INTERNATIONAL STANDARD

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Information technology — Open Systems Interconnection — Conformance test suite for the Session protocol —

Part 1:
Test suite structure and test purposes

Technologies de l'information — Interconnexion de systèmes ouverts — Suite de tests de conformité pour le protocole de session — Partie 1: Structure de la suite de tests et objets des tests

Reference number
ISO/IEC 10168-1:1997(E)

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization as a whole. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committee 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 JTC1. 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 10168-1 was prepared by Joint Technical Committee ISO/IEC JTC1, *Information technology,* Subcommittee SC21, *Open systems interconnection, data management and open distributed processing.*

ISO/IEC 10168 consists of the following parts, under the general title *Information technology — Open Systems Interconnection — Conformance test suite for the Session protocol:*

— *Part 1: Test suite structure and test purposes*

— *Part 4: Test management protocol specification*

Annex A forms an integral part of this part of ISO/IEC 10168. Annex B is for information only.

Introduction

This part of ISO/IEC 10168, a multipart International Standard, specifies a test suite structure and a set of test purposes for use by test suite specifiers as the basis for all standardized conformance test suites needed to evaluate conformance to ISO/IEC 8327-1, the Session protocol.

A fundamental objective of the related standardized conformance test suites is to establish uniform conformance testing and unambiguous evaluation procedures for checking the ability of a Session protocol implementation to operate according to ISO/IEC 8327-1.

The standardization of these test suites should lead to comparability and wide acceptance of test results produced by different test laboratories, and therefore minimize repeated conformance testing of the same Session protocol implementation.

The conformance test suites based on this part of ISO/IEC 10168 are designed for use by:

a) test laboratories which provide a conformance testing service for the Session protocol;

b) test realizers which provide a means of testing to be used by such test laboratories;

c) implementors of the Session protocol.

The purpose of conformance testing is to increase the probability that different implementations are able to interwork, although conformance testing alone cannot give a guarantee of interworking. Conformance testing increases the confidence that each implementation conforms to the protocol specification by establishing that it has the required capabilities and that its behaviour conforms to the protocol specification in representative instances of communication.

Information technology — Open Systems Interconnection — Conformance test suite for the Session protocol —

Part 1 :

Test suite structure and test purposes

1 Scope

This part of ISO/IEC 10168 specifies a test suite structure and test purposes for the Session protocol, as defined in ISO/IEC 8327-1 except for the symmetric synchronize and for the data separation functional units.

This part of ISO/IEC 10168 does not specify how the conformance tests are to be realized or used, nor how the test results are to be presented or used.

This part of ISO/IEC 10168 applies to conformance test suites for testing Session protocol implementations which operate over a connection oriented Transport service (ISO 8072) and which claim conformance to ISO/IEC 8327-1.

NOTE - The choice of test method may restrict the test purposes which can be realised.

This part of ISO/IEC 10168 does not include a general assessment of performance, reliability or robustness of relevant protocol implementations, nor an assessment of the design of the protocol itself.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO/IEC 10168. 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 10168 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

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

ISO 7498-3:1989[1], *Information processing systems — Open Systems Interconnection — Basic Reference Model — Part°3 Naming and addressing.*

ISO/IEC 8072:1996, *Information technology — Open Systems Interconnection — Transport service definition.*

ISO/IEC 8326:1996, *Information technology — Open Systems Interconnection — Session service definition.*

ISO/IEC 8327-1:1996, *Information technology — Open Systems Interconnection — Connection-oriented Session protocol: Protocol specification.*

ISO/IEC 8327-2:1996, *Information technology — Open Systems Interconnection — Basic connection-oriented Session protocol: Protocol Implementation Conformance Statement (PICS) proforma.*

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

ISO/IEC 9646-2:1995, *Information technology — Open Systems Interconnection — Conformance testing methodology and framework — Part 2: Abstract Test Suite specification.*

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

3 Definitions

For the purposes of this part of ISO/IEC 10168, the following definitions apply.

3.1 Reference model definitions

This part of ISO/IEC 10168 uses the following terms defined in ISO/IEC 7498-1:

a) session-connection;

b) session layer;

c) session-protocol-data-unit;

d) session-service;

e) session-service-access-point;

f) session-service-data-unit;

g) transport Layer;

i) transport-service;

j) transport-service-access-point;

k) concatenation;

l) segmenting.

1 To be published.

3.2 Service conventions definitions

This part of ISO/IEC 10168 uses the following terms defined in ISO/IEC 10731:

a) service-provider;
b) service-user;
c) primitive;
d) request (primitive);
e) indication (primitive);
f) response (primitive);
g) confirm (primitive).

3.3 Transport service definitions

This part of ISO/IEC 10168 uses the following terms defined in ISO/IEC 8072:

a) calling transport service user;
b) called transport service user;
c) sending transport service user;
d) receiving transport service user.

3.4 Session service definitions

This part of ISO/IEC 10168 uses the following terms defined in ISO/IEC 8326:

a) calling SS-user;
b) called SS-user;
c) sending SS-user;
d) receiving SS-user;
e) requestor; requesting SS-user;
f) acceptor; accepting SS-user;
g) token;
h) conditional (parameter);
i) proposed parameter;
j) selected parameter.

3.5 Session protocol definitions

This part of ISO/IEC 10168 uses the following terms defined in ISO/IEC 8327-1:

a) Session Protocol Machine (SPM);
b) session-service-user (SS-user);
c) transport-service-provider (TS provider);
d) local matter;
e) initiator;
f) responder;
g) sending SPM;
h) receiving SPM;
i) owner (of a token);
j) proposed parameter;
k) negotiation;
l) selected parameter;
m) valid SPDU;
n) invalid SPDU;
o) protocol error;
p) transparent (data);
q) SPDU identifier (SI);
r) length indicator (LI);
s) parameter field;
t) parameter identifier (PI);
u) PI unit;
v) parameter group identifier (PGI);
w) PGI unit;
y) parameter value (PV);
z) local variable.

3.6 Conformance testing methodology and framework definitions

This part of ISO/IEC 10168 uses the following terms defined in ISO/IEC 9646-1 and ISO/IEC 9646-2:

a) basic interconnection testing;
b) behaviour testing;
c) capabilities of an IUT;
d) capability testing;
e) conformance testing;
f) conformance test suite;
g) dynamic conformance requirements;
h) implementation under test (IUT);
i) inopportune test event;
j) lower tester;
k) PICS proforma;
l) protocol implementation conformance statement (PICS);
m) static conformance requirements;
n) syntactically invalid test event;
o) system under test (SUT);
p) test group;
q) test purpose;
r) test suite.

3.7 Session test suite structure and test purposes definition

For the purposes of this part of ISO/IEC 10168, the following definitions also apply.

3.7.1 inopportune parameter: A parameter whose PGI or PI current value is defined in ISO/IEC 8327-1, but which occurs in a SPDU which is not allowed.

3.7.2 unknown parameter: A parameter whose PGI or PI current value is not defined in ISO/IEC 8327-1.

3.7.3 mislaid parameter: A parameter which does not appear in the order defined in ISO/IEC 8327-1 for a particular SPDU.

4 Abbreviations

4.1 Data units

SPDU	Session Protocol Data Unit
SSDU	Session Service Data Unit
TSDU	Transport Service Data Unit

4.2 Types of Session protocol data units

AA	ABORT ACCEPT SPDU
AB	ABORT SPDU
AC	ACCEPT SPDU
AD	ACTIVITY DISCARD SPDU
ADA	ACTIVITY DISCARD ACK SPDU
AE	ACTIVITY END SPDU
AEA	ACTIVITY END ACK SPDU
AI	ACTIVITY INTERRUPT SPDU
AIA	ACTIVITY INTERRUPT ACK SPDU
AR	ACTIVITY RESUME SPDU
AS	ACTIVITY START SPDU
CD	CAPABILITY DATA SPDU
CDA	CAPABILITY DATA ACK SPDU
CDO	CONNECT DATA OVERFLOW SPDU
CN	CONNECT SPDU
DN	DISCONNECT SPDU
DT	DATA TRASFER SPDU
ED	EXCEPTION DATA SPDU
ER	EXCEPTION REPORT SPDU
EX	EXPEDITED SPDU
FN	FINISH SPDU
GT	GIVE TOKENS SPDU
GTA	GIVE TOKENS ACK SPDU
GTC	GIVE TOKENS CONFIRM SPDU
MAA	MAJOR SYNC ACK SPDU
MAP	MAJOR SYNC POINT SPDU
MIA	MINOR SYNC ACK SPDU
MIP	MINOR SYNC POINT SPDU
NF	NOT FINISHED SPDU
OA	OVERFLOW ACCEPT SPDU
PR	PREPARE SPDU
PT	PLEASE TOKENS SPDU
RA	RESYNCHRONIZE ACK SPDU
RF	REFUSE SPDU
RS	RESYNCHRONIZE SPDU
TD	TYPED DATA SPDU

4.3 Types of Session service primitives

SACTDcnf	S-ACTIVITY-DISCARD confirm primitive
SACTDind	S-ACTIVITY-DISCARD indication primitive
SACTDreq	S-ACTIVITY-DISCARD request primitive
SACTDrsp	S-ACTIVITY-DISCARD response primitive
SACTEcnf	S-ACTIVITY-END confirm primitive
SACTEind	S-ACTIVITY-END indication primitive
SACTEreq	S-ACTIVITY-END request primitive
SACTErsp	S-ACTIVITY-END response primitive
SACTIcnf	S-ACTIVITY-INTERRUPT confirm primitive
SACTIind	S-ACTIVITY-INTERRUPT indication primitive
SACTIreq	S-ACTIVITY-INTERRUPT request primitive
SACTIrsp	S-ACTIVITY-INTERRUPT response primitive
SACTRind	S-ACTIVITY-RESUME indication primitive
SACTRreq	S-ACTIVITY-RESUME request primitive
SACTSind	S-ACTIVITY-START indication primitive
SACTSreq	S-ACTIVITY-START request primitive
SCDcnf	S-CAPABILITY-DATA confirm primitive
SCDind	S-CAPABILITY-DATA indications primitive
SCDreq	S-CAPABILITY-DATA request primitive
SCDrsp	S-CAPABILITY-DATA response primitive
SCGind	S-CONTROL-GIVE indication primitive
SCGreq	S-CONTROL-GIVE request primitive
SCONcnf	S-CONNECT confirm primitive
SCONind	S-CONNECT indication primitive
SCONreq	S-CONNECT request primitive
SCONrsp	S-CONNECT response primitive
SDTind	S-DATA indication primitive
SDTreq	S-DATA request primitive
SEXind	S-EXPEDITED-DATA indication primitive
SEXreq	S-EXPEDITED-DATA request primitive
SGTind	S-TOKEN-GIVE indication primitive
SGTreq	S-TOKEN-GIVE request primitive
SPABind	S-P-ABORT Indication primitive
SPERind	S-P-EXCEPTION-REPORT indication primitive
SPTind	S-TOKEN-PLEASE indication primitive
SPTreq	S-TOKEN-PLEASE request primitive
SRELcnf	S-RELEASE confirm primitive
SRELind	S-RELEASE indication primitive
SRELreq	S-RELEASE request primitive
SRELrsp	S-RELEASE response primitive
SRSYNcnf	S-RESYNCHRONIZE confirm primitive
SRSYNind	S-RESYNCHRONIZE indication primitive
SRSYNreq	S-RESYNCHRONIZE request primitive
SRSYNrsp	S-RESYNCHRONIZE response primitive
SRSYNcnf	S-RESYNCHRONIZE confirm primitive
SRSYNind	S-RESYNCHRONIZE indication primitive
SRSYNreq	S-RESYNCHRONIZE request primitive
SRSYNrsp	S-RESYNCHRONIZE response primitive
SSYNMcnf	S-SYNC-MAJOR confirm primitive
SSYNMind	S-SYNC-MAJOR indication primitive
SSYNMreq	S-SYNC-MAJOR request primitive
SSYNMrsp	S-SYNC-MAJOR response primitive
SSYNmcnf	S-SYNC-MINOR confirm primitive
SSYNmind	S-SYNC-MINOR indication primitive
SSYNmreq	S-SYNC-MINOR request primitive
SSYNmrsp	S-SYNC-MINOR response primitive
STDind	S-TYPED-DATA indication primitive
STDreq	S-TYPED-DATA request primitive
SUABind	S-U-ABORT indication primitive
SUABreq	S-U-ABORT request primitive
SUERind	S-U-EXCEPTION-REPORT indication primitive
SUERreq	S-U-EXCEPTION-REPORT request primitive

4.4 Other abbreviations

ACT	Activity management functional unit
CAD	Capability data exchange functional unit
EXD	Expedited data functional unit
EXCEP	Exception functional unit
FD	Duplex functional unit
FU(f)	True if and only if the functional unit f has been selected during the Session connection establishment phase.
HD	Half duplex functional unit
IUT	Implementation Under Test

LT	Lower Tester
MA	Major synchronize functional unit
NR	Negotiated release functional unit
OSI	Open Systems Interconnection
PICS	Protocol Implementation Conformance Statement
RESYN	Resynchronize functional unit
SY	Minor synchronize functional unit
TD	Typed data functional unit
TIM	Disconnection and abort timer
dk	Data token
mi	Minor synchronize token
ma	Major/activity token
tr	Release token
tk(t)	True if and only if the token t is available.
TSS & TP	Test suite structure and test purposes
TTCN	Tree and tabular combined notation

5 Compliance

A generic or abstract test suite which complies with this part of ISO/IEC 10168 shall:

a) consist of a set of test casescorresponding to the set or a subset of the test purposes specified in clauses 11 to 13;

b) identify clearly the test purposes used;

c) cover all the relevant test purposes specified in clauses 11 to 13, as appropriate to the coverage and test method chosen for that test suite;

d) use a test suite structure which is an appropriate subset (or the whole) of the test suite structure specified in clause7;

e) name its test groups and test cases using the naming conventions specified in clause 8 in such a way that the test group and test case names used in clauses 11 to 13 are used whenever relevant;

f) maintain the relationships specified in clauses 11 to 13 between the chosen test purposes and the entries in the PICS proforma to be used for test case selection;

g) comply with ISO/IEC 9646-2 .

6 Testing methodology

6.1 Introduction

The testing methodology used in this part of ISO/IEC 10168 complies with the requirements of ISO/IEC 9646-2.

6.2 Relation ship between the TSS & TP and abstract test suites

The test purposes in this part of ISO/IEC 10168 have been derived from ISO/IEC 8327-1, the Session protocol standard. This derivation has focused on identifying test purposes to test conformance aspects of the protocol. However, no consideration has been given to any test method, how such test purposes may be realized, or any practical or economic constraints may be placed upon testing.

It is intended that all test suites for the Session protocol shall include tests for all the test purposes in this part of ISO/IEC 10168, however, an abstract test suite specifier may subset the test purposes given in this part of ISO/IEC 10168, providing this is in compliance with ISO/IEC 9646-2, clause 10.

6.3 Test selection

The structure of the test suite is organized to make possible the selection of the appropriate test cases according to the contents of the PICS.

NOTE - If a PICS shows that a mandatory feature is omitted, the test cases related to that feature are not executed; the conformance test report indicates clearly any such instances of non-conformance.

6.4 Verdicts

Verdicts assigned by each abstract test case are determined on the basis of the IUT's ability to behave in accordance with the requirements of the Session protocol, and to support the capabilities and parameter values listed in the PICS. Conformance assessment is based on the individual verdicts, the Session protocol standard, and the IUT's PICS.

6.5 Test suite coverage

Test purposes are specified and structured according to ISO/IEC 9646-2, 10.2 (test group structure) and 10.3 (test purposes) to obtain the appropriate coverage of possible state/event, parameter values, and valid/invalid variations.

7 Test suite structure

The test suite for the Session protocol consists of test groups and test cases. Each test case has a narrowly defined purpose. Within the test suite, nested test groups are used to provide a logical ordering of the test cases. Test groups may be nested to an arbitrary depth. They may be used to aid planning, development, understanding or execution of a test suite.

The test suite consists of three main test groups:

a) Capability Tests, which are used to verify that the observable capabilities of Session protocol implementations are valid with respect to the static conformance requirements stated in ISO/IEC 8327-1, clause 9, the Session protocol specification and with respect to the PICS.

b) Valid Behaviour Tests, which test the extent to which the implementation meets the dynamic conformance requirements specified in ISO/IEC 8327-1, subclause 9.3.d and 9.3.e, the Session protocol specification when the tester behaves in a valid manner. These tests provide a detailed evaluation of the features which are claimed to be supported in the PICS.

c) Invalid Behaviour Tests, which test the extent to which the implementation meets the dynamic conformance requirements specified in ISO/IEC 8327-1, subclause 9.3.f, the Session protocol specification when the sends tests events which violate at least one conformance requirement of ISO/IEC 8327-1. This group of tests may be sub-divided into

1) Syntactically Invalid Tests, where the tester sends tests evens where the PDU syntax is not allowed by ISO/IEC 8327-1.

2) Semantically Invalid Tests, where the tester sends tests evens where semantics is not consistent with that allowed by ISO/IEC 8327-1.

3) Inopportune Tests, where the tester generates test events which occur when they are not allowed to by ISO/IEC 8327-1.

Each of these groups are further divided into a number of lower level test groups. The structure of the Session test suite is shown in figure 1 and the other figures reference therein.

NOTE - The numbers shown in parentheses after each item in the tree refer to the clauses of this part of ISO/IEC 10168 where the test group and test purposes may be found.