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European Standard (Telecommunications series)

**Integrated Services Digital Network (ISDN);
Digital Subscriber Signalling System No. one (DSS1) and
Signalling System No.7 (SS7) protocols;
Call Forwarding on Not Reachable (CFNRc)
supplementary service for
Cordless Terminal Mobility (CTM) phase 1;
Part 6: Abstract Test Suite (ATS) and partial Protocol
Implementation eXtra Information for Testing (PIXIT)
proforma specification for the network**



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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 6 of a multi-part deliverable covering the Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1) and Signalling System No. 7 (SS7) protocols for the Call Forwarding on Not Reachable supplementary service for Cordless Terminal Mobility (CTM) phase 1, as identified below:

- Part 1: "Protocol specification";
- Part 2: "Protocol Implementation Conformance Statement (PICS) proforma specification";
- Part 3: "Test Suite Structure and Test Purposes (TSS&TP) specification for the user";
- Part 4: "Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification for the user";
- Part 5: "Test Suite Structure and Test Purposes (TSS&TP) specification for the network";
- Part 6: "Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma specification for the network".**

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1 Scope

The present document specifies the Abstract Test Suite (ATS) and partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma for the Network side of Implementations conforming to the stage three standard for the Call Forwarding on Not Reachable (CFNRc) supplementary services for the signalling application for the mobility management service phase 1 protocol, EN 302 094-1 [1].

EN 302 094-5 [3] specifies the Test Suite Structure and Test Purposes (TSS&TP) related to this ATS and partial PIXIT proforma specification. Other parts specify the TSS&TP and the ATS and partial PIXIT proforma for the User side of implementations conforming to EN 302 094-1 [1].

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 EN 302 094-1: "Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1) and Signalling System No.7 (SS7) protocols; Call Forwarding on Not Reachable (CFNRc) supplementary service for Cordless Terminal Mobility (CTM) phase 1; Part 1: Protocol specification".
- [2] ETSI EN 302 094-2: "Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1) and Signalling System No.7 (SS7) protocols; Call Forwarding on Not Reachable (CFNRc) supplementary service for Cordless Terminal Mobility (CTM) phase 1; Part 2: Protocol implementation Conformance Statement (PICS) proforma specification".
- [3] ETSI EN 302 094-5: "Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1) and Signalling System No.7 (SS7) protocols; Call Forwarding on Not Reachable (CFNRc) supplementary service for Cordless Terminal Mobility (CTM) phase 1; Part 5: Test Suite Structure and Test Purposes (TSS&TP) specification for the network".
- [4] ETSI EN 301 144-1: "Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1) and Signalling System No. 7 (SS7) protocols; Signalling application for the mobility management service on the alpha interface; Part 1: Protocol specification".
- [5] ETSI EN 300 196-1: "Integrated Services Digital Network (ISDN); Generic functional protocol for the support of supplementary services; Digital Subscriber Signalling System No. one (DSS1) protocol; Part 1: Protocol specification".
- [6] ISO/IEC 9646-1: "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 1: General concepts".
- [7] ISO/IEC 9646-2: "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 2: Abstract Test Suite specification".
- [8] ISO/IEC 9646-3: "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 3: The Tree and Tabular Combined Notation (TTCN)".
- [9] ISO/IEC 9646-4: "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 4: Test realization".
- [10] ISO/IEC 9646-5: "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 5: Requirements on test laboratories and clients for the conformance assessment process".

- [11] ITU-T Recommendation X.209: "Specification of Basic Encoding Rules for Abstract Syntax Notation One (ASN.1)".
- [12] ETSI EN 300 175-5: "Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 5: Network (NWK) layer".

3 Definitions and abbreviations

3.1 Definitions

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

Abstract test case: Refer to ISO/IEC 9646-1 [6].

Abstract Test Suite (ATS): Refer to ISO/IEC 9646-1 [6].

Implementation Under Test (IUT): Refer to ISO/IEC 9646-1 [6].

Implicit send event: Refer to ISO/IEC 9646-3 [8].

Lower tester: Refer to ISO/IEC 9646-1 [6].

Protocol Implementation Conformance Statement (PICS): Refer to ISO/IEC 9646-1 [6].

PICS proforma: Refer to ISO/IEC 9646-1 [6].

Protocol Implementation eXtra Information for Testing (PIXIT): Refer to ISO/IEC 9646-1 [6].

Test Purpose (TP): Refer to ISO/IEC 9646-1 [6].

3.2 Abbreviations

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

ASN.1	Abstract Syntax Notation no. 1
ATM	Abstract Test Method
ATS	Abstract Test Suite
BER	Basic Encoding Rules
CFNRc	Call Forwarding on Not Reachable
CTM	Cordless Terminal Mobility
ExTS	Executable Test Suite
ISDN	Integrated Services Digital Network
IUT	Implementation Under Test
MOT	Means Of Testing
PICS	Protocol Implementation Conformance Statement
PIXIT	Protocol Implementation eXtra Information for Testing
SUT	System Under Test
TP	Test Purpose
TSS	Test Suite Structure
TTCN	Tree and Tabular Combined Notation

4 Abstract Test Method (ATM)

The multi-party test method is applied for the CFNRc network side ATS.

The requirement for testing the network IUT is to focus on the behaviour of the network IUT at the user-network alpha interface. Thus the IUT is the network CTM alpha protocol entity at a particular user-network interface and is not the whole network. In practice the behaviour at a single user-network interface does not occur in isolation, but depends on the activity at other user-network interfaces. Therefore a multi-party test method is used.

The general configuration used is shown in figure 1. In this ATS the PTCs act as slaves to the MTC; all active behaviour at the PTCs is initiated by CMs sent by the MTC. Not all components are used in every test case.

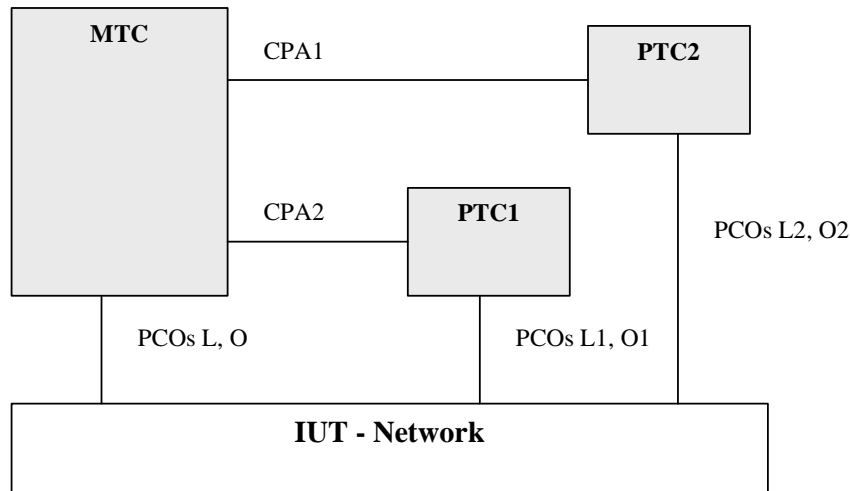


Figure 1: Multi-party test method

The Points of Control and Observation (PCOs) resides at the service access point between layers 2 and 3. These PCOs are named "L" (for Lower) for MTC, "L1" for PTC1 and "L2" for PTC2. These "Lx" 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.

The "informal" PCOs, called "O" (for Operator) for MTC, "O1" for PTC1 and "O2" for PTC2 are used to specify control but not observation above the IUT; events at these PCOs are never used to generate test case verdicts. Messages sent by the tester at these PCOs 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.

5 Untestable test purposes

There are no untestable test purposes associated with this ATS.

6 ATS conventions

6.1 Version of TTCN used

The version of TTCN used is that defined in ISO/IEC 9646-3 [8].

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.

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 [8] 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 [8] 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 ITU-T Recommendation X.209 [11]. 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 (ExTS) 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.

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.

Note that within BER, there are a number of variations for the encoding of lengths of fields. According to EN 300 196-1 [5], an IUT should be able to interpret all length forms within BER for received PDUs. When sending PDUs containing BER encoding, EN 300 196-1 [5] gives guidelines but makes no restrictions on the length forms within BER which an IUT may apply.

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	: EncapsulatedStimulus_Invoke_R
ASN.1 Type	: Component
Derivation Path	:
Comments	: ASN1_Encoding: BER Receive component: encapsulatedStimulus invoke component
Description	
<pre> encapsulatedStimulus_Components encapsulatedStimulus_InvokeCpt { invokeID ?, operation_value TSC_EncapsulatedStimulus, argument ? } </pre>	
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 [10], to produce a PCTR conformant with the PCTR template given in annex B of ISO/IEC 9646-5 [10].

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 of the present document.

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 [9], 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 [10], 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 ExTS for this ATS specification, shall comply with the requirements of ISO/IEC 9646-4 [9]. In particular, these concern the realization of an ExTS based on each ATS. The test realizer shall provide a statement of conformance of the MOT to this ATS specification.

An ExTS 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 [10]. A test laboratory which claims to conform to this ATS specification shall use an 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:	EN 302 094-1
PICS:	
Previous PCTRs (if any):	

A.1.3 Testing environment

PIXIT Reference number:	
ATS Specification:	EN 302 094-6
Abstract Test Method:	Remote 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 word "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
CFNRc_N01_001				
CFNRc_N02_001				
CFNRc_N03_001				
CFNRc_N04_001				
CFNRc_N05_001				
CFNRc_N06_001				
CFNRc_N06_002				
CFNRc_N06_003				
CFNRc_N07_001				
CFNRc_N08_001				
CFNRc_N09_001				
CFNRc_N10_001				
CFNRc_N10_002				

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: EN 302 094-1

ATS specification: EN 302 094-6

Abstract test method: Remote 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:

.....

Client contact:

.....

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: EN 302 094-1.

Protocol version: V1.1.3.

PICS reference: EN 302 094-2.

NOTE: The PICS reference should reference a completed PICS which is conformant with the PICS proforma contained in EN 302 094-2.

B.6.2 Basic call parameter values

Table B.1: Parameter values

Item	Question	Supported? (Y/N)	Allowed values	Value
1.1	Does the IUT support Basic Access?		N/A	N/A
1.2	What length of Call Reference is used?		1, 2	
1.3	Preferred B-channel for use in testing (Primary rate only)?		1..30	

B.6.3 Actions required by IUT

Table B.2: Actions required for initiation of IUT

Item	Action: What actions, have to be taken to?	Supported? (Y/N)	Stimulus (action taken)
2.1	DECT/GSM location registration procedure executed at the beginning of each test?		
2.2	CTM subscription registration procedure executed at the beginning of each test?		
2.3	CTM location registration procedure executed at the beginning of each test?		
2.4	Wait RESTART messages after re-establishment of the multiple frame operation.		
2.5	Layer 2 initialization shall take place at the start of each test case.		

B.6.4 Timer values

Table B.3: Timer values

Item	Timer duration	Supported? (Y/N)	Allowed values	Value
3.1	Wait for the test operator to perform an implicit send action (T_WAIT).			
3.2	Wait for the IUT to respond to a stimulus sent by the tester (T_AC).			
3.3	Control that the IUT does not respond to a stimulus sent by the tester (T_NOAC).			
3.4	Wait for the RESTART messages. This timer is used in the initialization Step only (T_RESTART).			
NOTE: The IUT provider may fill in a value range rather than a fixed value for the test management timers. During test execution the test laboratory will choose specific values for the timers dependant on the means of testing used. These specific values may even be beyond the range given by the IUT provider, if this is necessary for achieving satisfactory test results.				

B.6.5 CFNRc Parameter values - information element codings

Table B.4: Codings of DectToGSM information elements

Item	Information element: provide, if possible, ...	Supported? (Y/N)	Value
4.1	Value of the address of the serving node.		
4.2	GSM Location area identity to be used by the tester to send/receive a DectToGsm component.		
4.3	GSM basic service to be used by the tester to send a DectToGsm component for an outgoing call.		
4.4	GSM portable identity, IMSI to be used by the tester as initial TMSI value.		
4.5	GSM Location registration type area to be used by the tester to send a DectToGsm component.		
4.6	GSM CipherInfo to be used by the tester to send a DectToGsm component.		
4.7	GSM portable capabilities to be used by the tester to send a DectToGsm component.		
4.8	GSM portable identity to be used by the tester to send a DectToGsm component.		
4.9	GSM portable identity to be used by the tester (ON PTC1) to send a DectToGsm component.		
4.10	GSM portable identity to be used by the tester (ON PTC2) to send a DectToGsm component.		
4.11	GSM keypad information to be sent to the IUT to request registration to CFNRc.		
4.12	GSM keypad information to be sent to the IUT to request registration to CFNRc for PTC1.		
4.13	GSM keypad information to be sent to the IUT to request erasure to CFNRc.		
4.14	GSM keypad information to be sent to the IUT to request activation to CFNRc.		
4.15	GSM keypad information to be sent to the IUT to request deactivation to CFNRc.		
4.16	GSM keypad information to be sent to the IUT to request interrogation to CFNRc.		

Table B.5: Codings of CTM information elements

Item	Information element: provide, if possible, ...	Supported? (Y/N)	Value
5.1	Value of the CTM fixed Identity.		
5.2	Value of the CTM IPUI of the IUT.		
5.3	Value of the CTM IPUI for PTC1.		
5.4	Value of the CTM IPUI for PTC2.		
5.5	CTM basic service to be used by the tester to send a DectToGsm component.		
5.6	value of the authentication type supported by IUT (used in a CTMNetworkAuthentication procedure, see encoding in EN 300 175-5, clause 7.7.4).		
5.7	CTM portable capabilities to be used by the tester to send a CTM component.		
5.8	value of a Rand supported by IUT (used in a CTMNetworkAuthentication procedure, see encoding in EN 300 175-5, clause 7.7.7.32).		
5.9	CTM new location area used by the tester to send a CTM component.		
5.10	CTM keypad information to be sent to the IUT to request registration to CFNRc.		
5.11	CTM keypad information to be sent to the IUT to request registration to CFNRc for PTC1.		
5.12	CTM keypad information to be sent to the IUT to request erasure to CFNRc.		
5.13	CTM keypad information to be sent to the IUT to request activation to CFNRc.		
5.14	CTM keypad information to be sent to the IUT to request deactivation to CFNRc.		
5.15	CTM keypad information to be sent to the IUT to request interrogation to CFNRc.		

Table B.6: Codings of global information elements

Item	Information element: provide, if possible, ...	Supported? (Y/N)	Value
6.1	Number digits (IA5) for the Called party number information element to be sent to the IUT.		
6.2	Octet 3 (Type of number, Numbering plan identification) of the Called party number information elements to be sent to the IUT.		
6.3	Length of the Called party number information element to be sent to the IUT including the number digits.		
6.4	Length of the bearer capability to be sent by the test system (speech or 3,1 kHz audio).		
6.5	Value of the bearer capability to be sent by the test system (speech or 3,1 kHz audio).		

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 [8].

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

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

The TTCN.GR representation of this ATS is contained in an Adobe Portable Document Format™ file (CFNRc_N_v001.PDF contained in archive en_30209406v010101p0.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 (CFNRc_N_v001.MP contained in archive en_30209406v010101p0.ZIP) which accompanies the present document.

NOTE 1: The TTCN ATS contains references to EN 302 094-1 [1], EN 302 094-2 [2] and EN 301 144-1 [4].

NOTE 2: 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): Bibliography

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

History

Document history		
V1.1.1	July 2001	Public Enquiry PE 20011116: 2001-07-18 to 2001-11-16
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