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European Standard (Telecommunications series)

Private Integrated Services network (PISN); Inter-exchange signalling protocol; Cordless terminal authentication supplementary services; Part 2: Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification for the VPN "b" service entry point

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Reference

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Foreword

This European Standard (Telecommunications series) has been produced by ETSI Technical Committee Services and Protocols for Advanced Networks (SPAN).

The present document is part 2 of a multi-part deliverable covering the Private Integrated Service Network (PISN); Inter-exchange signalling protocol for the cordless terminal authentication supplementary services for the VPN "b" service entry point, as described below:

Part 1: "Test Suite Structure and Test Purposes (TSS&TP) specification for the VPN "b" service entry point";

Part 2: "Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification for the VPN "b" service entry point".

National transposition dates	
Date of adoption of this EN:	25 January 2002
Date of latest announcement of this EN (doa):	30 April 2002
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	31 October 2002
Date of withdrawal of any conflicting National Standard (dow):	31 October 2002

1 Scope

The present document specifies the Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma for the VPN "b" reference point of implementations conforming to the standard for the Cordless Terminal Authentication supplementary service as described in I-ETS 300 809.

EN 301 492-1 [4] specifies the Test Suite Structure and Test Purposes (TSS&TP) related to this ATS and partial PIXIT proforma specification.

2 References

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

- References are either specific (identified by date of publication and/or edition number or version number) or non-specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies.

[1]   ETSI TR 101 101 (V1.1.1): "Methods for Testing and Specification (MTS); TTCN interim version including ASN.1 1994 support [ISO/IEC 9646-3] (Second Edition Mock-up for JTC1/SC21 Review)".

[2]   ISO/IEC 9646: "Information technology - Open Systems Interconnection - Conformance testing methodology and framework".

[3]   ISO/IEC 8825-1: "Information technology - ASN.1 encoding rules: Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER)". (See also ITU-T Recommendation X.690).

[4]   ETSI EN 301 492-1: "Private Integrated Services Network (PISN); Inter-exchange signalling protocol; Cordless terminal authentication supplementary services; Part 1: Test Suite Structure and Test Purposes (TSS&TP) specification for the VPN "b" service entry point".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in ISO/IEC 9646 [2] apply.

3.2 Abbreviations

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

ASN.1	Abstract Syntax Notation One
ATM	Abstract Test Method
ATS	Abstract Test Suite
BER	Basic Encoding Rules
CPA	Critical Path Analysis
CTM	Cordless Terminal Mobility
ETS	Executable Test Suite
ISDN	Integrated Services Digital Network
IUT	Implementation Under Test
MOT	Means Of Testing

MTC	Main Test Component
PCO	Point of Control and Observation
PCTR	Protocol Conformance Test Report
PICS	Protocol Implementation Conformance Statement
PIXIT	Protocol Implementation eXtra Information for Testing
PTC	Parallel Test Component
SCS	System Conformance Statement
SCTR	System Conformance Test Report
SS-CTAT	Supplementary Service - Authentication of a CTM user
SUT	System Under Test
TP	Test Purpose
TTCN	Tree and Tabular Combined Notation
VPN	Virtual Private Network

4   Abstract Test Method (ATM)

4.1   Description of ATM used

The multi-party test method is applied for testing the IUT. The general configuration used is shown in figure 1.

A Point of Control and Observation (PCO) resides at the service access point between layers 2 and 3 in the test system. The PCO used by the MTC is named "L0" (for Lower) and the PCO used by the PTC is named "L1". These PCOs are used to control and observe the behaviour of the Implementation Under Test (IUT) and test case verdicts are assigned depending on the behaviour observed at these PCOs.

A third "informal" PCO, called "O" (for Operator) is used to specify control but not observation above the IUT; events at this PCO are never used to generate test case verdicts. Messages sent by the tester at this PCO explicitly indicate to the operator actions, which are to be performed on the SUT. This is regarded as a preferred alternative to the use of the implicit send event.
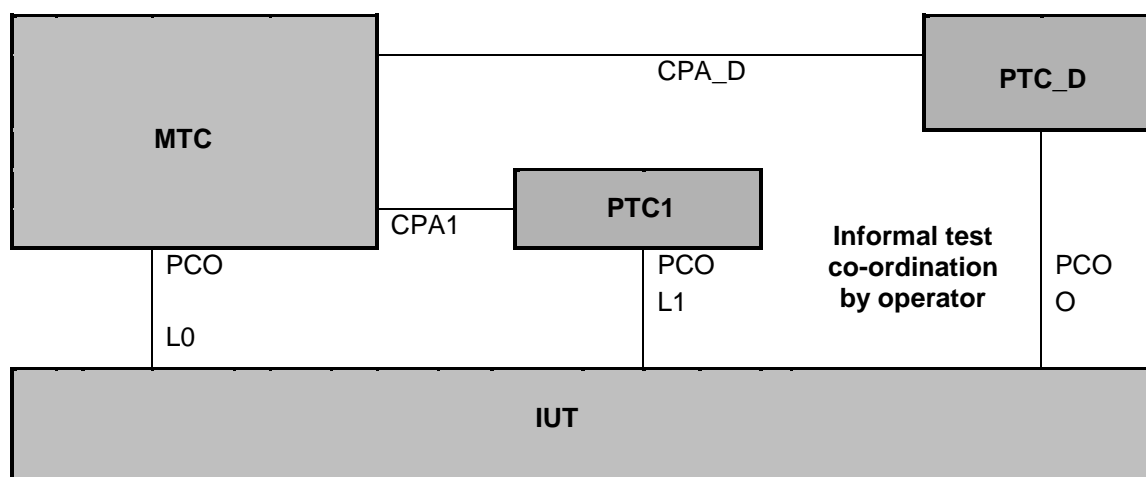
Figure 1: Multi-party test method

Not all components are used in every test case and the relationship between the IUT and the tester depends on the test group:

- when the IUT is in the Authentication configuration, the IUT is only connected to the MTC. The verdict depends only on the behaviour observed at the PCO between the IUT and the MTC. The PTC1 and PTC_D are not used;

- when the IUT is in the Home and Visitor configuration, the PTC1 and the MTC are both used. The verdict is assigned by the MTC or the PTC1 depending on the test purpose. The PTC_D and PCO O are used to specify control above the IUT.

5   Untestable test purposes

There are no untestable test cases associated with this ATS and ATM.

6   ATS conventions

6.1   Version of TTCN used

The version of TTCN used is that defined in TR 101 101 [1].

6.2   Use of ASN.1

6.2.1   Situations where ASN.1 is used

ASN.1 has been used for three major reasons. First, types defined in ASN.1 can model problems that "pure" TTCN cannot. For instance, data structures modelling ordered or unordered sequences of data are preferably defined in ASN.1. Second, ASN.1 provides a better restriction mechanism for type definitions by using sub-type definitions. Third, it is necessary to use ASN.1 to reproduce the type definitions for remote operation components as specified in the base standards in ASN.1.

The possibility to use TTCN and ASN.1 in combination is used, i.e. referring to an ASN.1 type from a TTCN type.

6.2.2   Specification of encoding rules

There is a variation in the encoding rules applied to ASN.1 types and constraints specified in this ATS and therefore a mechanism is needed to differentiate the encoding rules. However the mechanism specified in ISO/IEC 9646-3 [2] and in TR 101 101 [1] does not facilitate definition of the encoding rules as needed for this ATS. A solution is therefore used which is broadly in the spirit of ISO/IEC 9646-3 [2] in which comment fields have been used as a means of encoding rules.

For ASN.1 used in this ATS, two variations of encoding rules are used. One is the commonly known Basic Encoding Rules (BER) as specified in ISO/IEC 8825-1 [3]. In the second case the encoding is according to ISDN, i.e. the ASN.1 data types are a representation of structures contained within the ISDN specification (basic call, Generic functional protocol or individual supplementary service). For example, if octets of an information element are specified in ASN.1 as a SEQUENCE then this should be encoded in an Executable Test Suite (ETS) as any other ISDN information element specified using tabular TTCN. This ISDN encoding variation is the default encoding rule for this ATS. This means that all ASN.1 constraint tables are encoded using ISDN (non-BER) encoding unless stated otherwise. BER encoding should never be applied to an ASN.1 constraint where BER encoding has not been specified. This encoding rule is sometimes named "Direct Encoding".

For BER encoding, an indication is given in the comments field of the table header. For this ATS such indications appear in the ASN.1 type constraint declaration tables only. In the first line of the table header comment field, the notation "ASN1_Encoding: BER" is used.

In this particular ATS all ASN.1 type constraints which are of type "Component" are to be encoded using BER.

Table 1: ASN.1 type constraint declaration showing use of encoding variation

ASN.1 Type Constraint Declaration
Constraint Name: authCtmUser_inv_S1 (INV_ID: InvokeIDType; USR_NUM: PartyNumber; CHALLENGE: AuthChallenge; RESPONSE: AuthResponse)
ASN.1 Type: Component
Derivation Path:
Encoding Variation:
Comments: ASN1_Encoding: BER
Send Component: authCtmUser invoke component, element calcCtatInfo is included.
Description

authCtmUser_Comp
 authCtmUser_InvokeComp
  { invokeID   INV_ID,   -- The invoke identifier
    operation_value   localValue   72,   -- The value for operation
    argument   {pisnNumber   USR_NUM,
              calcCtatInfo   {{authChallenge   CHALLENGE,
                       authResponse   RESPONSE,
                       derivedCipherKey   OMIT,
                       calculationParam   OMIT}},
             dummyExtension   OMIT}
  }

Detailed comments:

7 ATS to TP map

The identifiers used for the TPs are reused as test case names. Thus there is a straightforward one-to-one mapping.

8 PCTR conformance

A test laboratory, when requested by a client to produce a PCTR, is required, as specified in ISO/IEC 9646-5 [2], to produce a PCTR conformant with the PCTR template given in annex B of ISO/IEC 9646-5 [2].

Furthermore, a test laboratory, offering testing for the ATS specification contained in annex C, when requested by a client to produce a PCTR, is required to produce a PCTR conformant with the PCTR proforma contained in annex A.

A PCTR, which conforms to this PCTR proforma specification, shall preserve the content and ordering of the clauses contained in annex A, clause A.6 of the PCTR may contain additional columns. If included, these shall be placed to the right of the existing columns. Text in italics may be retained by the test laboratory.

9 PIXIT conformance

A test realizer, producing an executable test suite for the ATS specification contained in annex C, is required, as specified in ISO/IEC 9646-4 [2], to produce an augmented partial PIXIT proforma conformant with this partial PIXIT proforma specification.

An augmented partial PIXIT proforma which conforms to this partial PIXIT proforma specification shall, as a minimum, have contents which are technically equivalent to annex B. The augmented partial PIXIT proforma may contain additional questions that need to be answered in order to prepare the Means Of Testing (MOT) for a particular IUT.

A test laboratory, offering testing for the ATS specification contained in annex C, is required, as specified in ISO/IEC 9646-5 [2], to further augment the augmented partial PIXIT proforma to produce a PIXIT proforma conformant with this partial PIXIT proforma specification.

A PIXIT proforma which conforms to this partial PIXIT proforma specification shall, as a minimum, have contents which are technically equivalent to annex B. The PIXIT proforma may contain additional questions that need to be answered in order to prepare the test laboratory for a particular IUT.

10   ATS conformance

The test realizer, producing MOT and ETS for this ATS specification, shall comply with the requirements of ISO/IEC 9646-4 [2]. In particular, these concern the realization of an ETS based on each ATS. The test realizer shall provide a statement of conformance of the MOT to this ATS specification.

An ETS, which conforms to this ATS specification, shall contain test groups and test cases, which are technically equivalent to those contained in the ATS in annex C. All sequences of test events comprising an abstract test case shall be capable of being realized in the executable test case. Any further checking which the test system might be capable of performing is outside the scope of this ATS specification and shall not contribute to the verdict assignment for each test case.

Test laboratories running conformance test services using this ATS shall comply with ISO/IEC 9646-5 [2].

A test laboratory, which claims to conform to this ATS specification, shall use a MOT which conforms to this ATS.

Annex A (normative):
Protocol Conformance Test Report (PCTR) proforma

Notwithstanding the provisions of the copyright clause related to the text of the present document, ETSI grants that users of the present document may freely reproduce the PCTR proforma in this annex so that it can be used for its intended purposes and may further publish the completed PCTR.

A.1 Identification summary

A.1.1 Protocol conformance test report

PCTR number:	
PCTR date:	
Corresponding SCTR number:	
Corresponding SCTR date:	
Test laboratory identification:	
Test laboratory manager:	
Signature:	

A.1.2 IUT identification

Name:	
Version:	
Protocol specification:	I-ETS 300 809
PICS:	
Previous PCTRs (if any):	

A.1.3   Testing environment

PIXIT reference number:	
ATS specification:	EN 301 492-2
Abstract test method:	Multi-party test method (see ISO/IEC 9646-2)
Means of testing identification:	
Dates of testing:	
Conformance log reference(s):	
Retention date for log reference(s):	

A.1.4   Limits and reservations

Additional information relevant to the technical contents or further use of the test report, or to the rights and obligations of the test laboratory and the client, may be given here. Such information may include restriction on the publication of the report.

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A.1.5   Comments

Additional comments may be given by either the client or the test laboratory on any of the contents of the PCTR, for example, to note disagreement between the two parties.

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A.2   IUT conformance status

This IUT has/has not been shown by conformance assessment to be non-conforming to the specified protocol specification.

Strike the appropriate words in this sentence. If the PICS for this IUT is consistent with the static conformance requirements (as specified in clause A.3 of the present document) and there are no "FAIL" verdicts to be recorded (in clause A.6) strike the words "has", otherwise strike the words "has not".

A.3   Static conformance summary

The PICS for this IUT is/is not consistent with the static conformance requirements in the specified protocol.

Strike the appropriate words in this sentence.

A.4   Dynamic conformance summary

The test campaign did/did not reveal errors in the IUT.

Strike the appropriate words in this sentence. If there are no "FAIL" verdicts to be recorded (in clause A.6 of the present document) strike the word "did"; otherwise strike the words "did not".

Summary of the results of groups of tests:

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A.5   Static conformance review report

If clause A.3 indicates non-conformance, this clause itemizes the mismatches between the PICS and the static conformance requirements of the specified protocol specification.

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A.6 Test campaign report

ATS reference	Selected? (Y/N)	Run? (Y/N)	Verdict	Observations
CTAT_Home01_001				
CTAT_Home01_002				
CTAT_Home01_003				
CTAT_Home01_004				
CTAT_Home01_005				
CTAT_Home02_001				
CTAT_Home02_002				
CTAT_Home02_003				
CTAT_Home02_004				
CTAT_Home02_005				
CTAT_Home02_006				
CTAT_Home02_007				
CTAT_Home03_001				
CTAT_Home03_002				
CTAT_Home03_003				
CTAT_Home03_004				
CTAT_Home03_005				
CTAT_Visit01_001				
CTAT_Visit01_002				
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CTAT_Visit01_004				
CTAT_Visit01_005				
CTAT_Visit01_006				
CTAT_Visit01_007				
CTAT_Visit02_001				
CTAT_Visit02_002				
CTAT_Visit02_003				
CTAT_Visit02_004				
CTAT_Visit02_005				
CTAT_Visit02_006				
CTAT_Auth_001				
CTAT_Auth_002				
CTAT_Auth_003				
CTAT_Auth_004				
CTAT_PrevVisit_001				
CTAN_Visit_001				
CTAN_Visit_002				
CTAN_Visit_003				
CTAN_Visit_004				
CTAN_Visit_005				
CTAN_Visit_006				
CTAN_Home_001				
CTAN_Home_002				
CTAN_Home_003				
CTAN_Home_004				
CTAN_Home_005				
CTAN_Home_006				
CTAN_Home_007				
CTAN_Auth_001				
CTAN_Auth_002				
CTAN_Auth_003				
CTAN_Auth_004				

A.7 Observations

Additional information relevant to the technical content of the PCTR is given here.

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Annex B (normative):
Partial PIXIT proforma

Notwithstanding the provisions of the copyright clause related to the text of the present document, ETSI grants that users of the present document may freely reproduce the partial PIXIT proforma in this annex so that it can be used for its intended purposes and may further publish the completed PIXIT.

B.1   Identification summary

PIXIT number:

....

Test laboratory name:

....

Date of issue:

....

Issued to:

....

B.2   Abstract test suite summary

Protocol specification: I-ETS 300 809

ATS specification: EN 301 492-2

Abstract test method: Multi-party test method (see ISO/IEC 9646-2)

B.3   Test laboratory

Test laboratory identification:

....

Accreditation status of the test service:

....

Accreditation reference:

....

Test laboratory manager:

....

Test laboratory contact:

....

Means of testing:

....

Test laboratory instructions for completion:

....

B.4   Client (of the test laboratory)

Client identification:

....

Client test manager:

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Client contact:

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Test facilities required:

....

B.5   System Under Test (SUT)

Name:

....

Version:

....

SCS reference:

....

Machine configuration:

....

Operating system identification:

....

IUT identification:

....

PICS (all layers):

....

....

Limitations of the SUT:

....

Environmental conditions:

....

B.6   Protocol information

B.6.1   Protocol identification

Specification reference: I-ETS 300 809

Protocol version: 1.2.1

PICS reference:

> NOTE: The PICS reference should reference a completed PICS which is conformant with the PICS proforma
> contained in I-ETS 300 809.

B.6.2   IUT information

B.6.2.1   Parameter values

Table B.1: Parameter values

Item	Question	Supported? (Y/N)	Value
1.1	Length of Business group identification (including octet 3).		
1.2	Business group identificator (bitstring [3]).		
1.3	A value for the Business group identification.	[0..12]	
1.4	Authentication challenge.		
1.5	Authentication response.		
1.6	Derived cipher key.		
1.7	Authentication session key.		
1.8	Calculation parameter.		
1.9	Authentication algorithm.		
1.10	Alternative identifier provided by the CTM user.		

B.6.2.2   Timer values

Table B.2: Timer values

Item	Timer duration	Supported? (Y/N)	Allowed values	Value
2.1	Wait for the IUT to respond to a stimulus sent by the tester (TAC). Duration in seconds.		Integer	
2.2	Control that the IUT does not respond to a stimulus sent by the tester (TNOAC). Duration in seconds.		Integer	
2.3	Wait for the test operator to perform an implicit send action or to wait for a PTC to react (TWAIT). Duration in seconds.		Integer	
2.4	Timer that is used to wait for RESTART messages (T_RESTART) (in seconds). Timer used in the initialization preamble only.		Integer	

B.6.2.3   Information parameter values

Table B.3: Parameter values

Item	Question	Supported? (Y/N)	Value
3.1	PISN number of the CTM user.		
3.2	Invalid PISN number.		
3.3	CTM user number (not authorized for SS-CTAT).		
3.4	Length of the Called party number information element to be sent to the IUT.		
3.5	Octet 3 (Type of number, Numbering plan identification) of the Called party number information element.		
3.6	Number digits (IA5) for the Called party number information element of the HOME PINX.		
3.7	Number digits (IA5) for the Called party number information element of the VISITOR PINX.		
3.8	Number digits (IA5) for the Called party number information element of the AUTHENTICATION SERVER PINX.		

B.7   Basic call PIXIT items

B.7.1   Parameter values - information element coding

Table B.4: Coding of information elements

Item	Information element: provide, if possible...	Supported? (Y/N)	Value
4.1	a value for the length of the Call Reference (bitstring [4]).		
4.2	a value to select if the IUT sends RESTART PDUs after re-establishment of the multiple frame operation.		
4.3	a value to select if the IUT initiates release of the multiple frame established operation after entering U00/N00.		
4.4	a value for the preferred channel number.		
4.5	a value for the preferred channel number for the second call.		

Annex C (normative):
Abstract Test Suite (ATS)

This ATS has been produced using the Tree and Tabular Combined Notation (TTCN) according to ISO/IEC 9646-3 [2].

The ATS was developed on a separate TTCN software tool and therefore the TTCN tables are not completely referenced in the contents table. The ATS itself contains a test suite overview part, which provides additional information and references.

C.1 The TTCN Graphical form (TTCN.GR)

The TTCN.GR representation of this ATS is contained in an Adobe Portable Document Format™ file (sp519634.PDF contained in archive en_30149202v010201p0.ZIP) which accompanies the present document.

C.2 The TTCN Machine Processable form (TTCN.MP)

The TTCN.MP representation corresponding to this ATS is contained in an ASCII file (sp519634.MP contained in archive en_30149202v010201p0.ZIP) which accompanies the present document.

NOTE: Where an ETSI Abstract Test Suite (in TTCN) is published in both .GR and .MP format these two forms shall be considered equivalent. In the event that there appears to be syntactical or semantic differences between the two then the problem shall be resolved and the erroneous format (whichever it is) shall be corrected.

Annex D (informative):
Changes

D.1 Comment 2 of 4TD 175 clause 1.2

Comment 2	
Location	Test step 'Synchronize'
Description	All dual configurations shall be updated with the test step 'Synchronize'. This test step coordinates the MTC and PTC.

The synchronization of multiple test components is shown in figure D.1.

Each test component is performing a preamble in order to establish a connection to the IUT and to load test parameters.

After the successful establishment the test components are synchronized. The synchronization is done in order to avoid run time problem and in order to ensure that the test procedure is started at the same time by each test component.

A further synchronization during the test procedure is only needed, if the MTC triggers an action of the IUT and the PTC observes the IUT's reaction.

In order to ensure that the postamble of each test component is performed at the same time, a synchronization shall be performed before the execution of the postambles.
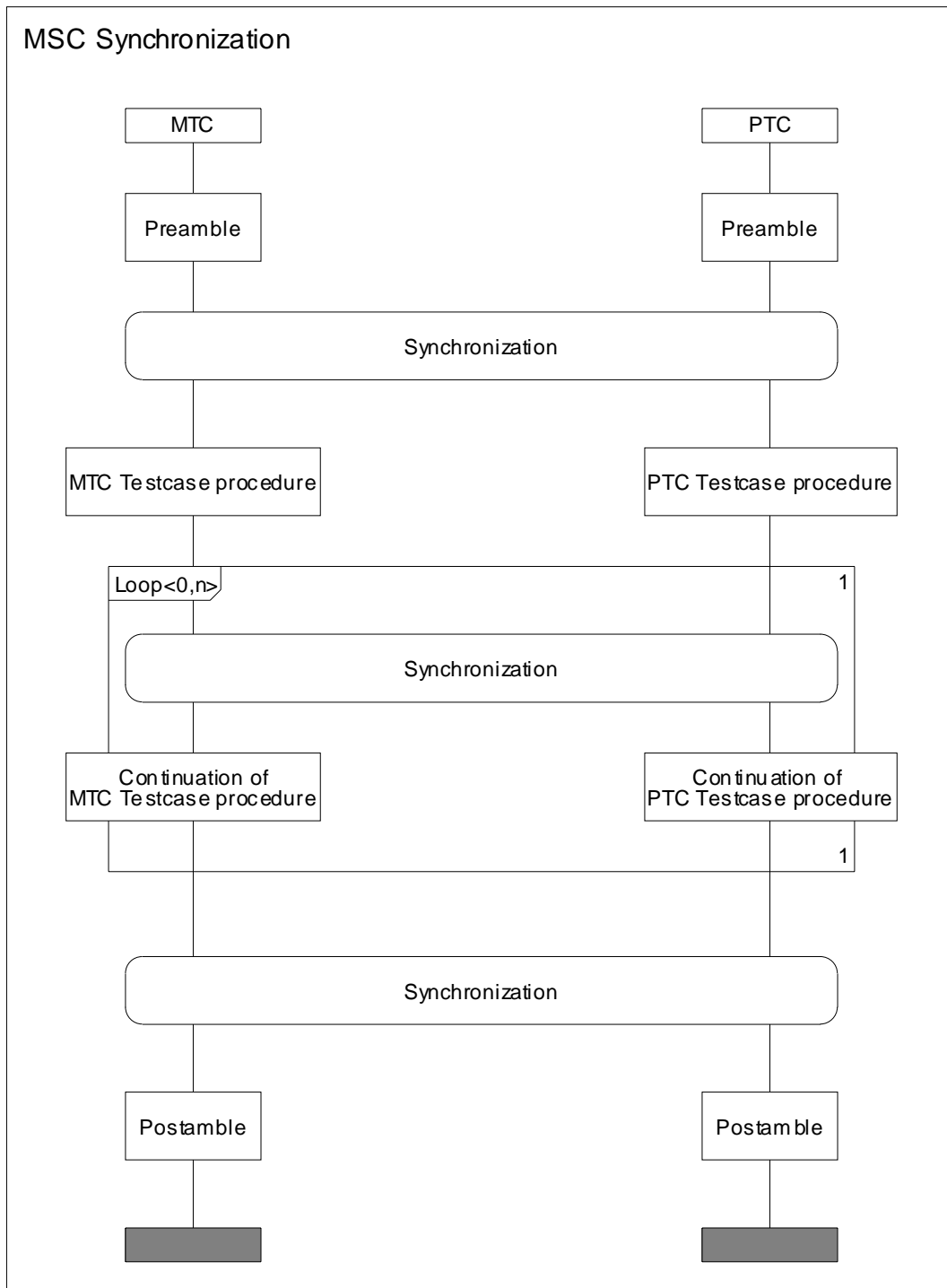
MSC Synchronization

```
        ┌─────────┐                                  ┌─────────┐
        │   MTC   │                                  │   PTC   │
        └─────────┘                                  └─────────┘
             │                                            │
        ┌─────────┐                                  ┌─────────┐
        │ Preamble│                                  │ Preamble│
        └─────────┘                                  └─────────┘
             │                                            │
   ╭─────────────────────────────────────────────────────────────╮
   │                     Synchronization                          │
   ╰─────────────────────────────────────────────────────────────╯
             │                                            │
   ┌─────────────────────┐              ┌─────────────────────────┐
   │MTC Testcase procedure│             │PTC Testcase procedure   │
   └─────────────────────┘              └─────────────────────────┘
             │                                            │
   ┌─Loop<0,n>─────────────────────────────────────────────────1─┐
   │                                                              │
   │  ╭────────────────────────────────────────────────────────╮ │
   │  │                  Synchronization                       │ │
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   │          │                                        │          │
   │  ┌───────────────────┐            ┌───────────────────────┐  │
   │  │  Continuation of  │            │   Continuation of     │  │
   │  │MTC Testcase procedure│         │PTC Testcase procedure │  │
   │  └───────────────────┘            └───────────────────────┘  │
   │          │                                        │        1 │
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   │                     Synchronization                          │
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             │                                            │
        ┌─────────┐                                  ┌─────────┐
        │Postamble│                                  │Postamble│
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Figure D.1: Synchronization

D.2   Comment 3 of 4TD 175 clause 1.2

Comment 3	
Location	Test messages to the Dummy PTC
Description	The test messages are unclear. Instead of a test message a test constant shall be sent. The test operator shall read then the description of the sent test constant. A description is clearer than a small test message.

The test operator receives via the PCO O instructions. These instructions describe the action which the test operator shall perform. Instead of a whole text, only the number of the instruction is prompted on the screen (TSC_action1, TSC_action2, etc.). As soon as an instruction is prompted on the screen, the test operator shall use the table D.1 of the present document, in order to see which action he shall perform.
This approach allows a more detailed description of the of the action which shall be performed.

All the possible test actions are shown in table D.1.

Table D.1: Description of test actions

Test action	Description of test action
TSC_action1	The operator shall use an appropriate action to trigger that the IUT invokes SS-CTAT with providing challenge and response values.
TSC_action2	The operator shall use an appropriate action to trigger that the IUT requests Authentication WITH canCompute.
TSC_action3	The operator shall use an appropriate action to trigger that the IUT requests Authentication WITHOUT canCompute.
TSC_action4	The operator shall use an appropriate action to trigger that the IUT sends a CORRECT Authentication Response.
TSC_action5	The operator shall use an appropriate action to trigger that the IUT sends an INCORRECT Authentication Response.
TSC_action6	The operator shall use an appropriate action to trigger that the IUT DOES NOT send an Authentication Response (time out error).
TSC_action7	The operator shall use an appropriate action to trigger that the IUT DOES NOT send an Authentication Response (NOT time out error).

D.3   Comment 4 of 4TD 175 clause 1.2

Comment 4	
Location	PIXITs for the address parameters
Description	To address the IUT there exists only the PIXIT CalledPartyNumber. It would be better to introduce several SETUP constraints. Each SETUP constraint is used to address a special PINX. Instead of having one global CalledPartyNumber, you would have a CalledPartyNumber_Primary Pinx, a CalledPartyNumber_Rerouteing Pinx, a CalledPartyNumber_Transferring Pinx, etc.

The modified items of table B.3 of the present document are listed in table D.2.

Table D.2: Modified items of Table B.3

Item	Question	Supported? (Y/N)	Value
3.6	Number digits (IA5) for the Called party number information element of the HOME PINX.		
3.7	Number digits (IA5) for the Called party number information element of the VISITOR PINX.		
3.8	Number digits (IA5) for the Called party number information element of the AUTHENTICATION SERVER PINX.		

Annex E (informative):
Bibliography

ETSI I-ETS 300 809 (1995): "Private Integrated Services Network (PISN); Cordless Terminal Mobility (CTM); Inter-exchange signalling protocol; Cordless terminal authentication supplementary services".

ETSI EN 300 171 (V1.2.1): "Private Telecommunication Network (PTN); Specification, functional models and information flows Control aspects of circuit mode basic services".

ETSI EN 300 172 (V1.4.1): "Private Integrated Services Network (PISN); Inter-exchange signalling protocol; Circuit-mode basic services".

ETSI ETS 300 239 (1995): "Private Integrated Services Network (PISN); Inter-exchange signalling protocol; Generic functional protocol for the support of supplementary services".

ETSI ETS 300 406 (1995): "Methods for Testing and Specification (MTS); Protocol and profile conformance testing specifications; Standardization methodology".

ETSI EN 301 060-1 (V1.2.2): "Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1) protocol; Basic call control; Enhancement at the "b" service entry point for Virtual Private Network (VPN) applications; Part 1: Protocol specification".

ETSI EN 301 061-1 (V1.2.2): "Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1) protocol; Generic functional protocol for the support of supplementary services at the "b" service entry point for Virtual Private Network (VPN) applications; Part 1: Protocol specification".

ETSI EN 301 492-2 (V1.1.1): "Private Integrated Services Network (PISN); Inter-exchange signalling protocol; Cordless terminal authentication supplementary services; Part 2: Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma for the VPN "b" service entry point".

ITU-T Recommendation I.112 (1993): "Vocabulary of terms for ISDNs".

ITU-T Recommendation I.210 (1993): "Principles of telecommunication services supported by an ISDN and the means to describe them".

History

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