure shall only be executed in voltage class B and in voltage class C, full power mode.

The test procedure shall be executed once for each of the following parameters:

- There are no test-case specific parameters for this test.

5.7.7.6.4.2 Initial conditions

- SHDLC link is established without SREJ support.

- SHDLC link is idle, i.e. no further communication is expected.

5.7.7.6.4.3 Test procedure

Step	Direction	Description	RQ
1	User → UICC	Trigger the UICC to send I-frames.	
2	UICC → T	Send I-frame(NS0_T, y).	
3	T	Do not acknowledge I-frame(NS0_T,y).	
4	UICC → T	If the UICC retransmits I-frame(NS0_T,y), then stop the test procedure, as it is not possible for the terminal simulator to send a valid REJ. This is not a failure of the UICC. If the UICC transmits I-frame(NS0+1,y), then continue the test procedure.	
5	T → UICC	Send REJ(NS0_T). The terminal simulator is required to send additional REJ(NS0_T), in response to any additional I-frame(NS0_T+x,y).	
6	UICC → T	Send I-frame(NS0_T,y).	RQ2
7	T → UICC	acknowledge I-frame(NS0_T,y).	
8	UICC → T	Send I-frame(NS0_T+1,y).	RQ2
9	T → UICC	acknowledge I-frame(NS0-T+1,y).	

5.7.7.7 Last Frame Loss

5.7.7.7.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clauses 10.7.6 and 10.6.1.

RQ1	10.7.6	Each frame shall have a guarding/transmit timeout in order to retransmit frames if the destination does not notice a loss.
RQ2	10.6.1	If the I-frames are not acknowledged, an endpoint shall retransmit these frames not sooner than T2.

5.7.7.7.2 Test Case 1: retransmission of a single frame

5.7.7.7.2.1 Test execution

The test procedure shall only be executed in voltage class B and in voltage class C, full power mode.

The test procedure shall be executed once for each of the following parameters:

- There are no test-case specific parameters for this test.

5.7.7.7.2.2 Initial conditions

- SHDLC link is established and idle, i.e. no further communication is expected.

5.7.7.7.2.3 Test procedure

Step	Direction	Description	RQ
1	User → UICC	Trigger the UICC to send an I-frame.	
2	UICC → T	Sends I-frame(NS0_T,x).	
3	T	Do not acknowledge I-frame(NS0_T,x).	
4	UICC → T	Sends I-frame(NS0_T,x).	RQ1, RQ2

5.7.7.7.3 Test Case 2: retransmission of multiple frames

5.7.7.7.3.1 Test execution

The test procedure shall only be executed in voltage class B and in voltage class C, full power mode.

Run this test procedure for every supported window size.

5.7.7.7.3.2 Initial conditions

- SHDLC link is established without SREJ support.
- SHDLC link is idle, i.e. no further communication is expected.

5.7.7.7.3.3 Test procedure

Step	Direction	Description	RQ
1	User → UICC	Trigger the UICC to send 9 I-frames.	
2	UICC → T T	UICC sends I-frames as indicated in step 1. For the first transmission of each I-frame, the terminal simulator does not acknowledge the I-frame.	
3	UICC → T T	UICC retransmits each I-frame according to RQ1, RQ2. For each retransmitted I-frame, the terminal simulator acknowledges only this I-frame.	RQ1, RQ2

5.7.7.8 Receive and not ready

5.7.7.8.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 10.7.7.

RQ1	10.7.7	When an endpoint transmits a RNR and is now ready to receive an I-Frame, it shall send a RR frame every 5 ms to 20 ms until it receives a new I-frame.
RQ2	10.7.7	If an endpoint receives a RR in a context described in RQ1 and has no data to send, it shall send an I-Frame with empty information field to signal the proper reception of the RR frame.
RQ3	10.7.7	If an endpoint receives RNR frame then it shall suspend transmission of I-frames.
RQ4	10.7.7	If an endpoint receives a RR in a context described in RQ1 and still has data to send, it shall resume the I-Frame(s) transmission.
RQ5	10.6.1	If the I-frames are not acknowledged, an endpoint shall retransmit these frames not sooner than T2.
NOTE: RQ1 will not be tested as it is not possible to trigger the UICC to transmit a RNR.		

5.7.7.8.2 Test case 1: RNR reception

5.7.7.8.2.1 Test execution

The test procedure shall only be executed in voltage class B and in voltage class C, full power mode.

The test procedure shall be executed once for each of the following parameters:

- There are no test-case specific parameters for this test.

5.7.7.8.2.2 Initial conditions

- SHDLC link is established and idle, i.e. no further communication is expected.

5.7.7.8.2.3 Test procedure

Step	Direction	Description	RQ
1	User → UICC	Trigger the UICC to send 9 non-empty I-frames.	
2	UICC → T	Starts sending I-frames.	
3	T → UICC	Acknowledge the first received I-frame(NS0_T,x) with RNR(NS0_T+1).	
4	T UICC → T	Wait 100 ms. The UICC may send further I-frames within the negotiated WS; in this case the terminal simulator should not acknowledge these I-frames.	RQ3
5	T → UICC	Send RR, every 5 ms to 20 ms until a new I-Frame is received where N(R) = NS0_T+1.	
6	UICC → T T → UICC	UICC sends remaining I-frames, where N(S) of the first I-frame = NS0_T+1. All of the I-frames shall be non-empty. Terminal simulator acknowledges remaining I-frames.	RQ4

5.7.7.8.3 Test case 2: Empty I-frame transmission

5.7.7.8.3.1 Test execution

The test procedure shall only be executed in voltage class B and in voltage class C, full power mode.

The test procedure shall be executed once for all combinations of the following parameters:

- Each supported window size.
- RR retransmission time of the terminal simulator in step 4 between 5 ms and 7 ms; and between 18 ms and 20 ms.

5.7.7.8.3.2 Initial conditions

- SHDLC link is established and idle, i.e. no further communication is expected.

5.7.7.8.3.3 Test procedure

Step	Direction	Description	RQ
1	User → UICC	Trigger the UICC to send 1 I-frame.	
2	UICC → T	Send I-frame(NS0_T,x).	
3	T → UICC	Acknowledge I-frames(NS0_T,x) with RNR(NS0_T+1).	
4	T→ UICC UICC → T	Send RR(NS0_T+1) in order to indicate to the UICC that I-frame transmission can be resumed. In the subsequent frame exchanges: • The terminal simulator shall apply the RR retransmission time specified in the Test execution clause. • The terminal simulator shall ignore the first I-frame sent by the UICC, in order to instigate a retransmission of the RR frame (by the terminal simulator) or the I-frame (by the UICC). In order to pass the test, the UICC: • Shall send a first empty I-frame(NS0_T+1,x) within 20 ms of the original RR frame; this may occur before or after one or more retransmissions by the terminal simulator of the original RR frame. • Shall send a further empty I-frame(NS0_T+1,x): o The transmission of the further empty I-frame may occur before or after a retransmission by the terminal simulator of the original RR frame. o If the start of the further empty I-frame is before the end of the first retransmitted RR frame, then the further empty I-frame shall be at least T2 after the original empty I-frame. The terminal simulator shall continue with this frame exchange until it successfully acknowledges an empty I-frame with RR(NS0_T+2).	RQ2, RQ5
5	User → UICC	Trigger the UICC to send further I-frames.	
6	UICC → T T → UICC	UICC sends remaining I-frames; the first I-frame shall be I-frame(NS0_T+2,x). Terminal simulator acknowledges remaining I-frames.	RQ3

5.7.7.9 Selective reject

5.7.7.9.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clauses 10.7.8, 10.8.2 and 10.4.2.

RQ1	10.8.2	If an I-frame (Ix,y) is received by an endpoint and support for Selective Reject S frames was negotiated for the link and X is exactly one higher than N(R), a SREJn(r) shall be sent instead of the REJn(r). The received I-frame shall be buffered.
RQ2	10.8.2	Once the retransmitted I-frame with X = N(R) is received in the content of RQ3, the buffered I-frame shall also be processed.
RQ3	10.7.8	If an endpoint receives a SREJ frame and supports for SREJ was agreed at link establishment, it shall retransmit the corresponding I-Frame.
RQ4	10.4.2	Only one SREJ shall remain outstanding on each link direction at any one time.
RQ5	10.4.2	An SREJ shall be transmitted for each erroneous frame; each frame is treated as a separate error.
RQ6	10.4.2	Optional type of frame shall not be used before capability negotiation is defined during initialization.
NOTE: RQ6 is not tested, as it is a non-occurrence RQ.		

5.7.7.9.2 Test case 1: SREJ transmission

5.7.7.9.2.1 Test execution

The test procedure shall be executed once for each of the following parameters:

- There are no test-case specific parameters for this test.

5.7.7.9.2.2 Initial conditions

- The SHDLC link is established with SREJ support.
- SHDLC link is idle, i.e. no further communication is expected.

5.7.7.9.2.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Send I-frame(NS0_S,x).	
2	UICC → T	Acknowledge I-frame(NS0_S,x).	
3	T → UICC	Send I-frame(NS0_S+2,x).	
4	UICC → T	Send SREJ(NS0_S+1).	RQ1
5	T → UICC	Sends I-frame(NS0_S+1,x).	
6	UICC → T	Acknowledges I-frame(NS0_S+1,x) and I-frame(NS0_S+2,x).	
7	T → UICC	Send I-frame(NS0_S+3, x).	
8	UICC → T	Acknowledges I-frame(NS0_S+3,x).	RQ2

5.7.7.9.3 Test case 2: SREJ transmission - multiple I-frames received

FFS.

5.7.7.9.4 Test case 3: SREJ reception

5.7.7.9.4.1 Test execution

The test procedure shall only be executed in voltage class B and in voltage class C, full power mode.

The test procedure shall be executed once for each of the following parameters:

- There are no test-case specific parameters for this test.

5.7.7.9.4.2 Initial conditions

- SHDLC link is established with SREJ support.
- SHDLC link is idle, i.e. no further communication is expected.

5.7.7.9.4.3 Test procedure

Step	Direction	Description	RQ
1	User → UICC	Trigger the UICC to send 9 I-frames.	
2	UICC → T	Send I-frame(NS0_T,x).	
3	T → UICC	Do not acknowledge the received I-frame.	
4	UICC → T	If the UICC retransmits I-frame(NS0_T,x), then stop the test procedure, as it is not possible for the terminal simulator to send a valid REJ. This is not a failure of the UICC. If the UICC transmits I-frame(NS0_T+1,x), then continue the test procedure.	
5	T → UICC	Send SREJ(NS0_T).	
6	UICC → T	Retransmit only the rejected I-Frame and continue sending remaining I-frames. terminal simulator acknowledges remaining I-frames.	RQ3

5.7.7.9.5 Void

5.7.8 Implementation

5.7.8.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 10.8.

There are no conformance requirements for the UICC for the referenced clause.

5.7.8.2 Information Frame emission

5.7.8.2.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 10.8.1.

There are no conformance requirements for the UICC for the referenced clause.

5.7.8.3 Information Frame reception

5.7.8.3.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 10.8.2.

All conformance requirements for the referenced clause are included in clause 5.7.7.9.1 of the present document.

5.7.8.4 Reception Ready Frame reception

5.7.8.4.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 10.8.3.

There are no conformance requirements for the UICC for the referenced clause.

5.7.8.5 Reject Frame reception

5.7.8.5.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 10.8.4.

There are no conformance requirements for the UICC for the referenced clause.

5.7.8.6 Selective Reject Frame reception

5.7.8.6.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 10.8.5.

There are no conformance requirements for the UICC for the referenced clause.

5.7.8.7 Acknowledge timeout

5.7.8.7.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 10.8.6.

There are no conformance requirements for the UICC for the referenced clause.

5.7.8.8 Guarding/transmit timeout

5.7.8.8.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 10.8.7.

There are no conformance requirements for the UICC for the referenced clause.

5.8 CLT LLC definition

5.8.1 System Assumptions

Reference: ETSI TS 102 613 [1], clause 11.1.

There are no conformance requirements for the UICC for the referenced clause.

5.8.2 Overview

Reference: ETSI TS 102 613 [1], clause 11.2.

There are no conformance requirements for the UICC for the referenced clause.

5.8.3 Supported RF protocols

5.8.3.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 11.2a.

RQ1	The UICC shall provide the initialization data to the CLF, which performs RF protocol initialization commands of ISO/IEC 18092 [8] 212 kbps/424 kbps passive mode based card emulation protocols.
NOTE: Test cases for RQ1 are out of scope of the present document.	

5.8.4 CLT Frame Format

5.8.4.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 11.3.

RQ1	When sending a CLT frame with the CLT PAYLOAD in Type A aligned structure, meaningless bits in the last byte of the CLT PAYLOAD shall be padded with 0.

5.8.4.2 Test case 1: Padding of CLT PAYLOAD in Type A aligned structure

5.8.4.2.1 Test execution

The test procedure shall be executed once for each of the following parameters:

- There are no test case specific parameters for this test case.

5.8.4.2.2 Initial conditions

- The SWP interface is activated and no more communication is expected.

5.8.4.2.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Send CLT frame with CL_PROTO_INF(A) in the ADMIN_FIELD, indicating byte aligned structure and with the DATA_FIELD set to '3000'.	
2	UICC → T	Respond CLT frame with CLT_CMD field set to 00000 and at least 1 byte of data in the CLT PAYLOAD field.	RQ1
3	T → UICC	Send CLT frame with CLT_CMD field set to 00000 and the DATA_FIELD set to '30010A4005'.	
4	UICC → T	Respond CLT frame with CLT_CMD field set to 00000 and at least 1 byte of data in the CLT PAYLOAD field.	RQ1

5.8.5 CLT Command Set

5.8.5.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clauses 11.4 and 11.5.3.3.

RQ1	11.4	The UICC shall interpret received data in DATA_FIELD as Type A aligned, if bit 5 in CLT CMD field is 0.
RQ2	11.4	The UICC shall interpret received data in DATA_FIELD as byte aligned, if bit 5 in CLT CMD field is 1.
RQ3	11.4	The UICC shall interpret a CLT frame containing an ADMIN_FIELD with the value 0000 as containing no administrative command.
RQ4	11.4	The UICC shall interpret a CLT frame containing an ADMIN_FIELD with the value 1000 as containing a CL_PROTO_INF(A) command.
RQ5	11.4	The UICC shall interpret a CLT frame containing an ADMIN_FIELD with the value 1001 as containing a CL_PROTO_INF(F) command.
RQ6	11.4	The UICC indicates that no administrative command is being sent by setting the ADMIN_FIELD in a CLT frame to 0000.
RQ7	11.4	For ISO/IEC 14443-3 [6], the UICC instructs the CLF to enter the initial state by sending a CLT frame with the ADMIN_FIELD set to 0001.
RQ8	11.4	For ISO/IEC 14443-3 [6], the UICC instructs the CLF to enter the "HALT" state by sending a CLT frame with the ADMIN_FIELD set to 0010.
RQ9	11.4	RFU values for ADMIN_FIELD shall not be sent by the UICC.
RQ10	11.4	When sending Type A aligned data in DATA_FIELD, the UICC shall set bit 5 in CLT CMD field to 0.
RQ11	11.4	When sending byte aligned data in DATA_FIELD, the UICC shall set bit 5 in CLT CMD field to 1.
RQ12	11.5.3.3	When the UICC decodes an error in a CLT frame, it shall send CL_GOTO_INIT.
RQ13	11.5.3.3	When the UICC decodes a HLTA command in a CLT frame, it shall send CL_GOTO_HALT.
NOTE: RQ9 is a non-occurrence RQ.		

5.8.5.2 Test case 1: CLT commands, ISO/IEC 14443-3 Type A

5.8.5.2.1 Test execution

The test procedure shall be executed once for each of the following parameters:

- There are no test case specific parameters for this test case.

5.8.5.2.2 Initial conditions

- The SWP interface is activated and no more communication is expected.

5.8.5.2.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Send CLT frame with CL_PROTO_INF(A) in the ADMIN_FIELD, indicating byte aligned structure and with the DATA_FIELD set to '3000'.	
2	UICC → T	Respond CLT frame with CLT_CMD field set to 00000 and at least 1 byte of data in the CLT PAYLOAD field.	RQ2, RQ4, RQ6, RQ9, RQ10
3	T → UICC	Send CLT frame with CLT_CMD field set to 00000 and the DATA_FIELD set to '30010A4005'.	
4	UICC → T	Respond CLT frame with CLT_CMD field set to 00000 and at least 1 byte of data in the CLT PAYLOAD field.	RQ1, RQ3, RQ6, RQ9 RQ10
5	T → UICC	Send CLT frame with CLT_CMD field set to 00000 and the DATA_FIELD set to '50015E6906', i.e. the HLTA command which causes the UICC to request a transition to "HALT" state as per ISO/IEC 14443-3 [6].	
6	UICC → T	Respond CLT frame with CLT_CMD field set to 00010 (i.e. ADMIN_FIELD set to CL_GOTO_HALT) (see note).	RQ1, RQ3, RQ8, RQ9 RQ10, RQ13
7	T → UICC	Send CLT frame with CL_PROTO_INF(A) in the ADMIN_FIELD, indicating byte aligned structure and with the DATA_FIELD set to '3000'.	
8	UICC → T	Respond CLT frame with CLT_CMD field set to 00000 and at least 1 byte of data in the CLT PAYLOAD field.	RQ2, RQ4, RQ6, RQ9 RQ10
9	T → UICC	Send CLT frame with CLT_CMD field set to 00000 and the DATA_FIELD set to '3001020408', i.e. the command '3000' with wrong CRC_A which causes the UICC to request a transition to "IDLE" state as per ISO/IEC 14443-3 [6].	
10	UICC → T	Respond CLT frame with CLT_CMD field set to 00001 (i.e. ADMIN_FIELD set to CL_GOTO_INIT) (see note).	RQ1, RQ3, RQ7, RQ9 RQ10, RQ12
NOTE: DATA_FIELD may be present or not.			

5.8.5.3 Test case 2: CLT commands, ISO/IEC 18092

5.8.5.3.1 Test execution

This test case is carried out only if DUT manufacturer provides sufficient information about opening a CLT session and exchanging CLT frames in Type F RF technology, and all parameters needed are present in the terminal.

The test procedure shall be executed once for each of the following parameters:

- There are no test case specific parameters for this test case.

5.8.5.3.2 Initial conditions

- The SWP interface is activated and no more communication is expected.
- The UICC is configured such that a received DATA_FIELD where the 2nd and 3rd bytes in 'POLLING REQUEST' are '8EFC' matches an application available on the UICC.
- The UICC is configured such that a received DATA_FIELD where the 2nd and 3rd bytes in 'POLLING REQUEST' are '8EFD' does not match with the applications available on the UICC.

5.8.5.3.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Send CLT frame with CL_PROTO_INF(F) in the ADMIN_FIELD and the RF data representing the initialization command 'POLLING REQUEST' where the Length is set to '06', 1st byte to '00', 2nd and 3rd bytes to '8EFC', 4th byte to '00', 5th byte to '00', and RF CRC to '64B0', which matches the application available on the UICC in the DATA_FIELD.	
2	UICC → T	Respond CLT frame with CLT_CMD field set to 10000 and RF data representing the initialization response 'POLLING RESPONSE' where the Length is set to '12', 1st byte to '01', 2nd to 9th bytes to '02FE000000000000', 10th to 17th bytes to 'FFFFFFFFFFFFFFFF', and RF CRC to 'A87D' in the DATA_FIELD field.	RQ2, RQ5, RQ6, RQ9 RQ11
3	T → UICC	Send CLT frame with CL_PROTO_INF(F) in the ADMIN_FIELD and the RF data representing the initialization command 'POLLING REQUEST' where the Length is set to '06', 1st byte to '00', 2nd and 3rd bytes to '8EFD', 4th byte to '00', 5th byte to '00', and RF CRC to '5380', which does not match the application available on the UICC in the DATA_FIELD.	
4	UICC → T	Respond CLT frame with CLT_CMD field set to 10000, without a DATA_FIELD.	RQ2, RQ5, RQ6, RQ9 RQ11

5.8.6 CLT Frame Interpretation

5.8.6.1 CLT frames with Type A aligned DATA_FIELD

5.8.6.1.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 11.5.1.

RQ1	When the UICC receives a CLT frame with Type A aligned DATA_FIELD, the bit count shall be retrieved implicitly from the length of the CLT PAYLOAD, where the interpretation rule is defined as table 11.2 in ETSI TS 102 613 [1].
RQ2	When the UICC sends a CLT frame with Type A aligned DATA_FIELD, the size of the CLT PAYLOAD shall be determined according to table 11.3 in ETSI TS 102 613 [1] and the number of RF bits to be sent.
RQ3	The UICC instructs the CLF to send N full bytes plus N parity bits over the RF by sending a CLT frame with a CLT PAYLOAD of a size determined according to table 11.3 in ETSI TS 102 613 [1] based on DATA_FIELD of (N × 9) bits in a Type A aligned manor, for 1 ≤ N ≤ 25.
RQ4	The UICC instructs the CLF to send 4 bits over the RF by sending a CLT frame with a CLT PAYLOAD of a size of 1 byte, based on DATA_FIELD of 4 bits in a Type A aligned manner.
NOTE:	Test cases for RQ1, RQ2, RQ3, RQ4 are out of scope of the present document, as the UICC can hardly be triggered to fulfil the needs of a test case.

5.8.6.2 Handling of DATA_FIELD by the CLF

5.8.6.2.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 11.5.2.

RQ1	If the condition not to respond is evaluated by the UICC, it shall send a CLF frame without a DATA_FIELD.
RQ2	If the condition to respond is evaluated by the UICC, it shall send a CLT frame with a DATA_FIELD of a size greater than zero bytes to the CLF.
NOTE:	Test cases for RQ1, RQ2, RQ3, RQ4 are out of scope of the present document, as the UICC can hardly be triggered to fulfil the needs of a test case.

5.8.6.3 Handling of ADMIN_FIELD

5.8.6.3.1 CL_PROTO_INF(A)

5.8.6.3.1.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 11.5.3.1.

RQ1	On receiving a CLT frame with ADMIN_FIELD CL_PROTO_INF(A), if the contents of the DATA_FIELD are a valid command for one of the RF protocols supported by the UICC, the UICC shall compute the response and send it to the CLF within a CLT frame.
RQ2	On receiving a CLT frame with ADMIN_FIELD CL_PROTO_INF(A), if the contents the DATA_FIELD are equal to ISO/IEC 14443-3 [6] command "HALT", the UICC shall reply with a CLT frame with the ADMIN_FIELD CL_GOTO_HALT.
RQ3	On receiving a CLT frame with ADMIN_FIELD CL_PROTO_INF(A), if the contents of DATA_FIELD are not a valid command for one of the RF protocols supported by the UICC or its not equal to ISO/IEC 14443-3 [6] command "HALT", the UICC shall send a CLT frame with the ADMIN_FIELD CL_GOTO_INIT.

5.8.6.3.1.2 Test case 1: Interpretation of CL_PROTO_INF(A)

5.8.6.3.1.2.1 Test execution

The test procedure shall be executed once for each of the following parameters:

- There are no test case specific parameters for this test case.

5.8.6.3.1.2.2 Initial conditions

- The SWP interface is activated and no more communication is expected.

5.8.6.3.1.2.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Send CLT frame with CL_PROTO_INF(A) in the ADMIN_FIELD, indicating byte aligned structure and with the DATA_FIELD set to '3000'.	
2	UICC → T	Respond CLT frame with CLT_CMD field set to 00000 and at least 1 byte of data in the CLT PAYLOAD field.	RQ1
3	T → UICC	Send CLT frame with CL_PROTO_INF(A) in the ADMIN_FIELD, indicating byte aligned structure and with the DATA_FIELD set to '5000', i.e. the HLTA command as per ISO/IEC 14443-3 [6].	
4	UICC → T	Respond CLT frame with CLT_CMD field set to 00010 (i.e. ADMIN_FIELD set to CL_GOTO_HALT) (see note).	RQ2
5	T → UICC	Send CLT frame with CL_PROTO_INF(A) in the ADMIN_FIELD, indicating byte aligned structure and with the DATA_FIELD set to '97', i.e. a command not representing either HLTA as per ISO/IEC 14443-3 [6] or a valid command for one of the RF protocols supported by the UICC in the DATA_FIELD.	
6	UICC → T	Respond CLT frame with CLT_CMD field set to 00001 (i.e. ADMIN_FIELD set to CL_GOTO_INIT) (see note).	RQ3
NOTE: DATA_FIELD may be present or not.			

5.8.6.3.2 CL_PROTO_INF(F)

5.8.6.3.2.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 11.5.3.2.

RQ1	On receiving a CLT frame with ADMIN_FIELD CL_PROTO_INF(F), and in case the error detection code (RF CRC) and the LEN byte are correct and the received DATA_FIELD does not match with the applications available on the UICC, the UICC shall send a CLT frame without a DATA_FIELD to the CLF within 1 150 µs.
RQ2	On receiving a CLT frame with ADMIN_FIELD CL_PROTO_INF(F), and in case the error detection code and the LEN byte are correct and the received DATA_FIELD matches with the applications available on the UICC, the UICC shall respond with an CLT frame containing the ISO/IEC 18092 [8] 212 kbps/424 kbps passive mode initialization response frame ("POLLING RESPONSE", including the LEN and RF CRC field) encapsulated in the DATA_FIELD, within 1 150 µs.
RQ3	On receiving a CLT frame with ADMIN_FIELD CL_PROTO_INF(F), and in case an error with respect to ISO/IEC 18092 [8] 212 kbps/424 kbps passive mode is detected, the UICC shall send a CLT frame without a DATA_FIELD to the CLF within 1 150 µs.
NOTE: Development of test cases for RQ3 is FFS.	

5.8.6.3.2.2 Test case 1: Polling command handling with CL_PROTO_INF(F)

5.8.6.3.2.2.1 Test execution

The test procedure shall be executed once for each of the following parameters:

POLLING REQUEST						**POLLING RESPONSE**					
LEN	**Payload**				**RF CRC**	**LEN**	**Payload**				**RF CRC**
	1st	**2nd~3rd**	**4th**	**5th**			**1st**	**2nd~9th**	**10th~17th**	**18th~19th**	
'06'	'00'	'FFFF'	'00'	'00'	'0921'	'12'	'01'	'02FE000000000000'	'FFFFFFFFFFFFFFFF'	none	'A87D'
'06'	'00'	'FFFF'	'00'	'03'	'3942'	'12'	'01'	'02FE000000000000'	'FFFFFFFFFFFFFFFF'	none	'A87D'
'06'	'00'	'FFFF'	'00'	'0F'	'F8CE'	'12'	'01'	'02FE000000000000'	'FFFFFFFFFFFFFFFF'	none	'A87D'
'06'	'00'	'FFFF'	'01'	'00'	'3A10'	'14'	'01'	'02FE000000000000'	'FFFFFFFFFFFFFFFF'	'8EFC'	'9043'
'06'	'00'	'FFFF'	'01'	'03'	'0A73'	'14'	'01'	'02FE000000000000'	'FFFFFFFFFFFFFFFF'	'8EFC'	'9043'
'06'	'00'	'FFFF'	'01'	'0F'	'CBFF'	'14'	'01'	'02FE000000000000'	'FFFFFFFFFFFFFFFF'	'8EFC'	'9043'
'06'	'00'	'8EFC'	'00'	'00'	'64B0'	'12'	'01'	'02FE000000000000'	'FFFFFFFFFFFFFFFF'	none	'A87D'
'06'	'00'	'8EFC'	'00'	'03'	'54D3'	'12'	'01'	'02FE000000000000'	'FFFFFFFFFFFFFFFF'	none	'A87D'
'06'	'00'	'8EFC'	'00'	'0F'	'955F'	'12'	'01'	'02FE000000000000'	'FFFFFFFFFFFFFFFF'	none	'A87D'
'06'	'00'	'8EFC'	'01'	'00'	'5781'	'14'	'01'	'02FE000000000000'	'FFFFFFFFFFFFFFFF'	'8EFC'	'9043'
'06'	'00'	'8EFC'	'01'	'03'	'67E2'	'14'	'01'	'02FE000000000000'	'FFFFFFFFFFFFFFFF'	'8EFC'	'9043'
'06'	'00'	'8EFC'	'01'	'0F'	'A66E'	'14'	'01'	'02FE000000000000'	'FFFFFFFFFFFFFFFF'	'8EFC'	'9043'
'06'	'00'	'8EFC'	'02'	'00'	'02D2'	'14'	'01'	'02FE000000000000'	'FFFFFFFFFFFFFFFF'	'0083'	'27AC'

5.8.6.3.2.2.2 Initial conditions

- The UICC is configured such that a received DATA_FIELD where the 2nd and 3rd bytes in 'POLLING REQUEST' are 'FFFF' or '8EFC' matches an application available on the UICC.
- The SPEED_CAP registry parameter in the terminal simulator is set to '83'.
- For low power mode execution: a prior HCI session initialization has been performed in full power mode and the registry parameters for ISO/IEC 18092 [8] (212 kbps/424 kbps) passive mode RF technology have been set. The SWP interface is activated and no more communication is expected.
- For full power mode execution: the SWP interface is activated, HCI session initialization has been performed, the registry parameters for ISO/IEC 18092 [8] (212 kbps/424 kbps) passive mode RF technology have been set and no more communication is expected.

5.8.6.3.2.2.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Send CLT frame with CL_PROTO_INF(F) in the ADMIN_FIELD and the RF data representing the initialization command 'POLLING REQUEST' which matches the application available on the UICC in the DATA_FIELD.	
2	UICC → T	Respond CLT frame with CLT_CMD field set to 10000 and RF data representing the initialization response 'POLLING RESPONSE' with the test execution parameters in the DATA_FIELD.	RQ2

5.8.6.3.2.3 Test case 2: Empty CLT(F) Frame

5.8.6.3.2.3.1 Test execution

The test procedure shall be executed once for each of the following parameters:

- There are no test case specific parameters for this case.

5.8.6.3.2.3.2 Initial conditions

- The UICC is configured such that a received DATA_FIELD where the 2nd and 3rd bytes in 'POLLING REQUEST' are '8EFD' does not match with the applications available on the UICC.
- For low power mode execution: a prior HCI session initialization has been performed in full power mode and the registry parameters for ISO/IEC 18092 [8] (212 kbps/424 kbps) passive mode RF technology have been set. The SWP interface is activated and no more communication is expected.
- For full power mode execution: the SWP interface is activated, HCI session initialization has been performed, the registry parameters for ISO/IEC 18092 [8] (212 kbps/424 kbps) passive mode RF technology have been set and no more communication is expected.

5.8.6.3.2.3.3 Test procedure

Step	Direction	Description	RQ
1	T → UICC	Send CLT frame with CL_PROTO_INF(F) in the ADMIN_FIELD and the RF data representing the initialization command 'POLLING REQUEST' where the Length is set to '06', 1st byte to '00', 2nd and 3rd bytes to '8EFD', 4th byte to '00', 5th byte to '00', and RF CRC to '5380', which does not match the application available on the UICC in the DATA_FIELD.	
2	UICC → T	Respond CLT frame with CLT_CMD field set to 10000, without a DATA_FIELD.	RQ1

5.8.6.3.3 CL_GOTO_INIT and CL_GOTO_HALT

Reference: ETSI TS 102 613 [1], clause 11.5.3.3.

RQ1	When the UICC decodes an error in a CLT frame, it shall send CL_GOTO_INIT.
RQ2	When the UICC decodes a HLTA command in a CLT frame, it shall send CL_GOTO_HALT.
NOTE:	RQ1 and RQ2 are tested in clause 5.8.5.

5.8.7 CLT Protocol Rules

5.8.7.1 Rules for the CLF

Reference: ETSI TS 102 613 [1], clause 11.6.1.

There are no conformance requirements for the UICC for the referenced clause.

5.8.7.2 Rules for the UICC

5.8.7.2.1 Conformance requirements

Reference: ETSI TS 102 613 [1], clause 11.6.2.

RQ1	The UICC shall not send a CLT frame before having received a CLT frame with the ADMIN_FIELD set to CL_PROTO_INF(A) or CL_PROTO_INF(F).
RQ2	The UICC shall interpret a received CLT frame with the ADMIN_FIELD set to CL_PROTO_INF(A) or CL_PROTO_INF(F) as condition to open a new CLT session and to close any former CLT session.
RQ3	After having received a CLT frame with the ADMIN_FIELD set to CL_PROTO_INF(A), subsequently sent CLT frames within the CLT session shall be coded in Type A aligned manner.
RQ4	During a CLT session, the UICC shall ignore a corrupted SWP frame.
RQ5	During a CLT session, the UICC shall ignore received CLT frames if the ADMIN_FIELD contains a value which is reserved for future use.
RQ6	During a CLT session, the UICC shall ignore received CLT frames if the length of the DATA_FIELD indicated for a Type A aligned CLT frame is invalid.
NOTE 1: Test cases for RQ1 and RQ2 are given also in clause 5.6.3.2 and subclauses of the present document. NOTE 2: Development of test cases for RQ1 to RQ6 is FFS.	

5.9 Timing and performance

Reference: ETSI TS 102 613 [1], clause 12.

There are no conformance requirements for the UICC for the referenced clause.

Annex A (informative): State diagrams

A.1 SDL symbols definition

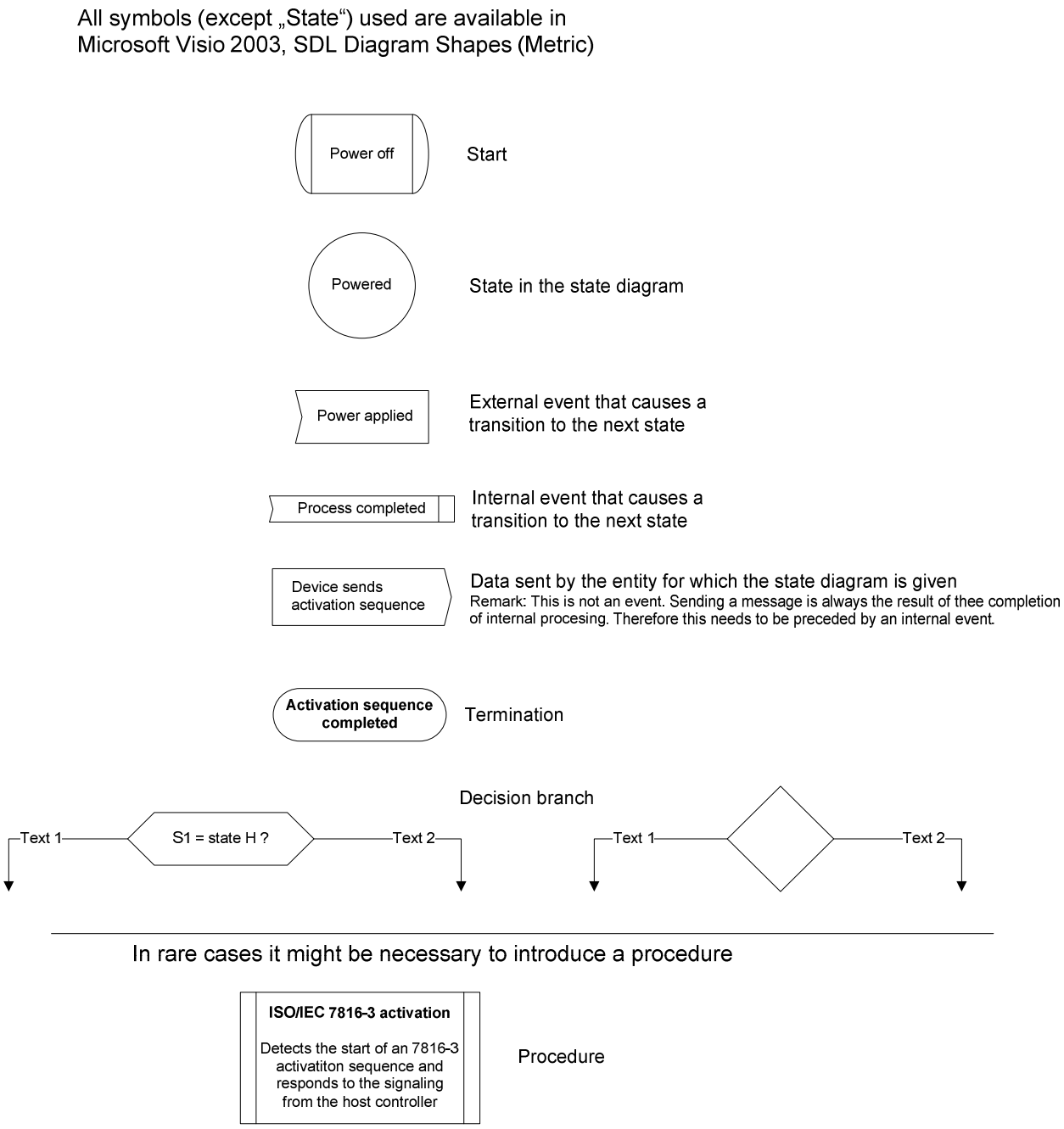

Figure A.1.1: SDL symbols definition

A.2 Initial SWP interface activation

This clause describes part of ETSI TS 102 613 [1], clause 6.2.3.1 in SDL notation.

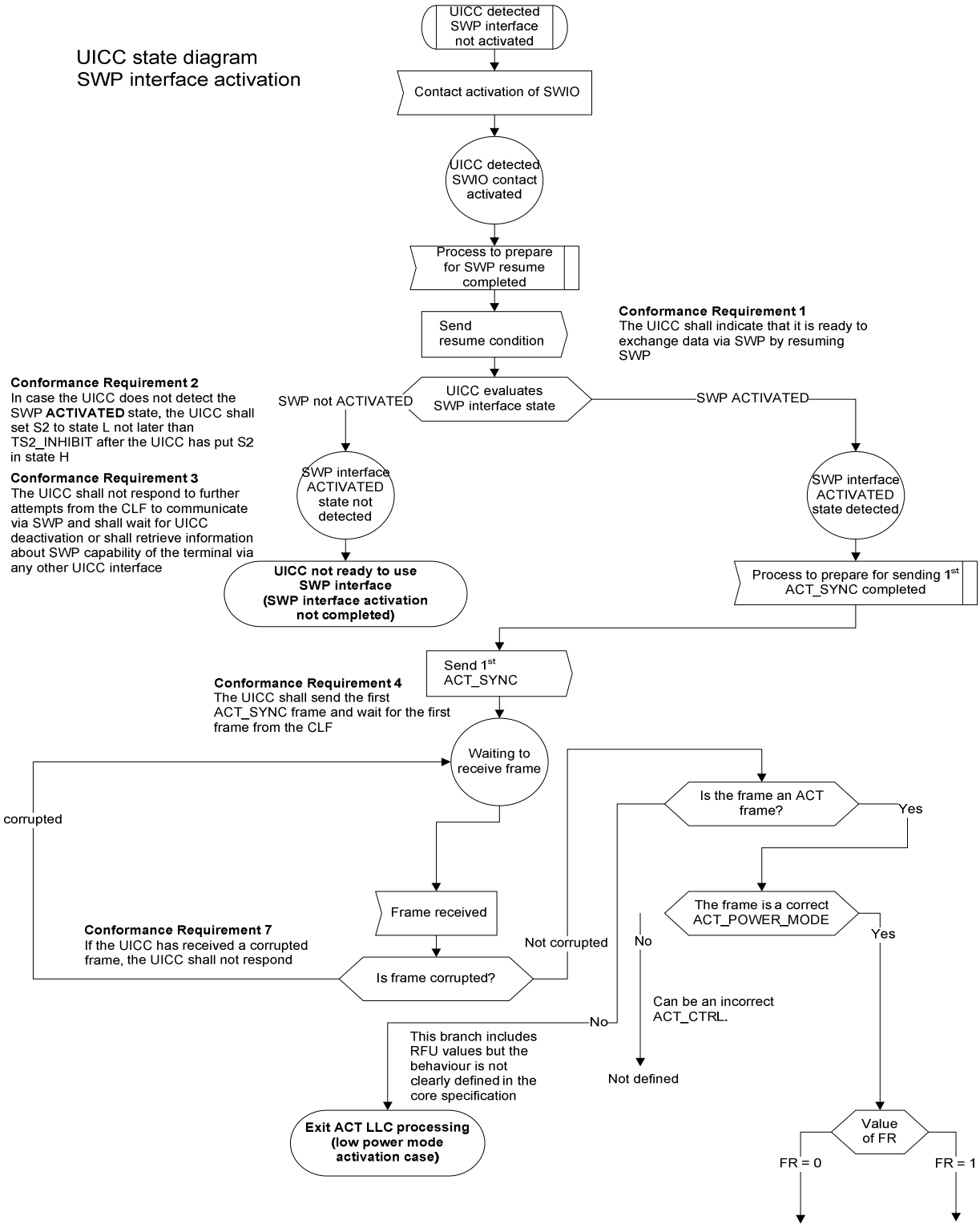

Figure A.2.1: Initial SWP interface activation, part 1

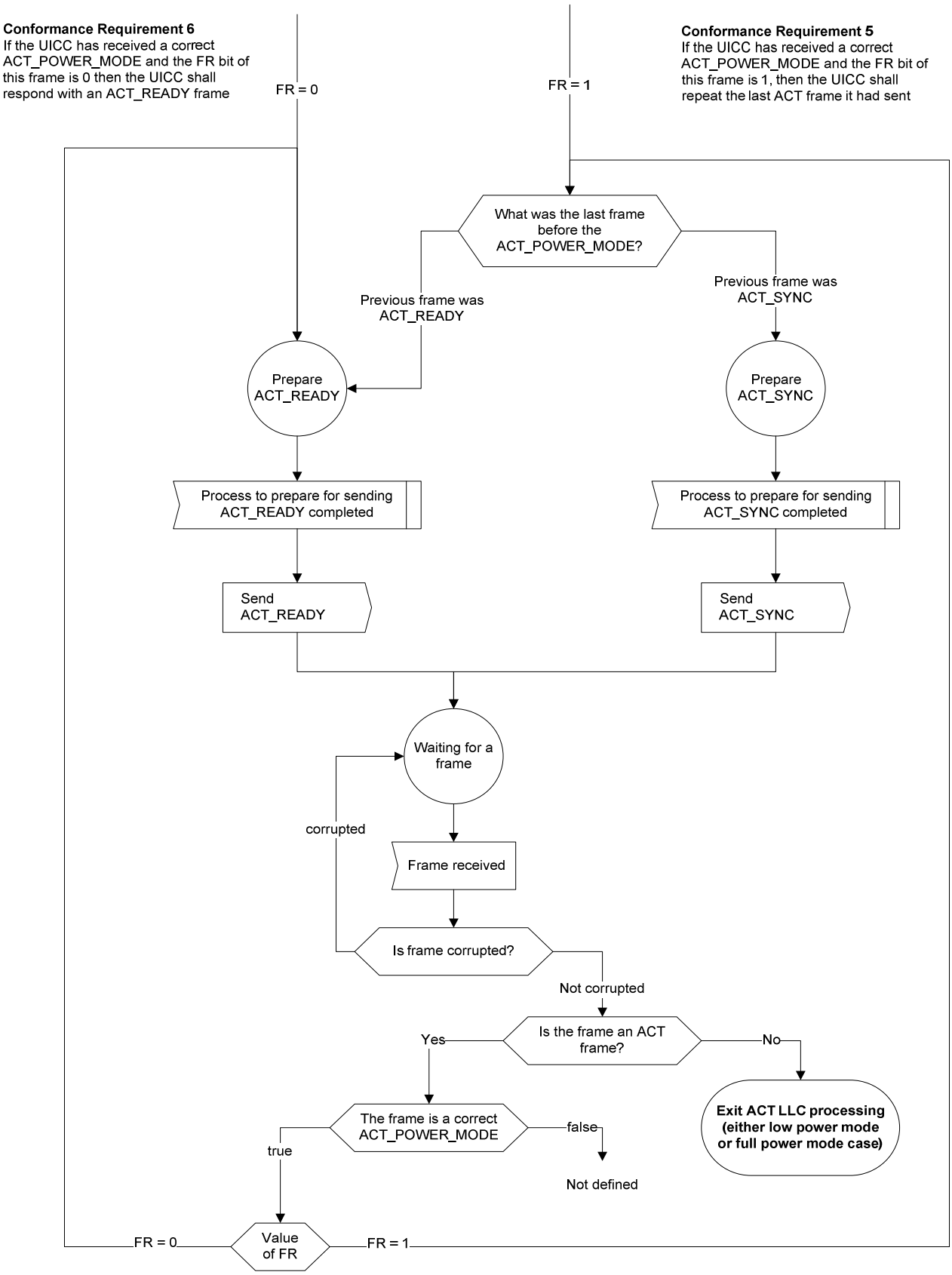

Figure A.2.2: Initial SWP interface activation, part 2

A.3 SHDLC operation

This clause describes part of ETSI TS 102 613 [1], clause 10 in SDL notation.

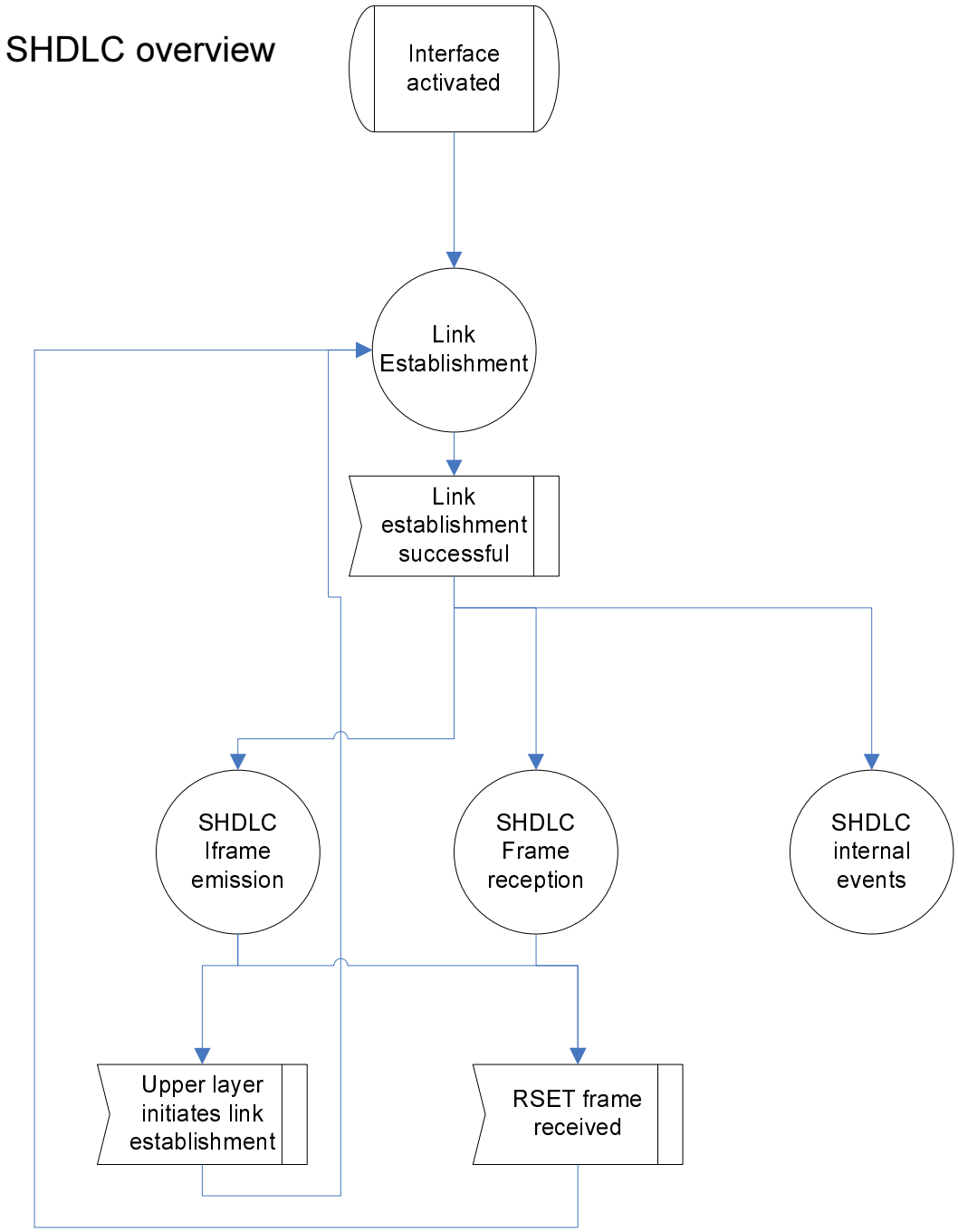

Figure A.3.1: SHDLC overview

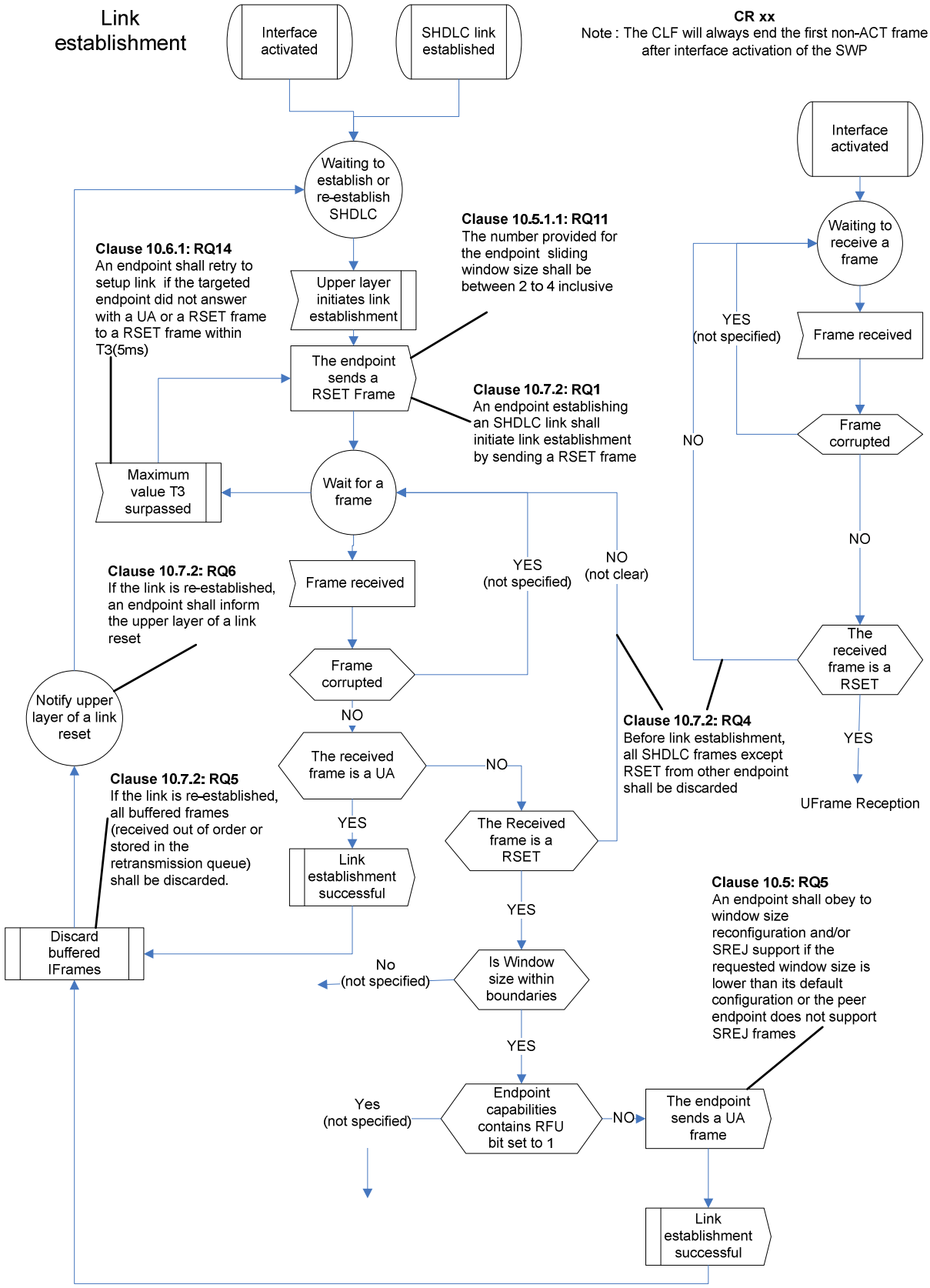

Figure A.3.2: Link establishment

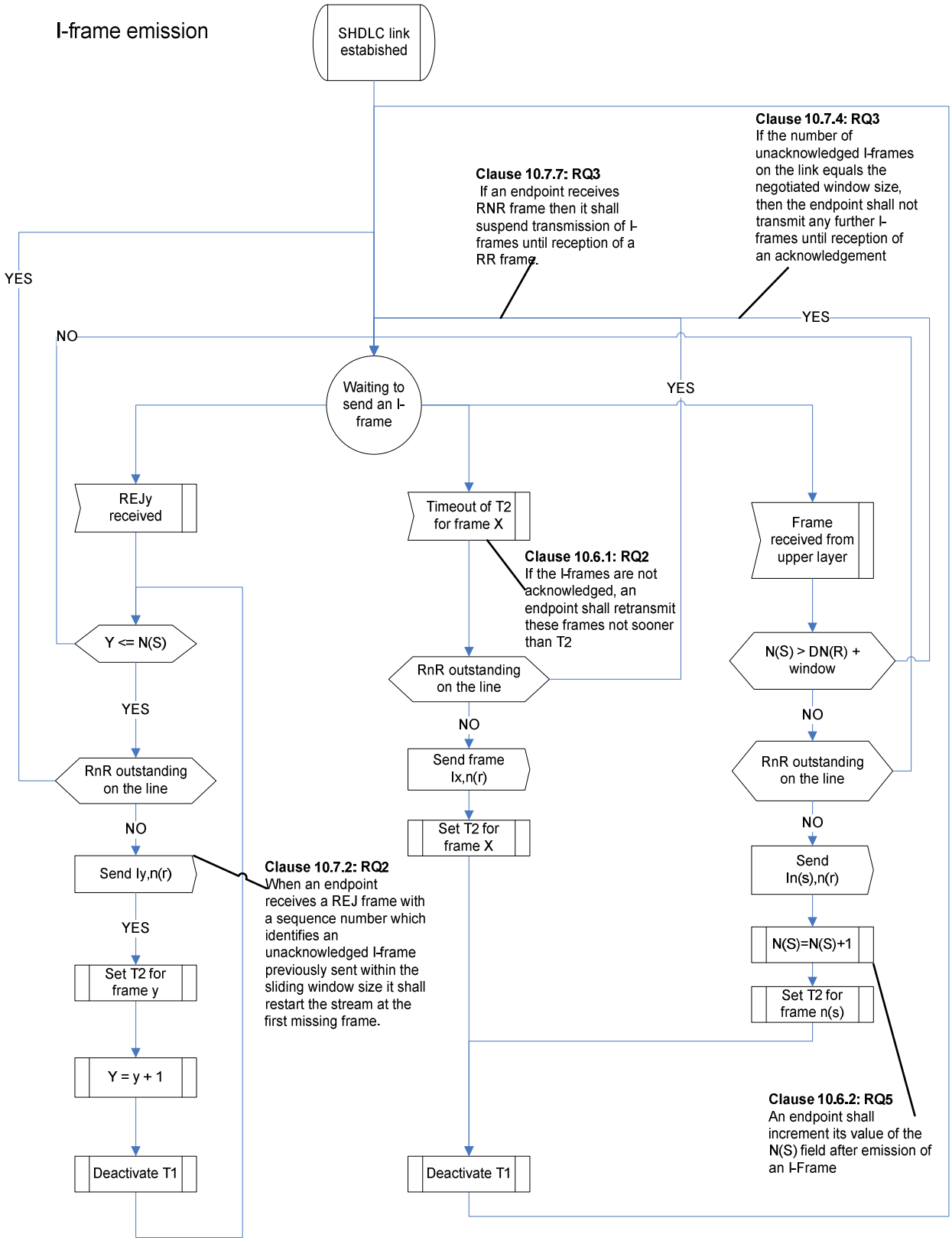

Figure A.3.3: I-frame emission

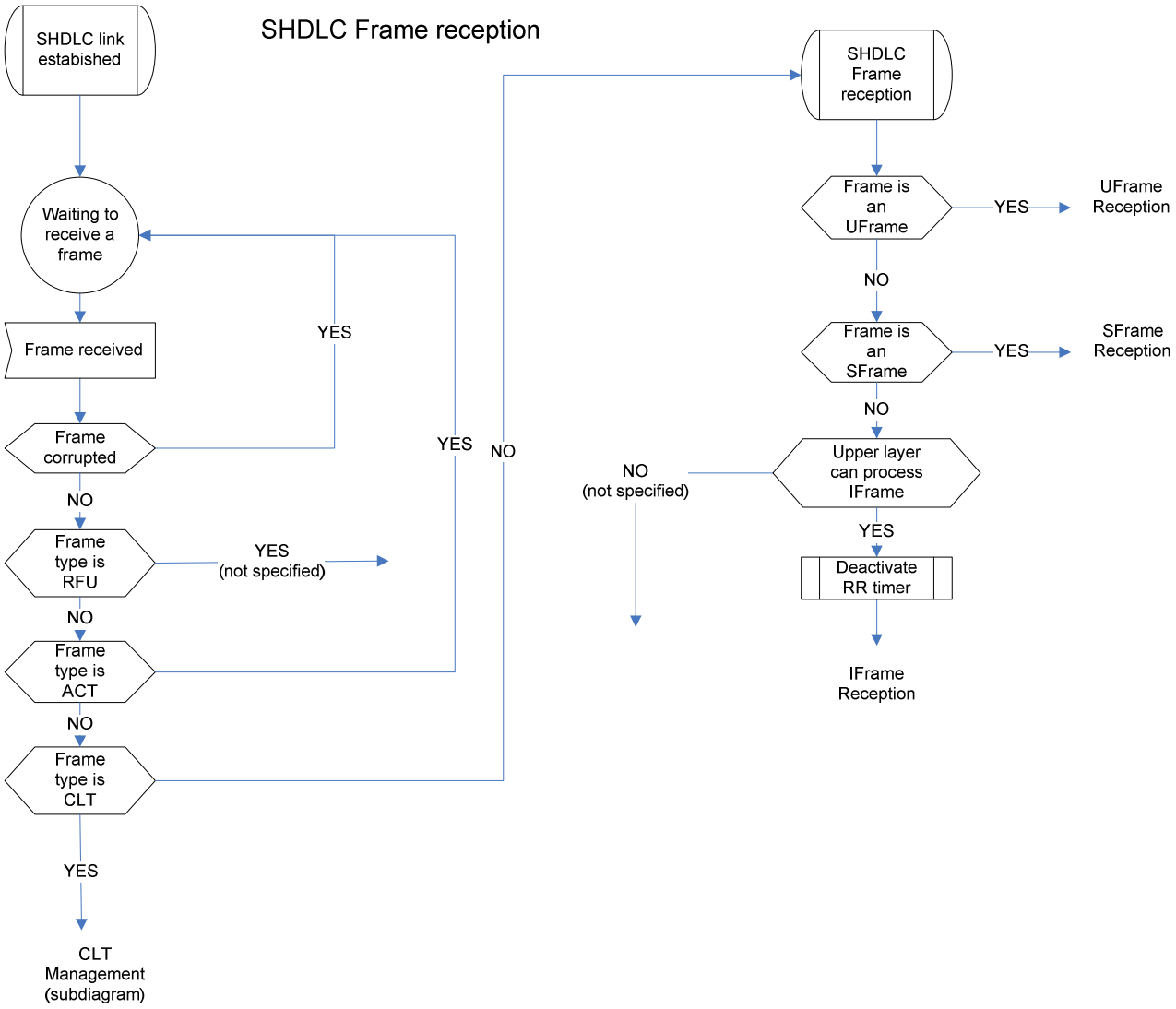

Figure A.3.4: SHDLC frame reception

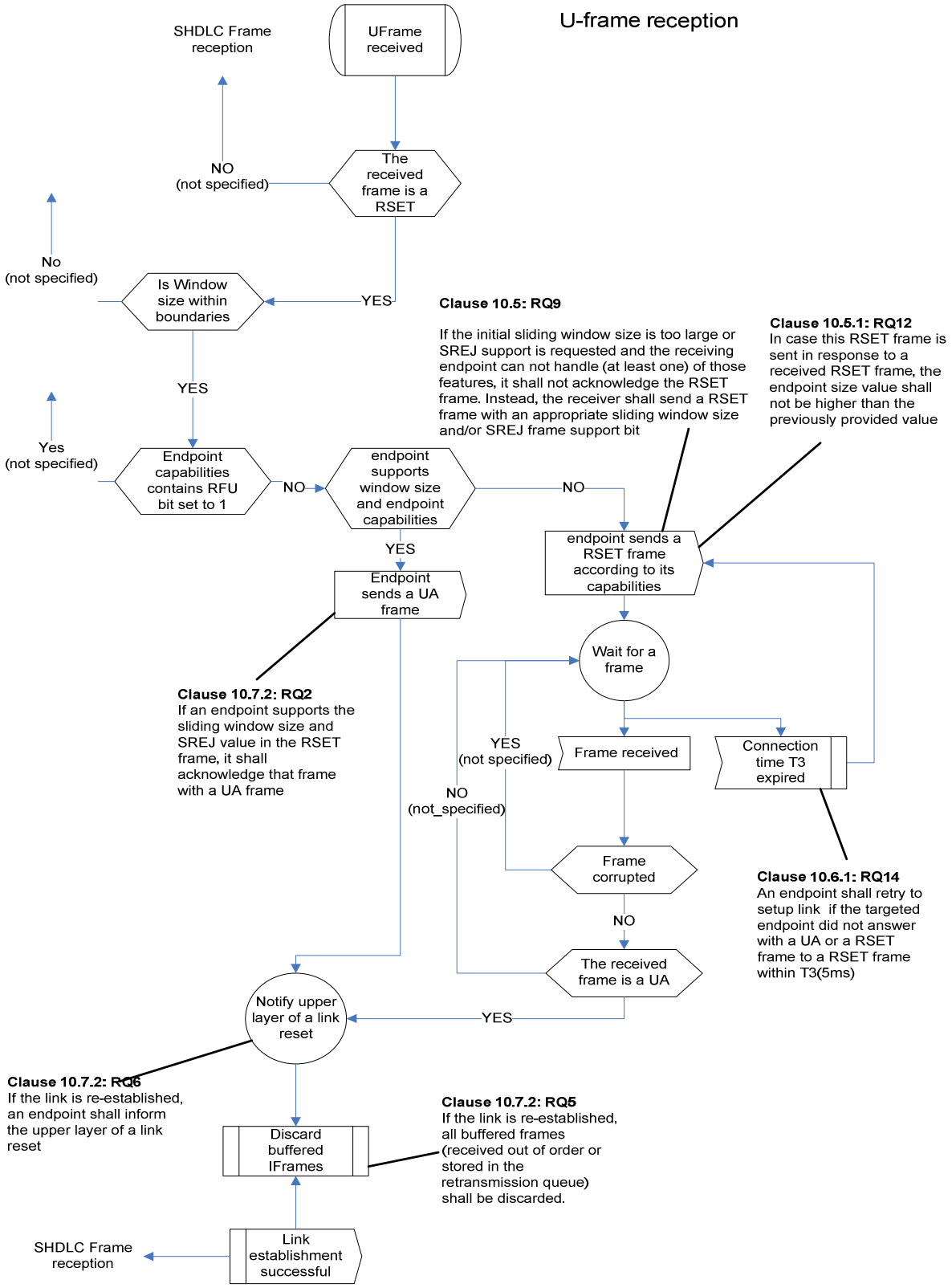

Figure A.3.5: U-frame reception

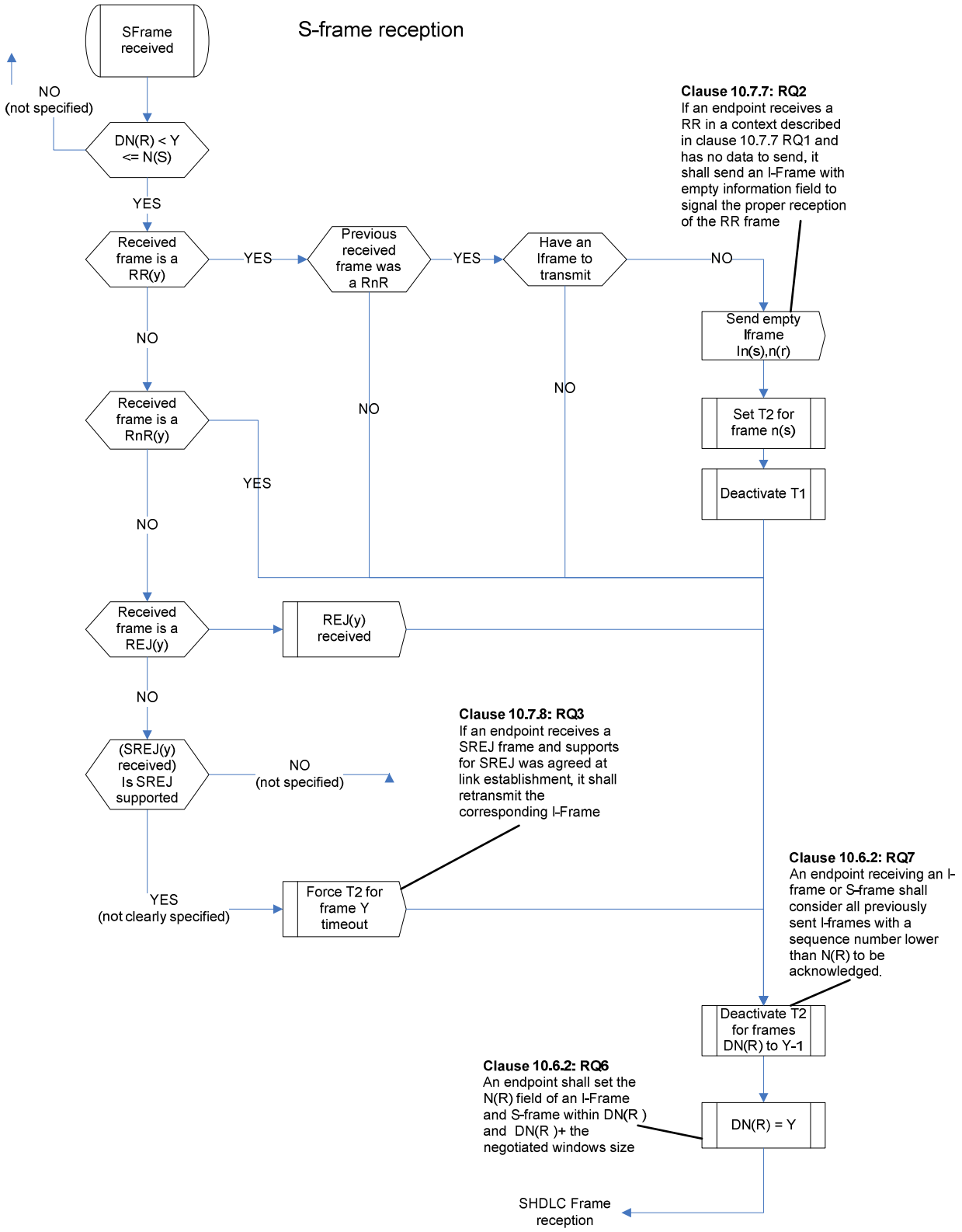

Figure A.3.6: S-frame reception

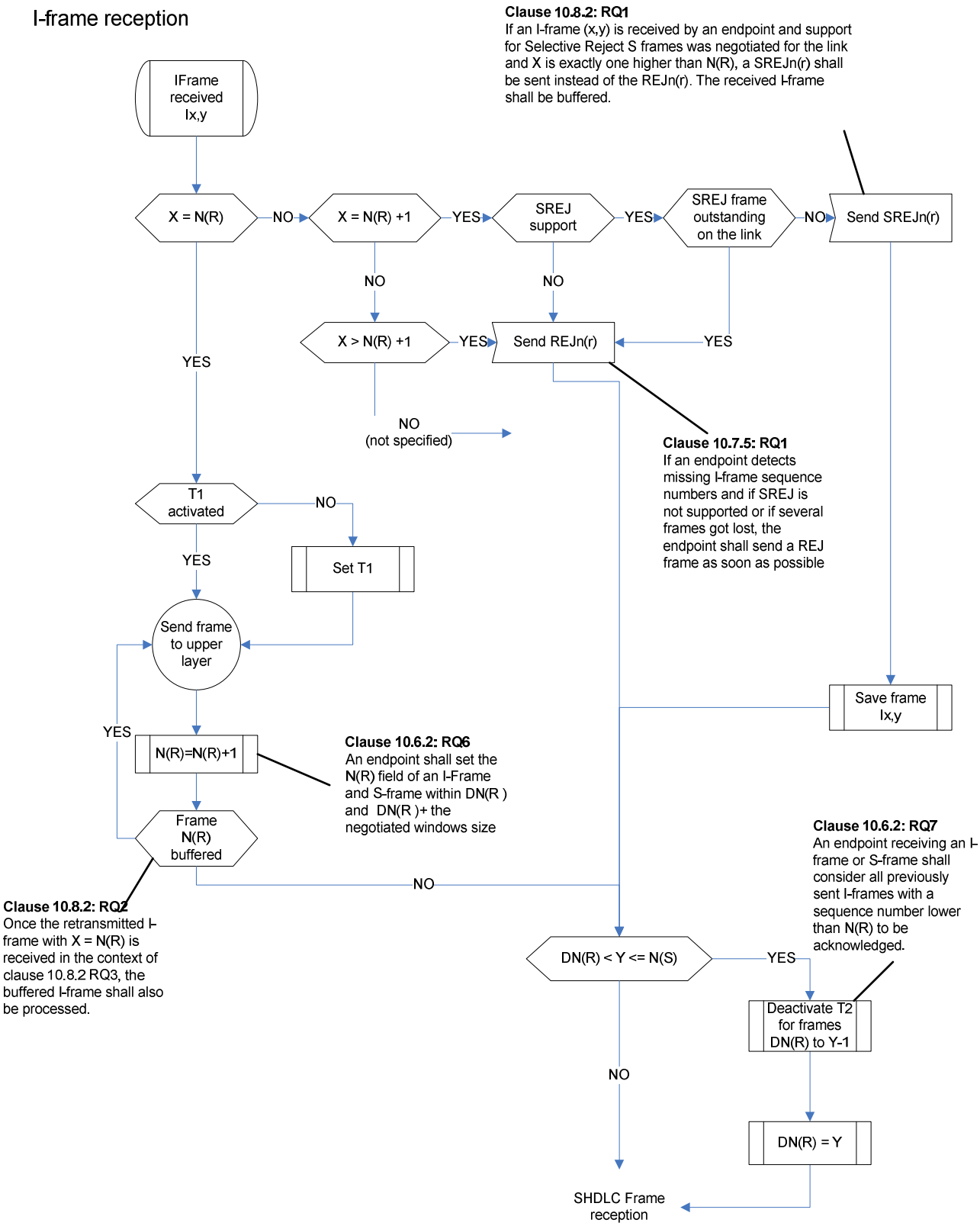

Figure A.3.7: I-frame reception

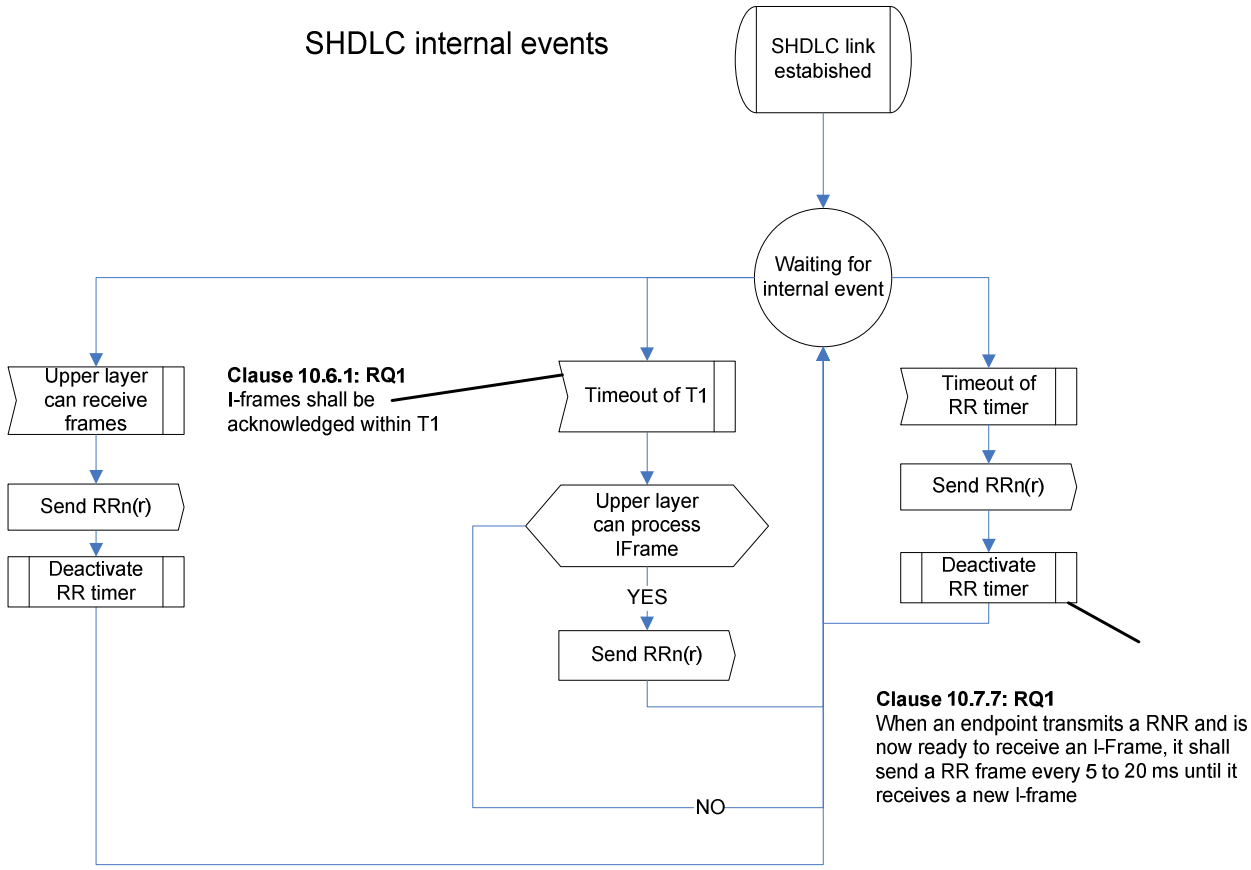

Figure A.3.8: SHDLC internal events

Annex B (informative): Void

Annex C (normative): Additional test cases

C.1 Overview

The annex provides test cases that can only be implemented in a standardized way if the information in table C.3 is provided. As this information is proprietary, the execution of these tests is optional.

C.2 Applicability table

Table C.1 specifies the applicability of each test case introduced in this annex. See clause 3.4 for the format of table C.1.

Table C.1: Applicability of tests

Test case	Description	Release	Execution requirements	Rel-7 UICC	Rel-8 UICC	Rel-9 UICC	Rel-10 UICC	Support
C.4.1	initial state at link reset - reset by the UICC	Rel-7	TR901	M	M	M	M	
C.4.2	link establishment by the UICC	Rel-7	TR901	M	M	M	M	
C.4.3	connection time - reset by UICC	Rel-7	TR901	M	M	M	M	
C.4.4	UICC discards I-frames and S-frames during link establishment	Rel-7	TR901	M	M	M	M	
C.4.5	forcing lower window size - link establishment by the UICC	Rel-7	TR901	C901	C901	C901	C901	
C.4.6	forcing SREJ not used - link establishment by the UICC	Rel-7	TR901	C902	C902	C902	C902	
C.4.7	forcing lower window size and SREJ not used - link establishment by the UICC	Rel-7	TR901	C903	C903	C903	C903	

Table C.2: Conditional items referenced by table C.1

Conditional item	Condition
C901	IF O_WS_3 THEN M ELSE N/A
C902	IF O_SREJ THEN M ELSE N/A
C903	IF O_SREJ AND O_WS_3 THEN M ELSE N/A

Table C.3: Execution requirements referenced by table C.1

Execution requirement	Description
TR901	The DUT manufacturer has to provide information how the user can trigger the DUT to reset the SHDLC link and send RSET.

NOTE: Clause 4.5.2 should be referenced for the meaning and usage of the execution requirements which are described in table C.3.

C.3 Conformance requirements

Reference: ETSI TS 102 613 [1], clauses 10.5, 10.5.1, 10.6.1, 10.6.3, 10.7.2 and 10.7.4.

RQ1	10.6.3	The following initial states shall apply in every endpoint after successful link establishment: N(S) = N(R) = DN(R) = 0.
RQ2	10.7.2	An endpoint establishing an SHDLC link shall initiate link establishment by sending a RSET frame.
RQ3	10.7.4	Once the link is established, an endpoint shall be able to receive data.
RQ4	10.6.1	An endpoint shall retry to setup link if the targeted endpoint did not answer with a UA or a RSET frame to a RSET frame within T3(5 ms).
RQ5	10.7.2	If an endpoint supports the sliding window size and SREJ value in the RSET frame, it shall acknowledge that frame with a UA frame.
RQ6	10.5	An endpoint shall obey to window size reconfiguration and/or SREJ support if the requested window size is lower than its default configuration or the peer endpoint does not support SREJ frames.
RQ7	10.5.1	A RSET frame response shall not indicate the same window size and the same endpoint capabilities as the received RSET frame; in such a case a UA frame shall be sent.

C.4 Test cases

C.4.1 Test case 1: initial state at link reset - reset by the UICC

C.4.1.1 Test execution

The test procedure shall only be executed in voltage class B and in voltage class C, full power mode.

The test procedure shall be executed once for each of the following parameters:

- There are no test-case specific parameters for this test.

C.4.1.2 Initial conditions

- SHDLC link is established and idle, i.e. no further communication is expected.

C.4.1.3 Test procedure

Step	Direction	Description	RQ
1	User → UICC	Trigger the UICC to reset the SHDLC link.	
2	UICC → T	Send RSET.	
3	T → UICC	Send UA.	
4	Conditional	If the UICC does not immediately send I-frames after SHDLC link establishment, trigger the UICC to send an I-frame. If the trigger involves sending I-frames to the UICC, only one I-frame shall be sent.	
5	UICC → T	Send I-frame(0, NR). If the trigger in step 4 involved sending an I-frame to the UICC, NR = 1,else NR = 0.	RQ1
6	T → UICC	Send RR(1).	
7	Conditional	If the UICC continue to send I-frames, acknowledge them.	
8	T → UICC	Send I-frame(NS,NR).	
9	UICC → T	acknowledge the previously sent I-frame.	RQ1

C.4.2 Test Case 2: link establishment by the UICC

C.4.2.1 Test execution

The test procedure shall only be executed in voltage class B and in voltage class C, full power mode.

The test procedure shall be executed once for each of the following parameters:

- There are no test-case specific parameters for this test.

C.4.2.2 Initial conditions

- SHDLC link is established and idle, i.e. no further communication is expected.

C.4.2.3 Test procedure

Step	Direction	Description	RQ
1	User → UICC	Trigger the UICC to reset the SHDLC link.	
2	UICC → T	Send RSET.	RQ2
3	T → UICC	Send UA.	
4	T → UICC	Send an I-frame.	
5	UICC → T	Acknowledge the previously sent I-frame.	RQ3

C.4.3 Test case 3: connection time - reset by UICC

C.4.3.1 Test execution

The test procedure shall only be executed in voltage class B and in voltage class C, full power mode.

The test procedure shall be executed once for each of the following parameters:

- There are no test-case specific parameters for this test.

C.4.3.2 Initial conditions

- SHDLC link is established and idle, i.e. no further communication is expected.

C.4.3.3 Test procedure

Step	Direction	Description	RQ
1	User → UICC	Trigger the UICC to reset the SHDLC link.	
2	UICC → T	Send RSET.	
3	T	Do not send a UA frame.	
4	UICC → T	Send RSET after at least T3 time after execution of step 2.	RQ4

C.4.4 Test case 4: UICC discards I-frames and S-frames during link establishment

C.4.4.1 Test execution

The test procedure shall only be executed in voltage class B and in voltage class C, full power mode.

The test procedure shall be executed once for each of the following parameters:

- Run the test procedure for the following frames in step 3:
  - I-frame(0,0);
  - RNR(0);
  - SREJ(0).

C.4.4.2 Initial conditions

- SHDLC link is established and is idle, i.e. no further communication is expected.

C.4.4.3 Test procedure

Step	Direction	Description	RQ
1	User → UICC	Trigger the UICC to reset the SHDLC link.	
2	UICC → T	Send RSET.	
3	T	Do not send a UA frame and send the defined frame.	
4	UICC → T	Send RSET after at least T3 time after execution of step 2.	RQ4

C.4.5 Test Case 5: forcing lower window size - link establishment by the UICC

C.4.5.1 Test execution

The test procedure shall only be executed in voltage class B and in voltage class C, full power mode.

The test procedure shall be executed once for each of the following parameters:

- There are no test-case specific parameters for this test.

C.4.5.2 Initial conditions

- SHDLC link is established and idle, i.e. no further communication is expected.

C.4.5.3 Test procedure

Step	Direction	Description	RQ
1	User → UICC	Trigger the UICC to reset the SHDLC link.	
2	UICC → T	Send RSET frame.	
3	T → UICC	Send RSET(WS=2).	
4	UICC →T	Send UA.	RQ5, RQ6, RQ7

C.4.6 Test Case 6: forcing SREJ not used - link establishment by the UICC

C.4.6.1 Test execution

The test procedure shall only be executed in voltage class B and in voltage class C, full power mode.

The test procedure shall be executed once for each of the following parameters:

- There are no test-case specific parameters for this test.

C.4.6.2 Initial conditions

- SHDLC link is established and idle, i.e. no further communication is expected.

C.4.6.3 Test procedure

Step	Direction	Description	RQ
1	User → UICC	Trigger the UICC to reset the SHDLC link.	
2	UICC → T	Send RSET(Wsy, SREJ=1) frame. Where y = host provider announced size.	
3	T → UICC	Send RSET(WS=y, SREJ=0) frame.	
4	UICC → T	Send UA.	RQ5, RQ6, RQ7

C.4.7 Test Case 7: forcing lower window size and SREJ not used - link establishment by the UICC

C.4.7.1 Test execution

The test procedure shall only be executed in voltage class B and in voltage class C, full power mode.

The test procedure shall be executed once for each of the following parameters:

- There are no test-case specific parameters for this test.

C.4.7.2 Initial conditions

- SHDLC link is established and idle, i.e. no further communication is expected.

C.4.7.3 Test procedure

Step	Direction	Description	RQ
1	User → UICC	Trigger the UICC to reset the SHDLC link.	
2	UICC → T	Send RSET(Wsy, SREJ=1) frame. Where y = host provider announced size.	
3	T → UICC	Send RSET(WS=2, SREJ=0) frame.	
4	UICC → T	Send UA.	RQ5, RQ6, RQ7

Annex D (informative): Core specification version information

Unless otherwise specified, the versions of ETSI TS 102 613 [1] from which conformance requirements have been extracted are as follows:

Release	Latest version from which conformance requirements have been extracted
Rel-7	V7.10.0 + SCP(12)000167, SCP(12)000211
Rel-8	V8.3.0 + SCP(12)000207, SCP(12)000212
Rel-9	V9.3.0 + SCP(12)000208, SCP(12)000213
Rel-10	V10.0.0 + SCP(12)000209, SCP(12)000214
Rel-11	V11.0.0 + SCP(12)000210, SCP(12)000215
Rel-12	V11.0.0 + SCP(12)000210, SCP(12)000215, SCP(16)000091r1

Annex E (informative): Bibliography

- ISO/IEC 14443-4: "Identification cards - Contactless integrated circuit cards - Proximity cards - Part 4: Transmission protocol".

Annex F (informative): Change history

The table below indicates all changes that have been incorporated into the present document since it was placed under change control.

Change history								
Date	**Meeting**	**Plenary Doc**	**CR**	**Rev**	**Cat**	**Subject/Comment**	**Old**	**New**
2009-07	SCP #42	SCP-090254				Creation of the specification	2.4.0	7.0.0
2009-10	SCP #43	SCP-090315	001	-	F	Test Case 5.3.2.3.3: initial activation in low power mode with corrupted frames	7.0.0	7.1.0
		SCP-090315	002	-	F	Correction of the RQ verification of TC 4: 'Communication with frames - idle bits and wakeup sequence'	7.0.0	7.1.0
		SCP-090315	003	2	F	Addition of test cases for CLT LLC definition	7.0.0	7.1.0
		SCP-090315	004		F	Changes with respect to ETSI TS 102 221 interface	7.0.0	7.1.0
2010-03	SCP #44	SCP(10)0066	005	1	D	Editorial corrections	7.0.0	7.1.0
		SCP(10)0067	006	1	F	Modify test case 5.2.4.5 and adding new test cases 5.2.4.x and 5.2.4.y	7.0.0	7.1.0
		SCP(10)0068	007	1	F	Reword RQ6 in clause 5.7.7.5	7.0.0	7.1.0
		SCP(10)0069	008	1	F	Correct test case 5.7.7.6.3	7.0.0	7.1.0
		SCP(10)0070	009	1	F	Modified 5.2.4.2 to start clock in middle of frame exchange	7.0.0	7.1.0
		SCP(10)0071	010	1	F	Modification of 5.2.4.4/5 to send ISO command after SWP deactivation	7.0.0	7.1.0
		SCP(10)0072	011	1	F	Updated 5.3.2.3.6 to test both with and without activation of ETSI TS 102 221 interface	7.0.0	7.1.0
		SCP(10)0073	012	1	F	Loosened test equipment timing constraints in 5.7.1.X	7.0.0	7.1.0
		SCP(10)0074	013	1	D	Various editorial corrections	7.0.0	7.1.0
		SCP(10)0075	014	1	F	Updated test cases for activation / corrupted frames to send subsequent frames in order to check for response	7.0.0	7.1.0
		SCP(10)0076	015	1	F	Correction of tests wrongly implying an ACT_POWER_MODE after a correct ACT_SYNC in low power mode	7.0.0	7.1.0
		SCP(10)0077	016	1	F	5.5.1.3 - removal of redundant test execution parameters	7.0.0	7.1.0
		SCP(10)0078	017	1	F	5.6.2.3.9: removal of redundant and unclearly specified test case	7.0.0	7.1.0
		SCP(10)0079	018	1	F	Correction of test case 5.6.2.2.4	7.0.0	7.1.0
2010-07	SCP #45	SCP(10)0119	019	-	F		7.1.0	7.2.0
		SCP(10)0119	020	-	F	Addition of specific max. Time for 'no response'	7.1.0	7.2.0
		SCP(10)0119	022	-	F	Delete test case 5.6.2.1.2	7.1.0	7.2.0
		SCP(10)0119	023	-	F	Addition of new test case to test RQ5 from ETSI TS 102 694-2, clause 5.5.1.1 and remove this RQ from the related test cases	7.1.0	7.2.0
		SCP(10)0119	024	-	F	Removal of duplication/invalid execution parameters in activation tests	7.1.0	7.2.0
		SCP(10)0119	025	-	F	Correction of test case 5.7.7.8.3	7.1.0	7.2.0
		SCP(10)0119	026	-	F	Improved testing of idle bits	7.1.0	7.2.0
		SCP(10)0119	027	-	F	Change of usage of 10 I-frames throughout specification to 9 I-frames	7.1.0	7.2.0
		SCP(10)0119	029	-	F	Test case 5.6.4.1.6: removal of redundant parameter	7.1.0	7.2.0
		SCP(10)0119	030	-	F	ACT_INFORMATION in ACT_SYNC during initial interface activation made mandatory	7.1.0	7.2.0
		SCP(10)0119	031	-	F	Correction of Terminal Capability support to be optional	7.1.0	7.2.0
		SCP(10)0119	032	-	F	Test case 5.7.1.2: correction of ambiguous text	7.1.0	7.2.0
		SCP(10)0119	033	-	F	Test case 5.4.1.2.2: correction of ATR test	7.1.0	7.2.0
		SCP(10)0119	035	-	F	Test case 5.7.7.3.4: consistency of window size support	7.1.0	7.2.0
		SCP(10)0119	021	-	F	Update of SHDLC test cases to align with ETSI TS 102 694-1	7.1.0	7.2.0
		SCP(10)0119	028	1	F	HCP message fragmentation	7.1.0	7.2.0
		SCP(10)0119	034	1	F	Clarification of O_WS_3	7.1.0	7.2.0
2010-10	SCP #46	SCP(10)0222	016	-	F	Removal of execution parameter in test cases 'interpretation of incorrect formatted frames'	7.2.0	7.3.0

Change history								
Date	**Meeting**	**Plenary Doc**	**CR**	**Rev**	**Cat**	**Subject/Comment**	**Old**	**New**
2011-01	SCP #47	SCP(11)0027	037		F	Correction to "only one SREJ at any one time" test case	7.3.0	7.4.0
2011-03	SCP #48	SCP(11)0108	040		F	Addition of testing for reception of closely spaced frames	7.3.0	7.4.0
2011-03	SCP #48	SCP(11)0106	038		F	Creation of ETSI TS 102 694-2 Rel-8	7.4.0	8.0.0
2011-12	SCP #53	SCP(11)0342	046		F	Deletion of test case 5.7.7.9.3	8.0.0	8.1.0
2011-12	SCP #53	SCP(11)0345r1	044	1	F	Clarification of the representative SWP frame exchange procedure when HCI is used.	8.0.0	8.1.0
2011-12	SCP #53	SCP(11)0343	042		B	Creation of ETSI TS 102 694-2 REL-9	8.1.0	9.0.0
2012-03	SCP #54	SCP(12)000040r2	045	3	F	Correction of test procedure in 5.2.4.6 and 5.2.4.7	9.0.0	9.1.0
2012-03	SCP #54	SCP(12)000036r2	047	2	F	Modification of the test execution parameters of test case 5.5.4.5 and 5.5.4.6	9.0.0	9.1.0
2012-03	SCP #54	SCP(12)000039r2	050	2	F	Addition of test case 5.2.4.X	9.0.0	9.1.0
2012-09	SCP #56	SCP(12)000184r1	051	2	F	Introduction of Execution Requirements	9.1.0	9.2.0
2012-09	SCP #56	SCP(12)000180r1	052	1	F	Clarification of RNR reception vs. window size in TC 5.7.7.8.2	9.1.0	9.2.0
2012-09	SCP #56	SCP(12)000181r1	053	1	D	Correction of editorial errors	9.1.0	9.2.0
2012-09	SCP #56	SCP(12)000182r1	054	1	F	Modify the test execution in clauses 5.6.4.1.5.1 and 5.6.4.1.7.1	9.1.0	9.2.0
2012-09	SCP #56	SCP(12)000183r1	055	1	F	Addition of first non-ACT frame sent by CLF test case	9.1.0	9.2.0
2012-12	SCP #57	SCP(12)000237	056		F	Correction of test case 5.2.4.3 regarding PPS after warm reset	9.2.0	9.3.0
2012-12	SCP #57	SCP(12)000246	057		F	Removal of low power mode execution for test case 5.3.2.3.4	9.2.0	9.3.0
2012-12	SCP #57	SCP(12)000238	058		F	Removal of test case 5.5.4.9	9.2.0	9.3.0
2012-12	SCP #57	SCP(12)000239	059		F	Clarification of test cases 5.3.2.3.6/7	9.2.0	9.3.0
2012-12	SCP #57	SCP(12)000240	060		F	Test case 5.7.7.8.3: addition of compliance to T2	9.2.0	9.3.0
2012-12	SCP #57	SCP(12)000241r1	061	1	F	Definition of measurement process for power consumption	9.2.0	9.3.0
2012-12	SCP #57	SCP(12)000242	062		F	Clarification of test case 5.7.7.8.2 to not allow empty I-frames	9.2.0	9.3.0
2012-12	SCP #57	SCP(12)000243	063		F	Refinement of the Wake-Up sequence definition	9.2.0	9.3.0
2013-02	SCP #58	SCP(13)000030	048	3	F	Clarification on the flow control used by the UICC	9.2.0	9.3.0
2013-02	SCP #58	SCP(13)000025	064		F	Clarification of setting uncertainty	9.2.0	9.3.0
2013-02	SCP #58	SCP(13)000026	065		F	Extension of T_S1_HIGH_V timings applied in test cases	9.2.0	9.3.0
2013-02	SCP #58	SCP(13)000027	066		F	Clarification of bit stuffing test case	9.2.0	9.3.0
2013-02	SCP #58	SCP(13)000028	067		F	Clarification of power consumption phases and values	9.2.0	9.3.0
2013-02	SCP #58	SCP(13)000029	068		F	Splitting of O_EXTENDED_T into two options	9.2.0	9.3.0
2013-04	SCP #59	SCP(13)000071r1	069	1	F	Update of test case 5.6.2.3.2 to clarify validation logic	9.3.0	9.4.0
2013-04	SCP #59	SCP(13)000072	070		F	Initial Reset state test enhancement	9.3.0	9.4.0
2013-04	SCP #59	SCP(13)000073	071		F	SHDLC window size negotiation	9.3.0	9.4.0
2013-04	SCP #59	SCP(13)000074r1	074	1	F	Clause 5.5.4 correction of RQ5 and test cases	9.3.0	9.4.0
2013-04	SCP #59	SCP(13)000075	072		B	Creation of ETSI TS 102 694-2 REL-10	9.4.0	10.0.0
2013-07	SCP #60	SCP(13)000131r1	075	1	F	Test case 5.6.2.3.2: removal of invalid I-frame bit pattern	10.0.0	10.1.0
		SCP(13)000132r1	076	1	F	Clause 5.5.4 addition of test cases related to EVT_HCI_END_OF_OPERATION	10.0.0	10.1.0
2014-02	SCP #62	SCP(14)000017	077		F	Clarification of Type F initialization command and response parameters	10.1.0	10.2.0
2014-04	SCP #63	SCP(14)000112	078		B	Addition of Type F UICC test for 694-2	10.1.0	10.2.0
2014-12	SCP #66	SCP(14)000305	079		F	Removal of explicit ANDs in applicability table	10.2.0	10.3.0
		SCP(14)000306r1	080	2	F	Addition of test case 5.5.3.X	10.2.0	10.3.0
		SCP(14)000307r1	081	1	B	Clarification of time to wait and retransmission for response / acknowledgement	10.2.0	10.3.0
		SCP(14)000308	082		F	Definition of the way to measure the S2 current	10.2.0	10.3.0
		SCP(14)000309	083		F	Test case 5.2.4.8: replacement of SPW frame exchange procedure with I-frame	10.2.0	10.3.0
		SCP(14)000310	084		F	Test case 5.6.4.1.7: clarification of applicability	10.2.0	10.3.0
		SCP(14)000311	085		F	Consideration of upper layer indication	10.2.0	10.3.0
		SCP(14)000312	086		F	Test cases 5.5.4.5 6: clarification of SWP activation and initialization phase	10.2.0	10.3.0
2015-02	SCP #67	SCP(15)000017	087		F	Terminal Capability test cases: addition of normal processing response from UICC	10.2.0	10.3.0
2015-04	SCP #68	SCP(15)000095	089		F	Refinement of bit duration used by test equipment	10.3.0	10.4.0
		SCP(15)000096	090		F	Addition of test case 5.5.2.3 - S2 switching with variation of bit duration	10.3.0	10.4.0

Change history								
Date	**Meeting**	**Plenary Doc**	**CR**	**Rev**	**Cat**	**Subject/Comment**	**Old**	**New**
		SCP(15)000097	091		F	Clarification of the test execution parameters for test case 5.7.7.6.2	10.3.0	10.4.0
		SCP(15)000098r1	092	1	C	Moving of test cases related to TR1 from clause 5 to Annex C (new)	10.3.0	10.4.0
		SCP(15)000110	094		D	Compliance with ETSI drafting rules regarding hanging paragraphs	10.3.0	10.4.0
2015-10	SCP #70	SCP(15)000221r1	097	1	F	Update of SHDLC checking to indicate inconclusive for initial conditions	10.3.0	10.4.0
2015-10	SCP #70	SCP(15)000222r1	098	1	F	Modifications on the test procedure of test cases 5.5.4.5, 5.5.4.6, 5.5.4.7, 5.5.4.8 5.5.4.10 and 5.5.4.11	10.3.0	10.4.0
		SCP(15)000223r1	099	1	F	Test case 5.7.7.8.3: correction of details about retransmission	10.3.0	10.4.0
		SCP(15)000224r1	100	1	F	Test cases 5.2.3.3/4/5: specification of successful response	10.3.0	10.4.0
2015-04	SCP #68	SCP(15)000094	088		B	Creation of ETSI TS 102 694-2 REL-11	10.3.0	11.0.0
2015-07	SCP #69	SCP(15)000157	095		F	Corrections of RQ12 in clause 5.3.2.3.1	10.3.0	11.0.0
		SCP(15)000158r1	096	1	F	Voiding of test cases related to C6 low impedance	10.3.0	11.0.0
2015-12	SCP #71	SCP(15)000281	101	1	F	Refinement of acknowledgement behaviour of test tool	10.3.0	11.0.0
2016-02	SCP #72	SCP(16)000032	093	1	F	Addition of explicit CLT_A command sequence for three test cases	10.3.0	11.0.0
2016-04	SCP #73	SCP(16)000064	102		D	Removal of redundant Class A and Terminal Capability references	10.3.0	11.0.0
		SCP(16)000065	103		D	Editorial: removal of ES and EUT	10.3.0	11.0.0
2016-07	SCP #74	SCP(16)000125	104		F	Test case 5.8.6.3.1.2: correction of CLT content for HLTA	10.3.0	11.0.0
		SCP(16)000126	105		F	Test cases 5.6.3.2.X: specification of test case behaviour for CLT-A	10.3.0	11.0.0
		SCP(16)000127	106		F	CLT-A test cases: clarification of requirements for CL_GOTO_HALT/INIT	10.3.0	11.0.0
		SCP(16)000128	107		D	Removal of TERM_CAP option (not used)	10.3.0	11.0.0
		SCP(16)000140r1	108	1	F	Test case 5.3.2.3.14: introduction of reactivation timings	10.3.0	11.0.0
2016-10	SCP #75	SCP(16)000174r1	109	1	F	Correction of references to accepted CRs in ETSI TS 102 613	10.3.0	11.0.0
		SCP(16)000175r1	110	1	F	Replacement of piggybacking test case	10.3.0	11.0.0
		SCP(16)000176r1	111	1	D	Test case 5.3.2.3.14: Addition of information for the source of reactivation timing.	10.3.0	11.0.0
2016-12	SCP #76	SCP(16)000254	112		F	Clarification of test case 5.6.3.2.5	10.3.0	11.0.0
2017-06	SCP #79	SCP(17)000094	113		B	Addition of RQs and modification of TCs considering changes by CR089 and in Rel-12 of ETSI TS 102 221 with regard to UICC power states	11.0.0	12.0.0
2018-02	SCP #82	SCP(18)000024	114		F	Addition of new test case on Extended resume by slave time	11.0.0	12.0.0
2019-09						Correction of ETSI TS 102 613 references in clause 5.5.4.1	12.0.0	12.0.1
2021-10	SCP #101	SCP(21)000130	117		D	Remove test case 5.6.3.2.5	12.0.1	12.1.0
2021-10	SCP #101	SCP(21)000131	118		F	Test case 5.5.3.4: corrections and clarifications	12.0.1	12.1.0

History

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