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

**Part 1:**  
General concepts

*Technologies de l'information — Interconnexion de systèmes ouverts —  
Cadre général et méthodologie des tests de conformité OSI —  
Partie 1: Concepts généraux*



Contents	Page
Foreword .....	iv
Introduction .....	v
1 Scope .....	1
2 Normative references .....	2
3 Definitions .....	3
3.1 Reference model definitions .....	3
3.2 Terms defined in other International Standards, ITU-T Recommendations and Technical Reports .....	3
3.3 Conformance testing definitions .....	4
4 Abbreviations .....	10
5 The meaning of conformance in OSI .....	11
5.1 Introduction .....	11
5.2 Conformance requirements .....	11
5.3 Static conformance requirements .....	11
5.4 Dynamic conformance requirements .....	12
5.5 Conformance requirements related to transfer syntaxes .....	12
5.6 Implementation Conformance Statements (ICSS) .....	12
5.6.1 Introduction .....	12
5.6.2 Protocol Implementation Conformance Statement (PICS) .....	12
5.6.3 Profile Implementation Conformance Statement (profile ICS) .....	12
5.6.4 System Conformance Statement (SCS) .....	13
5.7 A conforming system .....	13
5.8 Interworking and conformance .....	13
6 Conformance and testing .....	14
6.1 Objectives of conformance testing .....	14
6.1.1 Introduction .....	14
6.1.2 Basic Interconnection Tests .....	14
6.1.3 Capability tests .....	14
6.1.4 Behaviour tests .....	15
6.1.5 Conformance resolution tests .....	15
6.2 Extra information for testing .....	15
6.2.1 Implementation Extra Information for Testing (IXIT) .....	15
6.2.2 Protocol Implementation Extra Information for Testing (PIXIT) .....	16

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6.2.3	Profile Implementation Extra Information for Testing (profile IXIT)	16
6.3	Conformance assessment process overview	16
6.4	Use of Basic Interconnection Tests and capability tests in the test campaign	18
6.5	Analysis of results	18
6.5.1	Test outcomes and test verdicts	18
6.5.2	Conformance test reports	18
6.5.3	Repeatability of results	19
6.5.4	Comparability of results	19
6.5.5	Auditability of results	19
7	Test methods	19
7.1	Introduction	19
7.2	Classification of real open systems and IUTs for conformance testing	19
7.2.1	Classification of SUTs	19
7.2.2	Identification of the IUT	21
7.3	Abstract testing methodology	21
7.3.1	General	21
7.3.2	Points of Control and Observation (PCOs)	23
7.4	Abstract testing functions	23
7.5	Overview of Abstract Test Methods	24
7.5.1	End-system IUTs in the Single-Party Testing context	24
7.5.2	The Local and Distributed test methods	24
7.5.3	The Coordinated and Remote test methods	24
7.5.4	Variants of abstract test methods	24
7.5.5	IUTs in the Multi-Party Testing context	24
7.6	Applicability of test methods to real open systems	24
7.7	Applicability of the test methods to OSI protocols and layers	26
8	Test suites	26
8.1	Structure	26
8.2	Abstract and executable test cases	26
8.3	Base specification conformance testing specifications	28
8.4	Profile Test Specifications (PTS)	28
9	Relationships between parts, concepts and roles	29
10	Compliance	29
<b>Annex</b>		
A	Options	31
B	Index of parts 1, 2, 4, 5, 6 and 7	32

## 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 9646-1 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee 21, *Open Systems Interconnection, data management and open distributed processing*.

This second edition cancels and replaces the first edition (ISO/IEC 9646-1:1991) which has been technically revised. It also consolidates Technical Corrigendum 1.

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*
- *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 and B of this part of ISO/IEC 9646 are for information only.

## Introduction

The objective of OSI will not be completely achieved until systems can be tested to determine whether they conform to the relevant protocol and profile specifications. The relevant ones can be OSI International Standards, ITU-T Recommendations or International Standardized Profiles.

Standardized Abstract Test Suites should be developed for each International Standard or ITU-T Recommendation which specifies an OSI protocol, for use by suppliers or implementors in self-testing, by users of OSI products, by telecommunications administrations and recognized private operating agencies, or by other third party testing organizations. Standardized Profile Test Specifications should be developed for each OSI profile defined in an International Standardized Profile, or in an International Standard or ITU-T Recommendation, to specify how to combine and select from these Abstract Test Suites for the purpose of testing conformance of systems to that profile. This should lead to comparability and wide acceptance of test results produced by different test laboratories, and thereby minimize the need for repeated conformance testing of the same system.

The standardization of test suites requires international definition and acceptance of a common testing methodology, together with appropriate testing methods and procedures. It is the purpose of ISO/IEC 9646 to define the methodology, to provide a framework for specifying conformance test suites, and to define the procedures to be followed during testing.

Conformance testing involves testing both the capabilities and behaviour of an implementation, and checking what is observed against the conformance requirements in the relevant International Standards or ITU-T Recommendations and if appropriate in the related International Standardized Profiles and against what the implementor states the implementation capabilities are.

Conformance testing does not include assessment of the performance nor the robustness or reliability of an implementation. It cannot give judgements on the physical realization of the Abstract Service Primitives, how a system is implemented, how it provides any requested service, nor the environment of the protocol implementation. It cannot, except in an indirect way, prove anything about the logical design of the protocol itself.

The purpose of conformance testing is to increase the probability that different OSI implementations are able to interwork. However it should be borne in mind that the complexity of most protocols makes exhaustive testing impractical on both technical and economic grounds. Also, testing cannot guarantee conformance to a specification since it detects errors rather than their absence. Thus conformance to a test suite alone cannot guarantee interworking. What it does do is give confidence that an implementation has the required capabilities and that its behaviour conforms consistently in representative instances of communication.

It should be noted that the OSI basic reference model (ISO 7498: 1984 or CCITT X.200 (1984)) states (in 4.3):

*“Only the external behaviour of Open Systems is retained as the standard of behaviour of real Open Systems”*

This means that although aspects of both internal and external behaviour are described in OSI International Standards and ITU-T Recommendations, it is only the requirements on external behaviour that have to be met by real open systems. Although some of the methods defined in ISO/IEC 9646-2 do impose certain limitations on the implementor, for example that there be some means of realizing control and observation at one or more Service Access Points, it should be noted that other methods defined herein do not impose such limitations.

However, in the case of partial OSI end-systems which provide OSI protocols up to a specific layer boundary, it is desirable to test not only the external behaviour of the implemented protocol entities, but also the ability of those entities to support correct external behaviour in higher layers.

Detailed investigation of relative benefits, efficiency and limitations of all methods is addressed in various parts of ISO/IEC 9646. However, any organization contemplating the use of test methods defined in ISO/IEC 9646-2 in a context such as certification should carefully consider the limitations on their applicability and the benefits of each.

Testing is voluntary as far as ISO/IEC and ITU-T are concerned. Requirements for testing in procurement and other external contracts are not a matter for standardization.

This part of ISO/IEC 9646 is also to be published by ITU-T as Recommendation X.290 but not as identical text.

# Information technology – Open Systems Interconnection – Conformance testing methodology and framework – Part 1: General concepts

## 1 Scope

**1.1** ISO/IEC 9646 is a multi-part International Standard which specifies a general methodology for testing the conformance of products to OSI specifications which the products are claimed to implement. The methodology applies to testing conformance to

- a) the specification of an OSI protocol;
- b) the specification of a transfer syntax used in combination with a specific OSI protocol;
- c) the specification of an OSI protocol profile, including the testing of conformance to any specified information objects used in combination with one or more of the protocols, as specified in the profile;
- d) the specifications of a combination of OSI protocols, possibly used in combination with a specified transfer syntax and/or one or more specified information objects.

The OSI specification to which conformance is tested may be contained in an International Standard, an ITU-T Recommendation, or an International Standardized Profile.

**1.2** ISO/IEC 9646 is in principle, applicable to conformance testing for Integrated Services Digital Network (ISDN).

**1.3** ISO/IEC 9646 is applicable to conformance testing for those implementations of a protocol or set of protocols that require communication between two or more real open systems to achieve their purpose (*e.g.* Message Handling Service (MHS)), Directory Services, ISDN, Transaction Processing, Routing, and Systems Management).

**1.4** ISO/IEC 9646 is applicable to the different phases of the conformance testing process, these phases being characterized by three major activities. These activities are:

- a) the specification of Abstract Test Suites (ATSs) for particular OSI protocols and Profile Test Specifications (PTSs) for particular OSI profiles;
- b) realization of a Means of Testing (MOT) able to run an executable form of an Abstract Test Suite;
- c) the conformance assessment process carried out by a test laboratory for a specific client on the basis of an Implementation Conformance Statement (ICS), culminating in the production of a System Conformance Test Report (SCTR) and one or more Protocol Conformance Test Reports (PCTR), one for each ATS used; the results are given in terms of the relevant protocol specification(s) and test suite(s) used.

This part is applicable to all three activities, providing tutorial introductory material, together with definitions of common terms and concepts.

NOTE - ISO/IEC 9646-2 deals with the requirements and guidance for the specification of ATSs, independent of test notation. ISO/IEC 9646-3 defines the recommended test notation. ISO/IEC 9646-4 deals with requirements and guidance for realization of the means of testing. ISO/IEC 9646-5 deals with requirements and guidance for test laboratories and their clients for the conformance assessment process. ISO/IEC 9646-6 deals with the requirements and guidance for PTSs based upon ATSs for each of the protocols involved. ISO/IEC 9646-7 deals with the requirements and guidance for ICSs, System Conformance Statements (SCSs), their proformas and Requirements Lists (RLs).

**1.5** ISO/IEC 9646 specifies the requirements for and gives guidance on the procedures to be followed in OSI conformance testing.

**1.6** ISO/IEC 9646 includes only such information as is necessary to meet the following objectives:

- a) to achieve an adequate level of confidence in the tests as a guide to conformance;
- b) to achieve comparability between the results of the corresponding tests on a particular OSI implementation applied in different places at different times;
- c) to facilitate communication between the parties responsible for the activities described in 1.4 above.

1.7 This part of ISO/IEC 9646 includes tutorial introductory material which provides

- a) an exposition of the meaning of conformance in the context of OSI;
- b) a description of the major categories of conformance tests;
- c) an introduction to the conformance assessment process;
- d) an introduction to the Abstract Test Methods and their applicability;
- e) an introduction to the concepts of test suite design.

In addition, this part describes the relationship between the other parts of ISO/IEC 9646 and the activities involved in conformance testing, and introduces the concept of compliance with respect to the other parts of ISO/IEC 9646.

1.8 The following are outside the scope of ISO/IEC 9646:

- a) certification, an administrative procedure which may follow conformance testing;
- b) requirements for procurement and contracts;
- c) testing by means of test methods which are specific to particular applications, protocols or systems;
- d) testing by means other than PDU exchange;

NOTE – ISO/IEC 9646 does not apply fully to Physical layer protocols. Nevertheless, many of the concepts apply to all protocols.

## 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 listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 7498: 1984, *Information processing systems – Open Systems Interconnection – Basic Reference Model*.  
(See also CCITT Recommendation X.200 (1984))

ISO/TR 8509: 1987, *Information processing systems – Open Systems Interconnection – Service conventions*.  
(See also CCITT Recommendation X.210 (1988))

ISO/IEC 8825:1990, *Information technology – Open Systems Interconnection – Specification of Basic Encoding Rules for Abstract Syntax Notation One (ASN.1)*.  
(See also CCITT Recommendation X.209 (1988))

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 -<sup>1)</sup>)

ISO/IEC 9646-3: 1992, *Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 3: The Tree and Tabular Combined Notation (TTCN)*.  
(See also ITU-T Recommendation X.292 (1993))

ISO/IEC 9646-3 Amd 1: -<sup>1)</sup>, *Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 3: The Tree and Tabular Combined Notation - Amendment 1: TTCN extensions*.

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 -<sup>1)</sup>)

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 -<sup>1)</sup>)

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 -<sup>1)</sup>)

ISO/IEC 9646-7: -<sup>1)</sup>, *Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 7: Implementation Conformance Statements*.  
(See also ITU-T Recommendation X.296 -<sup>1)</sup>)

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<sup>1)</sup> To be published.



ISO/IEC TR 10000-1: 1990, *Information technology - Framework and taxonomy of International Standardized Profiles, Part 1 - Framework*.