
**Information technology — Open Systems
Interconnection — Conformance testing
methodology and framework —**

**Part 3:
The Tree and Tabular Combined Notation
(TTCN)**

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*Technologies de l'information — Interconnexion de systèmes ouverts —
Essais de conformité — Méthodologie générale et procédures —*

*ISO/IEC 9646-3:1998,
Partie 3: Notation combinée, arborescente et tabulaire (TTCN)*

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Contents

	Page
1 Scope	1
2 Normative references	1
3 Definitions	3
3.1 Basic terms from ISO/IEC 9646-1	3
3.2 Terms from ISO/IEC 7498-1	4
3.3 Terms from ISO/IEC 10731	4
3.4 Terms from ISO/IEC 8824-1	4
3.5 Terms from ISO/IEC 8825-1	5
3.6 TTCN specific terms	5
4 Abbreviations	8
4.1 Abbreviations defined in ISO/IEC 9646-1	8
4.2 Abbreviations defined in ISO/IEC 9646-2	8
4.3 Other abbreviations	9
5 The syntax forms of TTCN	9
6 Compliance	10
7 Conventions	10
7.1 Introduction	10
7.2 Syntactic metanotation	10
7.3 TTCN.GR table proformas	11
7.3.1 Introduction	11
7.3.2 Single TTCN object tables	11
7.3.3 Multiple TTCN object tables	12
7.3.4 Alternative compact tables	12
7.3.5 Specification of proformas	13
7.4 Free Text and Bounded Free Text	13
8 Concurrency in TTCN	13
8.1 Test Components	13
8.2 Test Component Configurations	13
9 TTCN test suite structure	15
9.1 Introduction	15
9.2 Test Group References	15
9.3 Test Step Group References	15
9.4 Default Group References	15
9.5 Parts of a TTCN test suite	15
10 Test Suite Overview	16
10.1 Introduction	16
10.2 Test Suite Structure	16
10.3 Test Case Index	18
10.4 Test Step Index	19
10.5 Default Index	20
10.6 Test Suite Exports	21
10.7 The Import Part	22
10.7.1 Introduction	22
10.7.2 Imports	22
11 Declarations Part	24
11.1 Introduction	24
11.2 TTCN types	24
11.2.1 Introduction	24
11.2.2 Predefined TTCN types	24
11.2.3 Test Suite Type Definitions	26

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11.3	TTCN operators and TTCN operations	32
11.3.1	Introduction	32
11.3.2	TTCN operators	32
11.3.3	Predefined operations	33
11.3.4	Test Suite Operation definitions and descriptions	35
11.4	Test Suite Parameter Declarations	40
11.5	Test Case Selection Expression Definitions	41
11.6	Test Suite Constant Declarations	42
11.7	Test Suite Constant Declarations by Reference	43
11.8	TTCN variables	44
11.8.1	Test Suite Variable Declarations	44
11.8.2	Binding of Test Suite Variables	45
11.8.3	Test Case Variable Declarations	45
11.8.4	Binding of Test Case Variables	46
11.9	PCO Type Declaration	46
11.10	PCO Declarations	47
11.11	CP Declarations	49
11.12	Timer Declarations	50
11.13	Test Components and Configuration Declarations	51
11.13.1	Test Components	51
11.13.2	Test Component Configuration Declarations	53
11.14	ASP Type Definitions	55
11.14.1	Introduction	55
11.14.2	ASP Type Definitions using tables	55
11.14.3	Use of Structured Types within ASP Type Definitions	56
11.14.4	ASP Type Definitions using ASN.1	57
11.14.5	ASN.1 ASP Type Definitions by Reference	58
11.15	PDU Type Definitions	59
11.15.1	Introduction	59
11.15.2	PDU Type Definitions using tables	59
11.15.3	Use of Structured Types within PDU definitions	61
11.15.4	PDU Type Definitions using ASN.1	61
11.15.5	ASN.1 PDU Type Definitions by Reference	63
11.16	Test Suite Encoding Information	64
11.16.1	Encoding Definitions	64
11.16.2	Encoding Variations	65
11.16.3	Invalid Field Encoding Definitions	66
11.16.4	Application of encoding rules	68
11.17	CM Type Definitions	69
11.17.1	Introduction	69
11.17.2	CM Type Definitions using tables	69
11.17.3	CM Type Definitions using ASN.1	70
11.18	String length specifications	70
11.19	ASP, PDU and CM Definitions for SEND events	71
11.20	ASP, PDU and CM Definitions for RECEIVE events	72
11.21	Alias Definitions	72
11.21.1	Introduction	72
11.21.2	Expansion of Aliases	72
12	Constraints Part	73
12.1	Introduction	73
12.2	General principles	73
12.3	Parameterization of constraints	74
12.4	Chaining of constraints	74
12.5	Constraints for SEND events	75
12.6	Constraints for RECEIVE events	75
12.6.1	Matching values	75
12.6.2	Matching mechanisms	75
12.6.3	Specific Value	76
12.6.4	Instead of Value	76

12.6.5	Inside Values	79
12.6.6	Attributes of values	80
13	Specification of constraints using tables	81
13.1	Introduction	81
13.2	Structured Type Constraint Declarations	81
13.3	ASP Constraint Declarations	83
13.4	PDU Constraint Declarations	83
13.5	Parameterization of constraints	85
13.6	Base constraints and modified constraints	85
13.7	Formal parameter lists in modified constraints	86
13.8	CM Constraint Declarations	86
14	Specification of constraints using ASN.1	87
14.1	Introduction	87
14.2	ASN.1 Type Constraint Declarations	87
14.3	ASN.1 ASP Constraint Declarations	88
14.4	ASN.1 PDU Constraint Declarations	89
14.5	Parameterized ASN.1 constraints	90
14.6	Modified ASN.1 constraints	90
14.7	Formal parameter lists in modified ASN.1 constraints	91
14.8	ASP Parameter and PDU field names within ASN.1 constraints	91
14.9	ASN.1 CM Constraint Declarations	92
15	The Dynamic Part	92
15.1	Introduction	92
15.2	Test Case dynamic behaviour	92
15.2.1	Specification of the Test Case Dynamic Behaviour table	92
15.2.2	The Test Case Dynamic Behaviour proforma	93
15.2.3	Structure of the Test Case behaviour	94
15.2.4	Concurrent Test Case Behaviour Description	94
15.2.5	Line numbering and continuation	95
15.3	Test Step dynamic behaviour	95
15.3.1	Specification of the Test Step Dynamic Behaviour table	95
15.3.2	The Test Step Dynamic Behaviour proforma	96
15.4	Default dynamic behaviour	97
15.4.1	Default behaviour	97
15.4.2	Specification of the Default Dynamic Behaviour table	97
15.4.3	The Default Dynamic Behaviour proforma	97
15.5	The behaviour description	98
15.6	The tree notation	98
15.7	Tree names and parameter lists	99
15.7.1	Introduction	99
15.7.2	Trees with parameters	99
15.8	TTCN statements	99
15.9	TTCN test events	100
15.9.1	Sending and receiving events	100
15.9.2	Receiving events	100
15.9.3	Sending events	100
15.9.4	Lifetime of events	101
15.9.5	Execution of the behaviour tree	101
15.9.6	The IMPLICIT SEND event	103
15.9.7	The OTHERWISE event	104
15.9.8	OTHERWISE and concurrent TTCN	105
15.9.9	The TIMEOUT event	105
15.9.10	Concurrent TTCN events and constructs	105
15.10	TTCN expressions	106
15.10.1	Introduction	106
15.10.2	References for ASN.1 defined data objects	108
15.10.3	References for data objects defined using tables	110
15.10.4	Assignments	110
15.10.5	Qualifiers	111

15.10.6	Event lines with assignments and qualifiers	111
15.11	Pseudo-events	112
15.12	Timer management	112
15.12.1	Introduction	112
15.12.2	The START operation	113
15.12.3	The CANCEL operation	113
15.12.4	The READTIMER operation	114
15.13	The ATTACH construct	114
15.13.1	Introduction	114
15.13.2	Scope of tree attachment	114
15.13.3	Tree attachment basics	115
15.13.4	The meaning of tree attachment	115
15.13.5	Passing parameterized constraints	117
15.13.6	Recursive tree attachment	117
15.13.7	Tree attachment and Defaults	118
15.14	Labels and the GOTO construct	118
15.15	The REPEAT construct	119
15.16	The Constraints Reference	119
15.16.1	Purpose of the Constraints Reference column	119
15.16.2	Passing parameters in Constraint References	120
15.16.3	Constraints and qualifiers and assignments	120
15.17	Verdicts	120
15.17.1	Introduction	120
15.17.2	Preliminary results	121
15.17.3	Final verdict	121
15.17.4	Verdicts and OTHERWISE	122
15.17.5	Verdict assignment in concurrent TTCN	122
15.18	The meaning of Defaults	122
15.18.1	Introduction	122
15.18.2	Default References	123
15.18.3	The RETURN statement	124
15.18.4	The ACTIVATE statement	124
15.18.5	Defaults and tree attachment	124
15.18.6	Tree Attachment, Defaults, Activate and Return	126
15.18.7	Defaults and CREATE	132
15.18.8	Defaults and CMs	132
16	Page continuation	133
16.1	Page continuation of TTCN tables	133
16.2	Page continuation of dynamic behaviour tables	133
A(normative)	Syntax and static semantics of TTCN	134
A.1	Introduction	134
A.2	Conventions for the syntax description	134
A.2.1	Syntactic metanotation	134
A.2.2	TTCN.MP syntax definitions	134
A.3	The TTCN.MP syntax productions in BNF	136
A.3.1	TTCN Specification	136
A.3.2	TTCN Module	136
A.3.2.1	TTCN Module Overview Part	136
A.3.2.2	TTCN Module Import Part	136
A.3.3	Test suite	137
A.3.3.1	The Test Suite Overview	137
A.3.3.2	Test Suite Index	137
A.3.3.3	Test Suite Structure	137
A.3.3.4	Test Case Index	138
A.3.3.5	Test Step Index	138
A.3.3.6	Default Index	138
A.3.3.7	Test Suite Exports	138
A.3.3.8	The Import Part	138
A.3.3.9	The Declarations Part	138

A.3.3.10	Definitions	138
A.3.3.11	Parameterization and Selection	143
A.3.3.12	Declarations	144
A.3.3.13	ASP, PDU and CM Type Definitions	149
A.3.3.14	The Constraints Part	154
A.3.3.15	Test Suite Type Constraint Declarations	154
A.3.3.16	Structured Type Constraint Declarations	154
A.3.3.17	ASN.1 Type Constraint Declarations	155
A.3.3.18	ASP Constraint Declarations	155
A.3.3.19	Tabular ASP Constraint Declarations	155
A.3.3.20	ASN.1 ASP Constraint Declarations	156
A.3.3.21	PDU Constraint Declarations	156
A.3.3.22	Tabular PDU Constraint Declarations	156
A.3.3.23	ASN.1 PDU Constraint Declarations	158
A.3.3.24	CM Constraint Declarations	159
A.3.3.25	Tabular CM Constraint Declaration	159
A.3.3.26	ASN.1 CM Constraint Declaration	159
A.3.3.27	The Dynamic Part	159
A.3.3.28	Test Cases	159
A.3.3.29	Test Step Library	160
A.3.3.30	Default Library	160
A.3.3.31	Behaviour descriptions	160
A.3.3.32	Behaviour lines	161
A.3.3.33	TTCN statements	161
A.3.3.34	Expressions	163
A.3.3.35	Timer operations	164
A.3.3.36	Types	165
A.3.3.37	Values	165
A.3.3.38	Miscellaneous productions	167
A.4	General static semantics requirements	168
A.4.1	Introduction	168
A.4.2	Uniqueness of identifiers	168
A.5	Differences between TTCN.GR and TTCN.MP	172
A.5.1	Differences in syntax	172
A.5.2	Additional static semantics in the TTCN.MP	173
A.6	List of BNF production numbers	174
A.6.1	Introduction	174
A.6.2	The production index	174
B(normative)	Operational semantics of TTCN	181
B.1	Introduction	181
B.2	Precedence	181
B.3	Processing of test case errors	181
B.4	Converting a modularized test suite to an equivalent expanded test suite	181
B.5	TTCN operational semantics	183
B.5.1	Introduction	183
B.5.2	The pseudo-code notation	183
B.5.2.1	Introduction	183
B.5.2.2	Procedures and functions	183
B.5.2.3	Processes	183
B.5.2.4	Natural language within pseudo-code	184
B.5.2.5	Levels and alternatives	184
B.5.3	Execution of a Test Suite	184
B.5.3.1	Introduction	184
B.5.4	Execution of a Test Case	185
B.5.4.1	Execution of a Test Case - pseudo-code	185
B.5.4.2	Execution of a Test Case or Test Component - natural language	186
B.5.5	Expanding a set of alternatives	186
B.5.5.1	Introduction	186
B.5.5.2	Saving Defaults	187

B.5.5.3	Expansion of REPEAT constructs	187
B.5.5.4	Appending default behaviour	188
B.5.5.5	Expanding attached trees	188
B.5.6	Evaluation of an Event Line	189
B.5.6.1	Pseudo-code	189
B.5.6.2	Natural language description	189
B.5.7	Functions for TTCN events	189
B.5.7.1	Functions for TTCN events - pseudo-code	189
B.5.7.2	Functions for TTCN events - natural language description	190
B.5.8	Execution of the SEND event	190
B.5.8.1	Execution of the SEND event - pseudo-code	190
B.5.8.2	Execution of the SEND event - natural language description	191
B.5.9	Execution of the RECEIVE event	191
B.5.9.1	Execution of the RECEIVE event - pseudo-code	191
B.5.9.2	Execution of the RECEIVE event - natural language description	192
B.5.10	Execution of the OTHERWISE event	193
B.5.10.1	Execution of the OTHERWISE event - pseudo-code	193
B.5.10.2	Execution of the OTHERWISE event - natural language description	193
B.5.11	Execution of the TIMEOUT event	193
B.5.11.1	Execution of the TIMEOUT event - pseudo-code	193
B.5.11.2	Execution of the TIMEOUT event - natural language description	194
B.5.12	Execution of the DONE event	195
B.5.12.1	Execution of the DONE event - pseudo-code	195
B.5.12.2	Execution of the DONE event - natural language description	195
B.5.13	Execution of the IMPLICIT SEND event	196
B.5.13.1	Execution of the IMPLICIT SEND event - pseudo-code	196
B.5.13.2	Execution of IMPLICIT SEND - natural language description	196
B.5.14	Execution of a pseudo-event	196
B.5.14.1	Execution of a pseudo-event - pseudo-code	196
B.5.14.2	Execution of PSEUDO-EVENTS - natural language description	196
B.5.15	Execution of BOOLEAN expressions	196
B.5.15.1	Execution of BOOLEAN expressions - pseudo-code	196
B.5.15.2	Execution of BOOLEAN expressions - natural language description	197
B.5.16	Execution of assignments	197
B.5.16.1	Execution of assignments - pseudo-code	197
B.5.16.2	Execution of ASSIGNMENTS - natural language description	197
B.5.17	Execution of TIMER operations	197
B.5.17.1	Execution of TIMER operations - pseudo-code	197
B.5.17.2	Execution of START timer - natural language description	198
B.5.17.3	Execution of CANCEL timer - natural language description	198
B.5.17.4	Execution of READTIMER - natural language description	198
B.5.18	Functions for TTCN constructs	198
B.5.18.1	Functions for TTCN constructs - pseudo-code	198
B.5.18.2	Functions for TTCN constructs - natural language description	198
B.5.19	Execution of the ACTIVATE construct	198
B.5.19.1	Execution of the ACTIVATE construct - pseudo-code	198
B.5.19.2	Execution of the ACTIVATE construct - natural language description	199
B.5.20	Execution of the CREATE construct	199
B.5.20.1	Execution of the CREATE event - pseudo-code	199
B.5.20.2	Execution of the CREATE event - natural language description	199
B.5.21	Execution of the GOTO construct	200
B.5.22	Execution of the RETURN construct	200
B.5.23	The verdict	200
B.5.23.1	The verdict - pseudo-code	200
B.5.23.2	The VERDICT - natural language description	201
B.5.24	The Conformance Log	201
B.5.24.1	The LOG - pseudo-code	201
B.5.24.2	The conformance log - natural language description	201
B.5.25	Tree handling functions and procedures	202

B.5.26 Miscellaneous functions used by the pseudo-code	203
C (normative) TTCN Modules	206
C.1 Introduction	206
C.2 TTCN Module Overview Part	206
C.2.1 Introduction	206
C.2.2 TTCN Module Exports	206
C.2.3 TTCN Module Structure	208
C.2.4 Test Case Index	209
C.2.5 Test Step Index	209
C.2.6 Default Index	209
C.3 Import Part	209
C.3.1 Introduction	209
C.3.2 External	209
C.3.3 Import	210
D (normative) Test Suite Index	211
D.1 Introduction	211
D.2 The Test Suite Index	211
D.2.1 Introduction	211
D.2.2 The Test Suite Index	211
E (normative) Compact proformas	212
E.1 Introduction	212
E.2 Compact proformas for constraints	212
E.2.1 Requirements	212
E.2.2 Compact proformas for ASP constraints	212
E.2.3 Compact proformas for PDU constraints	213
E.2.3.2 Parametrized compact constraints	214
E.2.4 Compact proformas for Structured Type constraints	215
E.2.5 Compact proformas for ASN.1 constraints	217
E.3 Compact proforma for Test Cases	218
E.3.1 Requirements	218
E.3.2 Compact proforma for Test Case dynamic behaviours	218
F (informative) Examples	220
F.1 Examples of tabular constraints	220
F.1.1 ASP and PDU definitions	220
F.1.1.1 Flat type definition:	220
F.1.1.2 Structured Type definition:	220
F.1.1.3 Special type PDU, in order to allow use of (static) chaining of constraints	221
F.1.2 ASP/PDU constraints	221
F.2 Examples of ASN1 constraints	224
F.2.1 ASP and PDU definitions	224
F.2.2 ASN.1 ASP/PDU constraints	225
F.2.3 Further examples of ASN.1 constraints	229
F.3 Base and modified constraints	231
F.4 Type definition using macros	232
F.5 Use of REPEAT	234
F.6 Test suite operations	234
F.7 Example of a Test Suite Overview	235
F.8 Example of a Test Case in TTCN.MP Form	237
F.9 Use of Component Reference for Field Value Assignment in Constraints	239
F.10 Multi-Party Testing	242
F.11 Multiplexing/Demultiplexing	243
F.12 Splitting and Recombining	244
F.13 Multi-Protocol Test Cases	245
F.14 Example of Modular TTCN	246
F.15 Example of CREATE and DONE	246
G (informative) Style guide	253
G.1 Introduction	253
G.2 Test case structure	253
G.3 Use of TTCN with different abstract test methods	254

G.3.1 Introduction	254
G.3.2 TTCN and the LS test method	254
G.3.3 TTCN and the DS test method	254
G.3.4 TTCN and the CS test method	254
G.3.5 TTCN and the RS test method	255
G.4 Use of Defaults	255
G.5 Limiting the execution time of a Test Case	255
G.6 Structured Types	255
G.7 Abbreviations	256
G.8 Test descriptions	256
G.9 Assignments on SEND events	256
G.10 Multi-service PCOs	256
H (informative) Index	257
H.1 Introduction	257
H.2 The Index	257

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75% of the national bodies casting a vote.

International Standard ISO/IEC 9646-3 was prepared by the Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 21, *Open systems interconnection, data management and open distributed processing*.

This second edition cancels and replaces the first edition (ISO/IEC 9646-3:1992), which has been technically revised.

ISO/IEC 9646 consists of the following parts, under the general title *Information technology - Open Systems Interconnection - Conformance testing methodology and framework*:

- Part 1: *General concepts*
- Part 2: *Abstract Test Suite specification*
- Part 3: *The Tree and Tabular Combined Notation (TTCN)*
- Part 4: *Test realization*
- Part 5: *Requirements on test laboratories and clients for the conformance assessment process*
- Part 6: *Protocol profile test specification*
- Part 7: *Implementation Conformance Statements*

Annexes A to E form an integral part of this part of ISO/IEC 9646. Annexes F, G and H are for information only.

Introduction

This part of ISO/IEC 9646, one of a multi-part International Standard defines a test notation, called the Tree and Tabular Combined Notation (TTCN), for use in the specification of OSI abstract conformance test suites.

In constructing a standardized abstract test suite, a test notation is used to describe abstract test cases. The test notation can be an informal notation (without formally defined semantics) or a formal description technique (FDT). TTCN is an informal notation with clearly defined, but not formally defined semantics.

TTCN is designed to meet the following objectives:

- a) to provide a notation in which abstract test cases can be expressed in standardized test suites;
- b) to provide a notation which is independent of test methods, layers and protocols;
- c) to provide a notation which reflects the abstract testing methodology defined in ISO/IEC 9646; [ISO/IEC 9646-3:1998](https://standards.iteh.ai/catalog/standards/sist/b5532024-59fd-46e0-bad1-a36210244200/iso-iec-9646-3-1998)
- d) to provide a capability to use concurrency in the specification of abstract test cases, when appropriate, in both multi-party testing and single-party testing.

In the abstract testing methodology a test suite is looked upon as a hierarchy ranging from the complete test suite, through test groups, test cases and test steps, down to test events. TTCN provides a naming structure to reflect the positions of test cases in this hierarchy. It also provides the means of structuring test cases as a hierarchy of test steps culminating in test events. In TTCN, the basic test events are sending and receiving Abstract Service Primitives (ASPs), Protocol Data Units (PDUs) and timer events.

Two forms of the notation are provided: a human-readable tabular form, called TTCN.GR, for use in OSI conformance test suite standards, and a machine processable form, called TTCN.MP, for use in representing TTCN in a canonical form within computer systems and as the syntax to be used when transferring TTCN test cases between different computer systems. The two forms are semantically equivalent.

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Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 3: The Tree and Tabular Combined Notation (TTCN)

1 Scope

1.1 This part of ISO/IEC 9646 defines an informal test notation, called the Tree and Tabular Combined Notation (TTCN), for OSI conformance test suites, which is independent of test methods, layers and protocols, and which reflects the abstract testing methodology defined in ISO/IEC 9646-1 and ISO/IEC 9646-2.

1.2 It also specifies requirements and provides guidance for using TTCN in the specification of system-independent conformance test suites for one or more OSI standards. It specifies two forms of the notation: one, a human-readable form, applicable to the production of conformance test suite standards for OSI protocols; and the other, a machine-processable form, applicable to processing within and between computer systems.

1.3 This part of ISO/IEC 9646 applies to the specification of conformance test cases which can be expressed abstractly in terms of control and observation of protocol data units and abstract service primitives. Nevertheless, for some protocols, test cases may be needed which cannot be expressed in these terms. The specification of such test cases is outside the scope of this part of ISO/IEC 9646, although those test cases may need to be included in a conformance test suite standard.

For example, some static conformance requirements related to an application service may require testing techniques which are specific to that particular application.

The specification of test cases in which more than one behaviour description is to be run in parallel is dealt with by the concurrency features (particularly involving the definition of Test Components and Test Component Configurations).

1.4 This part of ISO/IEC 9646 specifies requirements on what a test suite standard may specify about a conforming realization of the test suite, including the operational semantics of TTCN test suites.

1.5 This part of ISO/IEC 9646 applies to the specification of conformance test suites for OSI protocols in OSI layers 2 to 7, specifically including Abstract Syntax Notation One (ASN.1) based protocols. The following are outside the scope of this part of ISO/IEC 9646:

- a) the specification of conformance test suites for Physical layer protocols;
- b) the relationship between TTCN and formal description techniques;
- c) the means of realization of executable test suites (ETS) from abstract test suites.

1.6 This part of ISO/IEC 9646 defines mechanisms for using concurrency in the specification of abstract test cases. Concurrency in TTCN is applicable to the specification of test cases:

- a) in a multi-party testing context;
- b) which handle multiplexing and demultiplexing in either a single-party or multi-party testing context;
- c) which handle splitting and recombining in either a single-party or multi-party testing context;
- d) in a single-party testing context when the complexity of the protocol or set of protocols handled by the IUT is such that concurrency can simplify the specification of the test case.

1.7 TTCN modules are defined to allow sharing of common TTCN specifications between test suites.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO/IEC 9646. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO/IEC 9646 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 646 : 1991, *Information technology - ISO 7-bit coded character set for information interchange*.

ISO/IEC 7498-1 : 1994, *Information technology - Open Systems Interconnection - Basic Reference Model: The Basic Model*.

(See also ITU-T Recommendation X.200 : 1994.)

ISO/IEC 8824-1: 1995, *Information technology - Abstract Syntax Notation One (ASN.1): Specification of basic notation.*

(See also ITU-T Recommendation X.680 : 1994.)

ISO/IEC 8824-1: 1995/Amd. 1: 1996, *Information Technology - Abstract Syntax Notation One (ASN.1): Specification of basic notation - Amendment 1: Rules of extensibility.*

(See also ITU-T Recommendation X.680 Amendment 1 : 1995.)

ISO/IEC 8824-2: 1995, *Information technology - Abstract Syntax Notation One (ASN.1): Information object specification.*

(See also ITU-T Recommendation X.681 : 1994.)

ISO/IEC 8824-2: 1995/Amd. 1 : 1996, *Information technology - Abstract Syntax Notation One (ASN.1): Information object specification - Amendment 1: Rules of extensibility.*

(See also ITU-T Recommendation X.681 Amendment 1 : 1995.)

ISO/IEC 8824-3 : 1995, *Information technology - Abstract Syntax Notation One (ASN.1): Constraint specification.*

(See also ITU-T Recommendation X.682 : 1994.)

ISO/IEC 8824-4 : 1995, *Information technology - Abstract Syntax Notation One (ASN.1): Parameterization of ASN.1 specifications.*

(See also ITU-T Recommendation X.683 : 1994.)

ISO/IEC 8825-1 : 1995, *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 : 1994.)

ISO/IEC 8825-2 : 1996, *Information technology - ASN.1 encoding rules: Specification of Packed Encoding Rules (PER).*

(See also ITU-T Recommendation X.690 : 1995.)

ISO/IEC 9646-1 : 1994, *Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 1: General concepts.*

(See also ITU-T Recommendation X.290 : 1995)

ISO/IEC 9646-2 : 1994, *Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 2: Abstract test suite specification.*

(See also ITU-T Recommendation X.291 : 1995)

ISO/IEC 9646-4 : 1994, *Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 4: Test realization.*

(See also ITU-T Recommendation X.293 : 1995)

ISO/IEC 9646-5 : 1994, *Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 5: Requirements on test laboratories and clients for the conformance assessment process.*

(See also ITU-T Recommendation X.294 : 1995)

ISO/IEC 9646-6 : 1994, *Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 6: Protocol profile test specification.*

(See also ITU-T Recommendation X.295 : 1995)

ISO/IEC 9646-7 : 1995, *Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 7: Implementation Conformance Statements.*

(See also ITU-T Recommendation X.296 : 1995)

ISO/IEC 10646-1 : 1993, *Information technology - Multiple-Octet Coded Character Set (UCS): Architecture and basic multilingual plane.*

ISO/IEC 10731: 1994, *Information technology - Open Systems Interconnection - Basic Reference Model - Conventions for the definition of OSI Services.*

(See also ITU-T Recommendation X.210 : 1993.)

3 Definitions

3.1 Basic terms from ISO/IEC 9646-1

The following terms defined in ISO/IEC 9646-1 apply:

- a) abstract service primitive
- b) abstract testing methodology
- c) abstract test case
- d) abstract test method
- e) abstract test suite
- f) conformance log
- g) conformance test suite
- h) coordinated test method
- i) distributed test method
- j) executable test case
- k) executable test case error
- l) executable test suite
- m) fail verdict
- n) idle testing state
- o) implementation under test
- p) inconclusive verdict
- q) invalid test event
- r) local test method
- s) lower tester
- t) means of testing
- u) pass verdict
- v) PICS proforma
- w) PIXIT proforma
- x) protocol implementation conformance statement
- y) protocol implementation extra information for testing
- z) point of control and observation
- aa) remote test method
- ab) stable testing state
- ac) standardized abstract test suite
- ad) static conformance requirements
- ae) syntactically invalid test event
- af) system under test
- ag) test body
- ah) test case
- ai) test case error
- aj) test coordination procedures

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