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Part 6:
Protocol profile test specification

Technologies de l'information — Interconnexion de systèmes ouverts — Cadre général et méthodologie des tests de conformité OSI —

Partie 6: Spécification de test pour les profils de protocoles

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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 9646-6 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee 21, *Open Systems Interconnection, data management and open distributed processing*.

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*

Annex A forms an integral part of this part of ISO/IEC 9646.

Introduction

This part of ISO/IEC 9646 provides OSI protocol profile testing methodology based on the protocol testing methodology specified in ISO/IEC 9646-2.

ISO/IEC 9646-1 defines terminology and introduces general concepts for both protocol and profile testing. ISO/IEC 9646-4 places requirements on test realization and ISO/IEC 9646-5 places requirements on the conformance assessment process, both of which are applicable to profile testing. ISO/IEC 9646-7 describes how profile requirements are documented in Implementation Conformance Statements (ICSs) and profile Requirements Lists (RLs).

A profile specification is a document containing one or more profiles. An International Standardized Profile (ISP) is an example of a standardized profile specification.

A profile is defined as the selection of one or more base specifications and the identification of the chosen classes, common subsets, options and parameters of those base specifications necessary for accomplishing a particular function. Profiles are defined to facilitate interworking between systems implementing the same profile.

A profile implementation is tested for conformance to the relevant profile specification in order to give confidence that interworking can be achieved, and to verify that the implementation conforms to the profile specification.

The meaning of conformance to a profile and the method of expressing profile conformance requirements are described in clause 6.

Profile testing principles, based on the methodology defined for the base protocol specifications, are described in clause 7.

The Profile Test Specification (PTS) is the complete set of documents needed to specify conformance testing for a profile. The PTS is based on the Abstract Test Suite (ATS) specifications of the protocols referenced by the profile. The PTS is described in clause 7.

The PTS-Summary provides, in a single document, references to all the elements of the PTS. The PTS-Summary is described in clause 8 and a template for a PTS-Summary is described in annex A.

The Profile Specific Test Specification (PSTS) contains any changes to the ATS specifications relevant to the base specifications and the additional test cases required for the profile testing. The PSTS is described in clause 9.

This part of ISO/IEC 9646 is also published by ITU as ITU-T Recommendation X.295, but not identical texts.

Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 6: Protocol profile test specification

1 Scope

This part of ISO/IEC 9646 specifies the requirements and provides guidance for the production of Profile Test Specifications (PTSs) for conformance testing of OSI protocol profiles. This part of ISO/IEC 9646 also specifies requirements concerning the expression of conformance requirements in protocol profile specifications.

This part of ISO/IEC 9646 is applicable to testing the conformance of a profile implementation to the static and dynamic conformance requirements of each protocol and any information objects included in the profile, by controlling and observing Protocol Data Unit (PDU) exchanges.

Testing requirements that go beyond conformance are outside the scope of this part of ISO/IEC 9646.

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 ITU-T Recommendation X.200 (1984)).

ISO/TR 8509: 1987, *Information processing systems - Open Systems Interconnection - Service conventions.*
(See also ITU-T Recommendation X.209 (1988)).

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 [1)]).

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 [1)]).

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: -[1)], *Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 3: The Tree and Tabular Combined Notation (TTCN) - 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 [1)]).

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 [1)]).

1) To be published

ISO/IEC 9646-7: -[1)], *Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 7:Implementation Conformance Statements*

(See also ITU-T Recommendation X.296 [1)]).

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

ISO/IEC TR 10000-2:1990, *Information technology - Framework and Taxonomy of International Standardized Profiles. Part 2: Taxonomy.*

3 Definitions

For the purposes of this part of ISO/IEC 9646, all the definitions in ISO/IEC 9646-1 apply.

In addition, the following definition applies to this part:

component (of a profile): A component of a profile is a single protocol or a combination of one or more protocols with zero or more information objects upon which a profile is based and which are to be tested in combination.

4 Abbreviations

For the purposes of this part of ISO/IEC 9646, the following abbreviations defined in ISO/IEC 9646-1 apply:

ATM: abstract test method
ATS: abstract test suite
ETS: executable test suite
ICS: implementation conformance statement
ISP: international standardized profile
IUT: implementation under test
IXIT: implementation extra information for testing
MOT: means of testing
OSI: open systems interconnection
PCTR: protocol conformance test report
PICS: protocol implementation conformance statement
PSTS: profile specific test specification
PTS: profile test specification
RL: requirements list
SCS: system conformance statement
SCTR: system conformance test report
SUT: system under test
TMP: test management protocol
TSS&TP: test suite structure and test purposes
XRL: profile IXIT requirements list

NOTE - The following abbreviations were defined for ISPs in ISO/IEC TR 10000-1 but are superseded in ISO/IEC 9646 by more general terms:

IPRL: ISP requirements list (general term is profile RL)
ISPICS: ISP implementation conformance statement (general term is profile ICS)
ISPIXIT: ISP implementation extra information for testing (general term is profile IXIT).

1) To be published

5 Compliance

A protocol profile specification which complies with this part of ISO/IEC 9646 shall satisfy all the requirements stated in clause 6. A Profile Test Specification Summary (PTS-summary) which complies with this part of ISO/IEC 9646 shall satisfy all the requirements stated in clause 8 and annex A. All the referenced conformance testing specifications shall comply with ISO/IEC 9646-2.

A Profile Specific Test Specification (PSTS) which complies with this part of ISO/IEC 9646 shall satisfy all the requirements stated in clause 9 and shall be the only internationally harmonized PSTS for the given profile.

If a PTS-Summary in compliance with this part of ISO/IEC 9646, references a PSTS, the PSTS shall comply with this part of ISO/IEC 9646.

A Profile Test Specification (PTS) which complies with this part of ISO/IEC 9646 shall satisfy all the requirements stated in clause 10.

6 The meaning of conformance to a profile

6.1 Principles of profile contents and profile conformance

A profile makes explicit the relationships between a set of base specifications used together to accomplish a particular function, and may also specify particular details related to each base specification being used.

It follows that a profile:

a) shall restrict the choice of base specification options to the extent necessary to maximise the probability of interworking between systems implementing the profile; thus a profile may retain base specification options as options of the profile provided that they do not affect interworking;

b) shall not specify any requirements that would contradict or cause non conformance to the base specifications to which it refers;

c) may contain conformance requirements which are more specific and limited in scope than those of the base specifications to which it refers.

For example, when a feature is associated with an allowed parameter value range, the profile shall only adopt the same value range as that allowed by the base specification, or a subset of that range.

Therefore, conformance to that set of base specifications does not necessarily imply conformance to the profile. However, conformance to a profile implies by definition conformance to the set of base specifications which it references.

6.2 Profile conformance requirements

6.2.1 Introduction

The concepts of static conformance and dynamic conformance apply also to profiles.

6.2.2 Static conformance requirements clause

In order to ensure consistency between profiles and base specifications, the static conformance requirements of a profile shall be specified, where possible, by reference to the conformance requirements of the referenced base specifications.

There shall be a static conformance requirements clause in a profile, structured as follows:

a) an overview of the major subsets or implementation categories which provides an overall rationale for the more detailed selection of classes and options made in the profile;

b) the conformance requirements which relate to these subsets or implementation categories;

c) for each base specification selected in the profile, a reference to the base specification static conformance requirements and a specification of the choices made for the profile;

d) any additional static conformance requirements of the profile which involve interdependencies of related services and protocols.

For general guidance on conformance clauses, see ISO/IEC 9646-2, annex B, B.5.

6.2.3 Relationship between profile and base specification static conformance requirements

The static conformance requirements of an OSI protocol profile shall relate to the static conformance requirements in the base specifications as defined in ISO/IEC 9646-7.

6.2.4 Expression of profile static conformance requirements

Profile static conformance requirements are expressed in the profile Implementation Conformance Statement (ICS) proforma. See ISO/IEC 9646-7 for requirements and guidance regarding the specification of the profile ICS proforma.

6.2.5 Dynamic conformance requirements

Given the implementation choices stated in the profile ICS, the dynamic conformance requirements for a profile are, for the most part, specified by the referenced base specifications.

Hence, a profile shall specify dynamic conformance requirements by reference to those base specifications, together with any further constraining requirements necessary to fulfil the stated purposes of the profile.

Restrictions by a profile on dynamic conformance requirements of a base specification are exceptions, and shall only apply to transmission. Restrictions shall not apply to reception. Consequently, it is possible that receipt of an excluded option may cause the receiving system to operate outside the profile, but still in accordance with the base specification.

6.3 Expression of profile extra information for testing

Extra information for testing a profile is expressed in the profile IXIT. See ISO/IEC 9646-1, subclause 6.2.3 for the scope and the role of a profile IXIT proforma and profile IXIT and see ISO/IEC 9646-5, subclause 6.4.5 for more details.

7 General testing principles

7.1 Profile Test Specification (PTS)

The PTS is the set of all the conformance testing specifications needed to assess conformance to a profile.

The contents of a PTS are specified in a standardized document called a PTS-Summary. The PTS-Summary is a part of the PTS.

The PTS-Summary does not contain the full text of any conformance testing specification, but only contains references to them. The PTS-Summary references

1) base specifications;

2) specific material created for a profile or a family of related profiles, called a PSTS.

The users of the PTS are

a) the test realizers who develop Executable Test Suites (ETSs) for the profile;

b) the test laboratories which carry out the conformance assessment process of an implementation of a profile;

c) the clients of the test laboratories who need to know the specifications by which their profile implementations will be tested.

Profile specifiers may utilize the concept of a common profile or common subprofile, hereafter called a "common (sub)profile", to define a common part of a profile which can be used by one or more other profiles. A common (sub)profile may be incomplete in itself. An example of such a common (sub)profile is the Common Upper Layer Requirements profile containing the protocols: Session, Presentation and Association Control Service Element.

In the case of such profiles, the PTS-Summary for a complete profile may reference the PTS-Summary for a common (sub)profile, to allow the PTS of the common (sub)profile to be incorporated within the PTS of the referencing profile.

A common (sub)profile may reference another common (sub)profile.

7.2 Rules to develop the elements of a Profile Test Specification (PTS)

The PTS shall provide testing coverage for each conformance requirement of the profile.

The contents of a PTS are based on the existence of conformance testing specifications, each one containing a Test Suite Structure and Test Purposes (TSS&TP), a partial Implementation Extra Information for Testing (IXIT) proforma and one or more Abstract Test Suites (ATSs) plus Test Management Protocol (TMP) if any, applicable to a component of the profile (i.e. to one or more protocols and/or information objects). The PTS shall avoid duplication of the conformance testing specifications and shall only contain references to them.

If no conformance testing specification exists for some component of the profile, one shall be developed in compliance with ISO/IEC 9646-2, in the context of the profile and submitted to the relevant standardization organization, for standardization of the conformance testing specification for the relevant base specification(s) (albeit that the coverage provided by the ATS may be incomplete).

If a profile has profile specific conformance requirements, then test purposes and corresponding abstract test cases shall be created for these requirements.

7.3 Relationship with base specification testing

7.3.1 Introduction

The conformance testing specification for each component of a profile is ideally a subset of the one for the base specification(s), in the same way as the profile itself specifies a subset of the base specifications.

7.3.2 Options excluded by a profile

In some exceptional circumstances, a profile may include a requirement to exclude certain dynamic behaviour allowed in the base specification (i.e. prohibiting the use of an optional capability, or restricting value ranges of parameters, allowed in the base specification).

When designing conformance testing specifications to test such requirements, there shall be no provocative tests designed to deliberately make the implementation operate outside the profile; thus the Means of Testing (MOT) shall at all times stay within the limits of the profile. If the implementation exhibits out of profile behaviour which is detected when it is being tested within the profile, a fail verdict shall be recorded for that test case.

When testing a profile implementation, the values given to parameters may need to be adapted to fit profile requirements. All chosen parameter values shall be within the range allowed by the profile (to test the valid behaviour) or outside the range allowed by the base specification (to test the invalid behaviour).

7.3.3 Options out-of-scope of a profile

In some circumstances, a profile may specify that a certain capability or a certain parameter value is out-of-scope.

When testing a profile implementation, the presence of an out-of-scope parameter value may become a requirement in order to correctly encode the complete Protocol Data Unit (PDU) (e.g. if just one element of a sub-structure is out-of-scope). However the semantics behind such a parameter shall not be tested within the PTS for that profile.

An out-of-scope parameter which is not needed to correctly encode the PDU shall not be the subject of profile testing. An out-of-scope capability shall not be the subject of profile testing. There shall be no test cases that test the implementation with a value that is outside the range specified in the profile, but inside the range specified in the base specification. However, invalid behaviour test cases are needed to probe the Implementation Under Test's response to behaviour which is invalid with respect to the base specification.

7.3.4 Profile testing of the IUT as receiver

Systems may support more than one profile and may have the ability to correctly respond to PDUs which contain parameters which are either out-of-scope or excluded by the profile being tested. Therefore, when testing an Implementation Under Test (IUT) as a receiver, the MOT shall only exhibit "in profile" behaviour and shall not attempt to coerce the receiving IUT to operate outside the profile.

The test suite specifier shall only specify valid behaviour test cases that restrain their behaviour to that allowed within the profile. This applies to a parameter value range, where a profile limits the range allowed by the base specification.

The implementer should not need to modify the implementation to reject the values in the wider range if they are sent to it. Also the implementer should have the possibility to constrain the implementation to the profile specification, thus rejecting values in the wider range. So the behaviour of profile implementations for values in the wider range cannot be uniquely defined.

7.3.5 Profile testing of the IUT as Sender

During connection negotiation, the MOT shall at all times act as a system having implemented the profile and be prepared to negotiate all the options available in the base specification.

Systems vary in their ability to be specifically configured for profile testing and may, upon connection establishment, offer options outside the scope of the profile. However, as the MOT is required to behave as an implementation of the profile, those options are either ignored or negotiated away. The resulting dialogue is therefore "in-profile".

For IUT originated protocol requests and responses, where the Upper Tester has control over the parameter values used in the dialogue, the Upper Tester shall not expect the implementation to reject or "tailor" parameter values that are outside the range allowed by the profile, but inside the range allowed by the base specification.

For IUT originated protocol requests and responses, where a given parameter is categorized as out-of-scope in the profile, and where the Upper Tester neither specifies the values for it, nor is able to negotiate the non-use of this parameter for the connection, the Lower Tester shall ignore the arrival of this parameter.

7.4 Abstract Test Methods (ATMs)

All Abstract Test Methods (ATMs) defined in ISO/IEC 9646-2 for base OSI protocols are applicable to the testing of components of a profile. See 10.3.3 for consideration on the choice of ATMs for the test of a profile.

7.5 System Under Test (SUT) configuration

In the context of conformance testing against base specifications or against a profile specification, the IUT is defined as an implementation of one or more protocols, possibly together with information objects.

A System Under Test (SUT) may have the ability to operate according to several profiles which make use of different capabilities of the same base specifications, and either to negotiate between profiles using different capabilities or to be configured appropriately. The System Conformance Statement (SCS) and its associated ICSs provide information on the profiles supported by the SUT.

If a multi-profile SUT is to be tested for support of more than one profile, it is tested for one profile at a time. Therefore, the SUT may need to be configured to operate according to each profile to be tested, unless it has the capability to support multiple profiles without reconfiguration.

If SUT configuration is required, it shall occur prior to undertaking each test campaign, using information contained in the profile IXIT.

NOTE - The requirements concerning SUT configuration are specified in ISO/IEC 9646-5.

8 The Profile Test Specification Summary (PTS-Summary)

8.1 Introduction

A PTS-Summary is a standardized document which references all the documents necessary to completely specify conformance testing for a profile. The PTS-Summary together with the documents it references constitute a PTS.

8.2 Contents of a PTS-Summary

8.2.1 Introduction

The PTS-Summary shall have the following structure:

a) section 1 contains references which apply to the profile and to the PTS as a whole (see 8.2.2);

b) section 2 is divided into subsections 2.N, each of which contains references applying to component N of the profile (see 8.2.3 and 8.2.4);

c) subsection 2.N.m contains references which apply to a specific ATS m for component N of the profile (see 8.2.5);

d) subsection 2.S contains references which apply to a common (sub)profile (see 8.2.6), if any;

e) section 3 refers to material specific to the profile, which is not related to any single component of the profile (see 8.2.7);

f) section 4 contains the conformance clause (see 8.2.8).

Annex A details the PTS-Summary template, to be used by the PTS specifier to make a PTS-Summary. It also contains a conformance clause stating the requirements to be met by a PTS-Summary to conform to this template.

8.2.2 PTS-Summary section 1: Profile Identification

Section 1 of the PTS-Summary shall contain general information relative to the profile. In particular, it shall contain:

a) the profile identifier, according to ISO/IEC TR 10000-2 taxonomy;

b) a reference to the profile specification;

c) a reference to the profile Requirements List (RL);

d) a reference to the profile specific ICS proforma, if needed;

e) a reference to the partial profile IXIT Requirements List (XRL), if needed;

f) a reference to the partial profile specific IXIT proforma, if needed;

g) a reference to an SCS proforma for the profile, if needed.

8.2.3 PTS-Summary section 2: Components of the Profile Test Specification

Section 2 shall contain a summary of the subsections describing conformance testing specifications for each component of the profile to be tested.

8.2.4 PTS-Summary subsection 2.N: Conformance testing specification for component N

8.2.4.1 The PTS-Summary shall contain a section 2.N for each component to be tested.

8.2.4.2 The following shall be listed for each protocol in the component:

a) identification of the protocol, including its name, reference to its specification, and if appropriate, any further information relevant to the profile (e.g. version number, class, reference to amendments and to technical corrigenda);

b) a reference to the Protocol Implementation Conformance Statement (PICS) proforma.

If a PICS proforma does not exist for one of the base protocols, the PTS specifier is expected to create a suitable PICS proforma, which shall be submitted to the relevant organization for progression towards standardization.

8.2.4.3 If the component includes information objects, the following shall be listed for each information object:

a) identification of the information object, including its object identifier, reference to its specification, and if appropriate, any further information relevant to the profile;

b) a reference to the information object ICS proforma.

If an ICS proforma does not exist for one of the information objects, the PTS specifier is expected to create a suitable information object ICS proforma, which shall be submitted to the organization responsible for the information object specification, for progression through the appropriate approval process.

8.2.4.4 In addition, there shall be a TSS&TP reference section for each component. The following shall be listed:

a) a reference to the TSS&TP specification;

If a TSS&TP specification does not exist for this component, the PTS specifier is expected to create a suitable TSS&TP, which shall be submitted to the relevant organization for progression towards standardization.

b) a reference to the additional test purposes, if any.

This shall reference the PSTS if additional Test Purposes are needed for profile specific conformance requirements relevant to the component.

8.2.5 PTS-Summary subsection 2.N.m: Use of ATS m for component N

Subsection 2.N.m shall contain a reference to each ATS m available for testing the component N. This is the largest and most technically complex part of the PTS.

The following shall be listed for each ATS specification:

a) identification of the ATS, including the reference to its specification, and any further information relevant to the profile (e.g. version number, date of publication, origin);

b) information which gives precision concerning the protocols, services, and/or information objects used in the ATS, e.g. any technical corrigenda applied or any restriction to subsets of the specifications;

c) the ATM(s) used for the ATS;

d) a reference to the TMP specification if relevant;

e) a reference to the partial IXIT proforma;

f) a reference to any additional test cases for component N; these shall be in the PSTS, if any.

8.2.6 PTS-Summary subsection 2.S: PTS-Summary for a common (sub)profile

If a common (sub)profile is used in the definition of the profile, some of the 2.N subsections and 2.N.m subsections shall be replaced by a direct reference to the PTS-Summary of the common (sub)profile.

8.2.7 PTS-Summary section 3: Conformance testing specifications not related to any single component

Section 3 shall reference information in the PSTS which relates to more than a single profile component, if any.

It shall contain

a) a reference to additional test purposes specific for the profile, if any;

b) a reference to additional test cases specific for the profile, if any.

8.2.8 PTS-Summary section 4: Conformance clause

Section 4 shall contain a conformance clause.

Annex A provides text for the conformance clause of the PTS-Summary.

9 Profile Specific Test Specification (PSTS)

A PSTS is a standardized document which is part of the PTS and defined in ISO/IEC 9646-1.

It shall include:

a) the following lists of relevant abstract test cases:

1) the list of test cases from each ATS which is applicable to the profile; this list of test cases shall be equivalent to the result of applying a fictitious profile ICS indicating support of all allowed profile options to the selection expressions of the relevant ATS;

2) the test case replacement list, identifying which abstract test cases from the list identified in a) 1) are to be replaced by test cases from the PSTS, and identifying each replacement test case;

3) the list of additional test cases for testing profile conformance requirements related to a single component of the profile, but not covered by the relevant base ATS specification(s); this list should ideally be empty;

4) the list of the additional test cases which are related to profile specific conformance requirements covering more than one component; this set of test cases forms an additional ATS;

b) the following set of relevant abstract test cases:

1) replacement test cases identified by the list a) 2) above;

2) the abstract test cases identified by the list a) 3) above; these test cases should if possible be generalized and migrated to the relevant ATS specification;

3) the test cases of the additional ATS identified in a) 4) above;

c) the following set of relevant test purposes:

1) new or modified test purposes related to those test cases identified in a) 2) and a) 3);

2) a TSS&TP for the additional ATS identified in a) 4);

d) information specifying the parameterization of all relevant abstract test cases in the form of

1) modifications to existing partial IXIT proformas;

2) a partial profile XRL giving additional requirements relating to existing partial IXIT proformas;

3) a partial profile specific IXIT proforma;

e) modified selection expressions related to test cases identified by the list a) 1), referring as necessary to the profile specific ICS proformas and/or profile specific IXIT proformas, or modified partial IXIT proformas;

f) modifications or additions to the TMP(s), if relevant;

g) profile specific information to be included in an SCTR proforma to be produced based on the template given in ISO/IEC 9646-5: 1994, annex A.

In addition, during the process of developing a PTS, the PSTS shall be used to provide a temporary location for documents to be referenced by the PTS-Summary but which are not yet in the process of being standardized. This includes defect reports and technical corrigenda

A PSTS may relate to a single profile. Alternatively, a PSTS may relate to more than one profile, in which case it shall be clear which components of the PSTS are relevant to each profile.

The PSTS shall include a conformance clause. The conformance clause shall contain the following statement:

> "The test realizer shall comply with the requirements of ISO/IEC 9646-4. In particular, these concern the realization of an Executable Test Suite (ETS) based on the PSTS. Test laboratories running conformance test services for this profile shall comply with ISO/IEC 9646-5".

10 The Profile Test Specification (PTS) development process

10.1 Introduction

This clause describes a process for obtaining the set of documents that makes up the PTS for a profile.

10.2 The profile Implementation Conformance Statement (profile ICS) proforma

The profile ICS proforma should be checked to ensure that it is adequate for use in testing the profile. This involves checking the profile RL and the ICS proformas for each protocol and information object in the profile. In performing these checks, defects

may be discovered in the ICS proformas or profile RL. Defects may also be discovered in the specification of the conformance clauses.

Defects discovered during these checks should be submitted to the relevant specification defining group. The structure of the ICS proformas and the profile RL shall not be altered for profile testing, except through the defect reporting process.

The PSTS is used during the development process to hold documents, such as defect reports, which are not yet in the process of being standardized.

10.3 The conformance testing specification for each component

10.3.1 Use of each conformance testing specification

For each component to be tested in the profile, the conformance testing specification should be checked to ensure that it is adequate for use in testing the profile.

This checking applies to all elements of each conformance testing specification, i.e. the TSS&TP, the ATS, the TMP if any and the partial IXIT proforma(s).

These checks may reveal that a standardized element is not available for a particular component. In such a case, the missing element shall be developed for that subset of the component that is within the profile. This element should be submitted to the relevant specification defining group.

In performing these checks, defects may be discovered in the specification of any of these elements, e.g. inadequate or missing test purposes, or test cases, or selection rules.

Defects due to inadequacy should be submitted to the relevant specification defining group using the defect reporting process. A replacement shall be defined to overcome the defect temporarily.

Defects due to omission shall result in additions to the conformance testing specification to overcome the omission. These additions developed to meet the needs of the profile should be submitted to the ATS specification defining group, to enable it to determine whether or not any changes to the conformance testing specifications are necessary.

Any replacement or addition shall be included in the PSTS.

The structure of the individual elements of the conformance testing specifications shall not be altered for profile testing, except through the defect reporting process.

The checking of the partial IXIT proformas should result into the production of the partial profile XRL and should identify whether a partial profile specific IXIT proforma is required.

10.3.2 Test purposes of base specification

Test purposes are written for the base specification as a whole and are intended to be independent of specific profiles and of specific ATMs. There is no need to produce a version of the TSS&TP specifically for testing a protocol in the profile context.

The TSS&TP for each relevant specification or combination thereof should be analysed to determine whether or not additional test purposes or modifications to the test purposes are needed to cover the profile requirements.

These test purposes may be either related to a single base specification or to more than one base specification to be tested together.

Additional test purposes related to a single base specification shall be incorporated within the relevant TSS&TP at appropriate points. This may involve adding them to existing test groups and/or involve adding new test groups.

Additional test purposes related to more than one base specification shall be specified in a separate TSS&TP.

10.3.3 Choice of Abstract Test Method (ATM)

Due to the nature of profiles, testing of protocols within a profile is usually done protocol by protocol, working upwards from the bottom, using incrementally the appropriate embedded variant of the chosen Abstract Test Method(s) (ATM(s)). This is particularly the case for Application profiles. Sometimes, however, it will be appropriate to test two protocols or a protocol plus one or more information objects as a single component of the profile.

When choosing which ATM(s) to use, there is a trade-off to be made between economic factors (e.g. cost of development, availability of existing source material, and cost of using the ATM for both test laboratories and their clients) and technical factors (e.g. degree of control that can be exerted over the testing of the IUT, and the testability of the component when tested using a given ATM).

Economic considerations will usually dictate that only one ATS specification can be developed for a given component in a given profile. This has the benefit of facilitating comparison between the test reports produced for different SUTs.

Technical considerations mean that it is not always possible to use a single ATM for the whole of a given ATS specification. A single component of a profile may need different ATMs to test its different roles (e.g. Distributed for the initiator role, Remote for the responder role). This is especially the case when multi-party testing is to be used, because in order to test all capabilities and all aspects of behaviour of an implementation of a multi-party protocol, it is likely to be necessary to use several different multi-party testing ATMs (i.e. different configurations of Lower Testers, Upper Testers, etc.)

Furthermore, within a profile, different components may need to be tested using different ATMs. This is obviously the case when the profile contains a multi-party protocol running over a stack of single-party protocols. However, even in a purely single party protocol profile, it may not be feasible to use embedded variants of ATMs for the most deeply embedded protocols because of the fact that control becomes weaker the deeper the embedding gets. In such cases, the non-embedded variants of the Coordinated test method could be considered, in order to give improved control.

Thus, it is not possible to require that only one ATM is used for testing the whole profile, or even for a single component of the profile.

10.4 Profile specific elements of the Profile Test Specification (PTS)

10.4.1 Profile specific test purposes

It may be necessary to define additional profile specific test purposes and associated test cases. These additional profile specific test purposes shall cover:

a) profile requirements which are the result of an identified inadequacy in base specification test coverage; these test purposes shall be documented in the PSTS;

NOTE - Concurrently, they should be reported to the base specification defining group for inclusion in the base specification TSS&TP, using a defect report or amendment procedure, as appropriate.

b) additional profile specific requirements, as defined in the profile specific ICS proforma; these test purposes shall also be documented in the PSTS.

10.4.2 Abstract test cases

Abstract test cases derived from additional profile specific test purposes shall be specified in the PSTS. The specification of these abstract test cases shall include selection expressions referring to the profile ICS proforma and partial profile IXIT proforma questions.

Profile specific test cases may be created which replace test cases in the base ATS specification. When this is done, a PSTS test case replacement list shall be created which lists the identifiers of base specification test cases and the corresponding identifiers of the replacement profile specific test cases.

10.4.3 Profile specific ICS and profile specific IXIT

If additional ICS proforma and/or IXIT proforma questions are needed by profile specific test cases or modifications to selection or parameterization rules, then the appropriate proformas shall be created (or extended if one already exists).

If a profile specific ICS proforma is to be created or extended, it shall accompany the profile RL and therefore should be passed to the profile defining group for inclusion in the profile specification.

If a partial profile specific IXIT proforma is to be created, it shall be included in the PSTS.

10.5 Minimum status for standardization

All documents referenced by the PTS-Summary shall have achieved at least CD status or its equivalent before the PTS-Summary and the PSTS are published as part of an ISP, International Standard or ITU-T Recommendation.

10.6 Packaging of the PTS-Summary and Profile Specific Test Specification (PSTS)

10.6.1 The PTS is not published in a single document. It is a collection of documents that the user has to gather, guided by the PTS-Summary.

Only the parts which are specifically standardized for a profile, i.e. PTS-Summary and PSTS, are published in separate parts of the profile specification.

10.6.2 A profile specification may contain one or more profiles. If it specifies only one profile, a profile specification document typically has three parts, as follows:

a) part 1 contains the specification of the profile, its Requirements List and profile specific ICS proforma;

b) part 2 contains the PTS-Summary;

c) part 3 contains the PSTS.

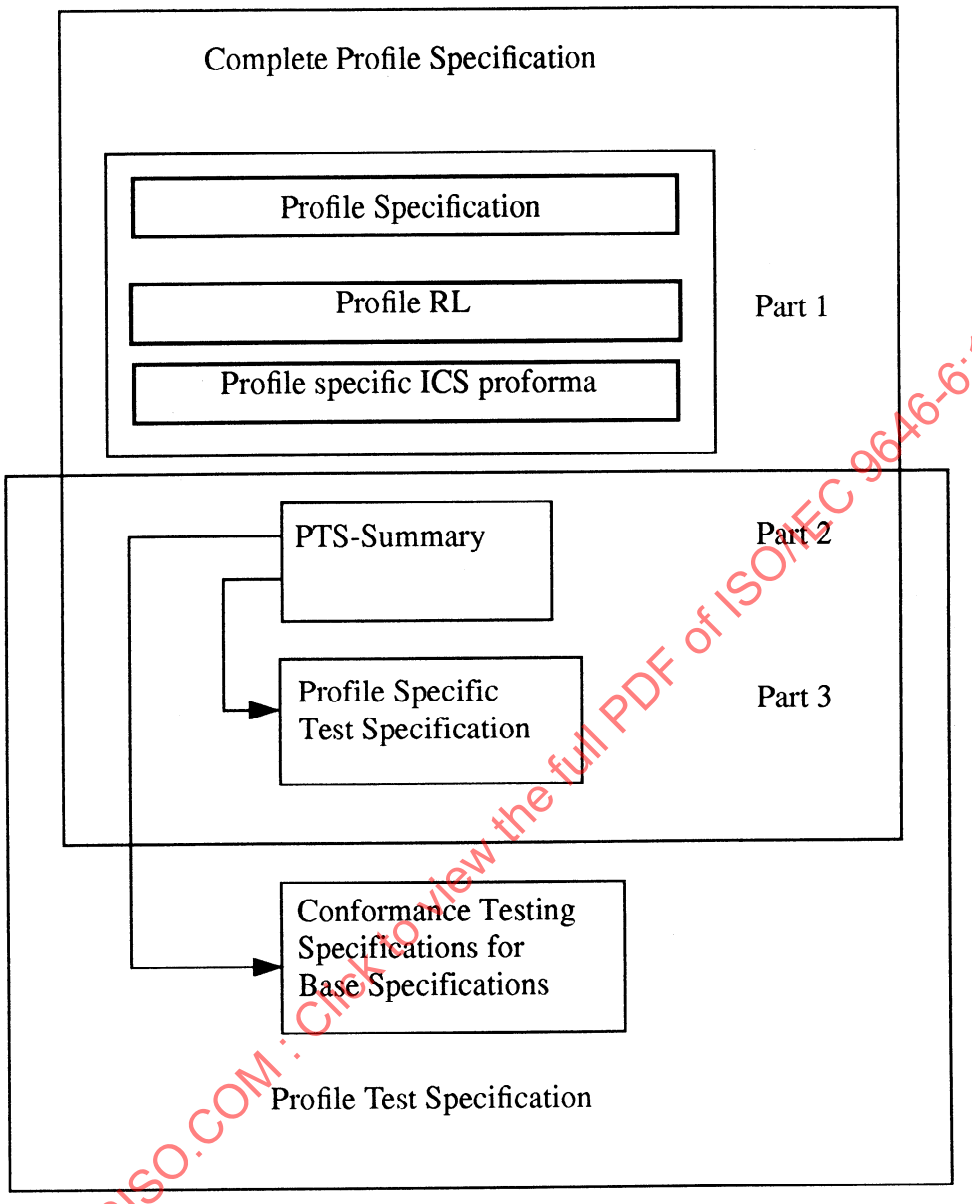

Figure 1 - Complete profile specification and PTS for a single profile

Figure 1 shows the structure of a complete profile specification which contains a single profile. The figure also shows the relationship between the scope of the complete profile specification and the scope of the PTS.

10.6.3 If the complete profile specification has more than one profile, it is typically structured as follows:

a) each profile is specified in a separate part of a multi-part profile specification;

b) each PTS-Summary is specified in a separate part of another multi-part specification;

c) the PSTSs are published in separate parts of their own multi-part specification, possibly including a common part which applies to more than one profile.

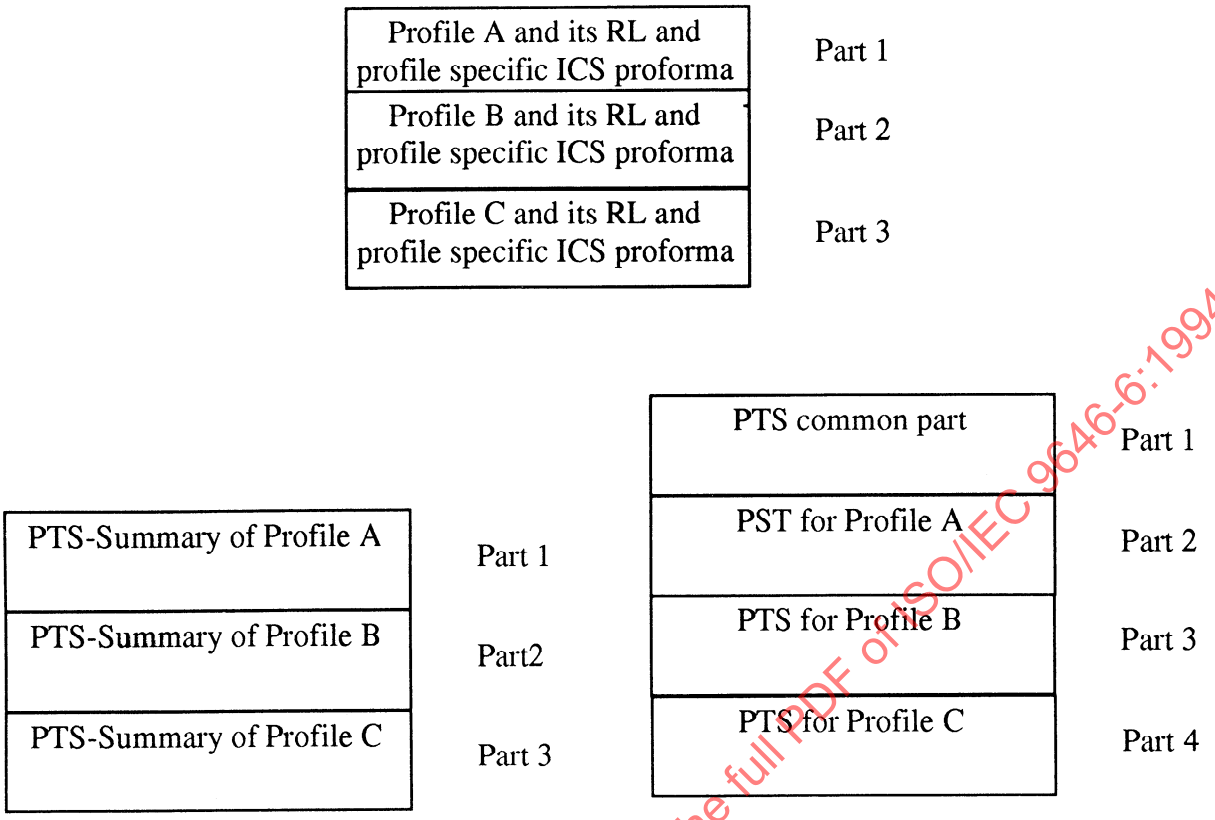

Figure 2 - Multi-profile specifications

Figure 2 shows the structure of multi-part specifications which relate to more than one profile.

Annex A
(normative)

PTS-Summary template

A.1 Introduction

This annex provides a template for a PTS-Summary. PTS specifiers shall use this template to produce a comprehensive PTS-Summary related to all the various components which constitute the profile.

Text in *italics* is comment for guidance purposes only, and shall be replaced with the actual information necessary for the PTS.

Text in ***bold italics*** is instructions on how to make a PTS-Summary, and shall be deleted when producing the PTS-Summary tailored to a profile.

A.2 Conformance of a PTS-Summary to this template

A PTS-Summary conforms to the PTS-Summary template given in this annex, provided that the following requirements are met:

a) no items shall be omitted from the template

b) the order of items shall be as specified in the template

c) instructions given in ***bold italics*** *shall be obeyed* and a tailored PTS-Summary containing all the necessary sections shall be produced covering all components of the profile

d) text in italics of each section shall be replaced by the relevant information specific to the profile.

A.3 PTS-Summary

The PTS-Summary shall use the following format: