
**Information technology — Open Systems
Interconnection — Distributed Transaction
Processing —**

Part 3:
Protocol specification

*Technologies de l'information — Interconnexion de systèmes ouverts
(OSI) — Traitement transactionnel réparti —*

Partie 3: Spécification du protocole

Contents	Page
Foreword	xi
Introduction	xii
1 Scope.....	1
2 Normative references	1
3 Definitions	2
4 Abbreviations	3
5 Conventions.....	3
6 Model of the PM.....	3
6.1 Overview	3
6.1.1 Principles of association usage	4
6.1.2 Functional unit capabilities and selection	4
6.1.3 Dialogue establishment.....	5
6.1.4 Soliciting dialogue establishment	6
6.1.5 Channel management.....	6
6.1.6 Channel utilization	7
6.1.7 Token control	7
6.1.8 Collisions of Ready Signals.....	8
6.1.9 Concatenation/separation	8
6.1.10 Embedding	9
6.2 OSI TP Protocol structure	9
6.2.1 Components of the PM	9
7 Execution Rules.....	12
7.1 Operation of the PM	12
7.1.1 Relationship of SAO(s) to MACF(s)	12
7.1.2 Input events to the PM	12
7.1.3 Action sequences.....	12
7.1.4 SACF queuing	13
7.1.5 Input event blocking at the PSAP	13
7.1.6 PM error conditions	14
7.2 Procedure rules.....	14
7.3 Definitions	16
7.4 Log records used by the PM	27
7.4.1 Log-ready record.....	27
7.4.2 Log-commit record	27
7.4.3 Log-heuristic record	27
7.4.4 Log-damage record.....	28
7.5 Recovery-context-handle.....	28
8 Use of ACSE, CCR and the Presentation Layer	28
8.1 Introduction	28

© ISO/IEC 1998

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

ISO/IEC Copyright Office • Case postale 56 • CH-1211 Genève 20 • Switzerland

Printed in Switzerland

8.2 Use of ACSE Service primitives.....	28
8.2.1 Use of the A-ASSOCIATE parameters	29
8.2.2 Use of the A-RELEASE parameters	29
8.2.3 Use of the A-ABORT and A-P-ABORT parameters	30
8.3 Use of CCR Service primitives.....	30
8.4 Use of the Presentation Layer	32
8.4.1 Use of Presentation Service primitives	32
8.4.2 Mapping of C-ROLLBACK-RI to Presentation	32
8.5 Association Management.....	32
8.5.1 Introduction.....	32
8.5.2 Association/dialogue compatibility.....	33
8.5.3 Association/channel compatibility.....	33
8.5.4 Initiating an association establishment.....	34
8.5.5 Receiving an association establishment indication	35
8.5.6 Responding to association establishment.....	36
8.5.7 Receiving confirmation of association establishment.....	37
8.5.8 Initiating an association release	38
8.5.9 Aborting an association	38
8.5.10 Initiating a dialogue solicitation.....	38
8.5.11 Responding to a dialogue solicitation	38
8.5.12 Receiving a rejection of a dialogue solicitation	39
8.5.13 Successful dialogue solicitation.....	39
9 TP-ASE description	39
9.1 Introduction	39
9.2 AF Service Definition	40
9.2.1 AF-BEGIN-DIALOGUE	40
9.2.2 AF-BID.....	41
9.2.3 AF-END-DIALOGUE	41
9.2.4 AF-U-ERROR.....	41
9.2.5 AF-ABORT	41
9.2.6 AF-GRANT-CONTROL	41
9.2.7 AF-REQUEST-CONTROL	41
9.2.8 AF-HANDSHAKE	41
9.2.9 AF-HANDSHAKE-AND-GRANT-CONTROL.....	42
9.2.10 AF-DEFER	42
9.2.11 AF-BEGIN-TRANSACTION	42
9.2.12 AF-PREPARE	42
9.2.13 AF-REPORT	42
9.2.14 AF-ABORT-AND-REPORT	42
9.2.15 AF-NOCHANGE.....	43
9.2.16 AF-EARLY-EXIT.....	43
9.2.17 AF-RECOVER.....	43
9.2.18 AF-TOKEN-GIVE	43
9.2.19 AF-TOKEN-PLEASE	43
9.2.20 AF-SOLICIT-DIALOGUE.....	43
9.3 AF-Services and TP APDUs: parameters and field Mappings.....	43
9.3.1 AF-BEGIN-DIALOGUE request/indication/response/confirm, TP-BEGIN-DIALOGUE-RI/-RC APDU.....	43
9.3.2 AF-BID request/indication/response/ confirm, TP-BID-RI/-RC APDU.....	46
9.3.3 AF-END-DIALOGUE request/ indication/response/confirm, TP-END-DIALOGUE-RI/-RC APDU	47
9.3.4 AF-U-ERROR request/indication/response/confirm, TP-U-ERROR-RI/-RC APDU	47
9.3.5 AF-ABORT request/indication, TP-ABORT-RI APDU.....	48
9.3.6 AF-GRANT-CONTROL request/ indication, TP-GRANT-CONTROL-RI APDU.....	49
9.3.7 AF-REQUEST-CONTROL request/ indication, TP-REQUEST-CONTROL-RI APDU.....	49
9.3.8 AF-HANDSHAKE request/indication/ response/confirm, TP-HANDSHAKE-RI/-RC APDU.....	49

9.3.9 AF-HANDSHAKE-AND-GRANT-CONTROL request/indication/response confirm, TP-HANDSHAKE-AND-GRANT-CONTROL-RI/-RC APDU	49
9.3.10 AF-BEGIN-TRANSACTION request/indication, TP-BEGIN-TRANSACTION-RI APDU	49
9.3.11 AF-DEFER request/indication, TP-DEFER-RI APDU	50
9.3.12 AF-PREPARE request/indication, TP-PREPARE-RI APDU	50
9.3.13 AF-REPORT request/ indication, TP-REPORT-RI APDU.....	50
9.3.14 AF-ABORT-AND-REPORT request/indication.....	52
9.3.15 AF-NOCHANGE request/indication, TP-NEXT-TID-RI APDU	53
9.3.16 AF-EARLY-EXIT request/indication/ response/confirm, TP-EARLY-EXIT-RI/-RC APDU	53
9.3.17 AF-RECOVER request/indication, TP-RECOVER-RI APDU	54
9.3.18 AF-TOKEN-GIVE request/indication, TP-TOKEN-GIVE-RI APDU	54
9.3.19 AF-TOKEN-PLEASE request/ indication, TP-TOKEN-PLEASE-RI APDU	55
9.3.20 AF-SOLICIT-DIALOGUE request/indication/response/confirm.....	55
9.4 Procedures.....	55
9.4.1 AF-BEGIN-DIALOGUE request	56
9.4.2 TP-BEGIN-DIALOGUE-RI TP APDU	56
9.4.3 AF-BEGIN-DIALOGUE response.....	56
9.4.4 TP-BEGIN-DIALOGUE-RC TP APDU	56
9.4.5 AF-BID request	56
9.4.6 TP-BID-RI TP APDU	56
9.4.7 AF-BID response.....	56
9.4.8 TP-BID-RC TP APDU	56
9.4.9 AF-END-DIALOGUE request.....	56
9.4.10 TP-END-DIALOGUE-RI TP APDU.....	56
9.4.11 AF-END-DIALOGUE response	56
9.4.12 TP-END-DIALOGUE-RC TP APDU	56
9.4.13 AF-U-ERROR request.....	56
9.4.14 TP-U-ERROR-RI TP APDU	57
9.4.15 AF-U-ERROR response.....	57
9.4.16 TP-U-ERROR-RC TP APDU.....	57
9.4.17 AF-ABORT request.....	57
9.4.18 TP-ABORT-RI TP APDU.....	57
9.4.19 AF-GRANT-CONTROL request.....	57
9.4.20 TP-GRANT-CONTROL-RI TP APDU	57
9.4.21 AF-REQUEST-CONTROL request.....	57
9.4.22 TP-REQUEST-CONTROL-RI TP APDU.....	57
9.4.23 AF-HANDSHAKE request.....	57
9.4.24 TP-HANDSHAKE-RI TP APDU.....	57
9.4.25 AF-HANDSHAKE response	57
9.4.26 TP-HANDSHAKE-RC TP APDU	57
9.4.27 AF-HANDSHAKE-AND-GRANT-CONTROL request	57
9.4.28 TP-HANDSHAKE-AND-GRANT-CONTROL-RI TP APDU	57
9.4.29 AF-HANDSHAKE-AND-GRANT-CONTROL response.....	58
9.4.30 TP-HANDSHAKE-AND-GRANT-CONTROL-RC TP APDU	58
9.4.31 AF-DEFER request	58
9.4.32 TP-DEFER-RI TP APDU.....	58
9.4.33 AF-BEGIN-TRANSACTION request.....	58
9.4.34 C-BEGIN indication	58
9.4.35 AF-PREPARE request	58
9.4.36 C-PREPARE indication	58
9.4.37 AF-REPORT request	58
9.4.38 TP-REPORT-RI TP APDU.....	58
9.4.39 AF-ABORT-AND-REPORT request.....	58
9.4.40 TP-ABORT-AND-REPORT-RI TP APDU.....	59
9.4.41 AF-EARLY-EXIT request	59
9.4.42 AF-EARLY-EXIT response.....	59
9.4.43 AF-RECOVER request.....	59

9.4.44 C-RECOVER indication.....	59
9.4.45 A-ABORT indication	59
9.4.46 C-ROLLBACK indication	59
9.4.47 C-ROLLBACK confirm	60
9.4.48 AF-NOCHANGE request.....	60
9.4.49 C-NOCHANGE indication	60
9.4.50 C-NOCHANGE confirm.....	60
9.4.51 C-COMMIT indication.....	60
9.4.52 C-COMMIT confirm	61
9.4.53 C-RECOVER confirm.....	61
9.4.54 P-TOKEN-GIVE (sync-minor) indication	61
9.4.55 AF-TOKEN-GIVE request	61
9.4.56 P-TOKEN-PLEASE (sync-minor) indication.....	61
9.4.57 AF-TOKEN-PLEASE request.....	61
9.4.58 AF-SOLICIT-DIALOGUE request.....	61
9.4.59 TP-SOLICIT-DIALOGUE-RI TP APDU	61
9.4.60 AF-SOLICIT-DIALOGUE response.....	61
9.4.61 TP-SOLICIT-DIALOGUE-RC TP APDU.....	62
9.5 Mapping	62
10 SACF description.....	63
10.1 Introduction	63
10.2 SACF states.....	63
10.3 Service definitions for SAF services	64
10.3.1 SAF-DETACH-ASSOCIATION request	64
10.3.2 SAF-ASSOCIATION-LOST indication.....	65
10.3.3 SAF-SOLICIT-DIALOGUE request/indication/response/confirm	65
10.4 Procedures for SAF primitives	65
10.4.1 SAF-DETACH-ASSOCIATION request	65
10.4.2 SAF-SOLICIT-DIALOGUE request	66
10.4.3 SAF-SOLICIT-DIALOGUE response	66
10.5 Procedures for TP-ASE, CCR, ACSE, and Presentation Service Primitives.....	66
10.5.1 AF-BEGIN-DIALOGUE request	66
10.5.2 AF-BEGIN-DIALOGUE indication	68
10.5.3 AF-BEGIN-DIALOGUE response.....	69
10.5.4 AF-BEGIN-DIALOGUE confirm.....	69
10.5.5 AF-BID indication	69
10.5.6 AF-BID confirm.....	70
10.5.7 AF-END-DIALOGUE request	71
10.5.8 AF-END-DIALOGUE indication.....	71
10.5.9 AF-END-DIALOGUE confirm	71
10.5.10 AF-U-ERROR request.....	71
10.5.11 AF-U-ERROR indication	71
10.5.12 AF-U-ERROR confirm.....	71
10.5.13 AF-ABORT request	72
10.5.14 AF-ABORT (provider, abortRI) indication.....	72
10.5.15 AF-ABORT (user, dataRI) indication	72
10.5.16 A-ABORT request	72
10.5.17 A-RELEASE (Result=affirmative) response	72
10.5.18 A-[P-]ABORT indication or A-RELEASE (Result=affirmative) confirm	73
10.5.19 AF-GRANT-CONTROL request.....	73
10.5.20 AF-GRANT-CONTROL indication.....	73
10.5.21 AF-REQUEST-CONTROL request	73
10.5.22 AF-REQUEST-CONTROL indication	73
10.5.23 AF-HANDSHAKE request	73
10.5.24 AF-HANDSHAKE indication	74
10.5.25 AF-HANDSHAKE confirm	74
10.5.26 AF-HANDSHAKE-AND-GRANT-CONTROL request	74
10.5.27 AF-HANDSHAKE-AND-GRANT-CONTROL indication	74

10.5.28 AF-HANDSHAKE-AND-GRANT-CONTROL confirm.....	74
10.5.29 AF-DEFER request	74
10.5.30 AF-DEFER indication	75
10.5.31 AF-PREPARE request	75
10.5.32 AF-PREPARE indication	75
10.5.33 AF-REPORT (commitRC) indication, or AF-REPORT (recoverDoneRC) indication	75
10.5.34 C-BEGIN request or AF-BEGIN-TRANSACTION request.....	75
10.5.35 C-BEGIN indication or AF-BEGIN-TRANSACTION indication.....	75
10.5.36 C-BEGIN confirm	76
10.5.37 C-READY indication	76
10.5.38 C-COMMIT indication or C-COMMIT+C-BEGIN indication.....	76
10.5.39 AF-ABORT (user, commitRI) indication or AF-ABORT (user, commitRC) indication	76
10.5.40 C-COMMIT confirm	76
10.5.41 AF-ABORT-AND-REPORT (commitRC) indication.....	76
10.5.42 C-ROLLBACK request	77
10.5.43 C-ROLLBACK indication	77
10.5.44 AF-ABORT-AND-REPORT request or AF-REPORT request.....	78
10.5.45 AF-ABORT-AND-REPORT (dataRI) indication or AF-REPORT (user, dataRI) indication	78
10.5.46 AF-ABORT (user/provider,rollbackRI) indication, AF-ABORT-AND-REPORT (rollbackRI) indication, AF-REPORT (rollbackRI) indication or AF-EARLY-EXIT indication	78
10.5.47 C-ROLLBACK confirm, AF-REPORT (rollbackRC) indication, AF-ABORT (user/provider, rollbackRC) indication or AF-ABORT-AND-REPORT (rollbackRC) indication	79
10.5.48 AF-NOCHANGE request or C-NOCHANGE request.....	79
10.5.49 C-NOCHANGE indication or AF-NOCHANGE indication	79
10.5.50 C-NOCHANGE confirm.....	79
10.5.51 AF-EARLY-EXIT confirm.....	79
10.5.52 AF-RECOVER indication	79
10.5.53 C-RECOVER request or AF-RECOVER request.....	80
10.5.54 C-RECOVER indication	80
10.5.55 C-RECOVER confirm	80
10.5.56 U-ASE request	80
10.5.57 U-ASE indication	80
10.5.58 AF-TOKEN-GIVE (regular) indication	80
10.5.59 AF-TOKEN-GIVE (keep) indication.....	81
10.5.60 AF-TOKEN-GIVE (two-way-recovery) request	82
10.5.61 AF-TOKEN-GIVE (two-way-recovery) indication	82
10.5.62 P-TOKEN-GIVE (sync-minor) indication	82
10.5.63 AF-TOKEN-PLEASE request.....	83
10.5.64 AF-TOKEN-PLEASE indication.....	83
10.5.65 P-TOKEN-PLEASE indication	83
10.5.66 AF-SOLICIT-DIALOGUE indication	84
10.5.67 AF-SOLICIT-DIALOGUE confirm.....	84
10.5.68 Protocol error	84
10.5.69 Other service primitives.....	84
10.6 SACF internal events	85
10.6.1 Unsolicited BID reject.....	85
10.7 Concatenation.....	85
10.7.1 Mapping precedence.....	85
10.7.2 Concatenation rules	85
10.8 Routing.....	87
11 MACF description	87
11.1 Introduction	87
11.2 CAF service definition	88

11.2.1 CAF-PLEASE request.....	88
11.2.2 CAF-GIVE indication	88
11.2.3 CAF-FAIL indication	89
11.2.4 CAF-DETACH request.....	89
11.2.5 CAF-RECOVER indication	90
11.3 Main procedures	90
11.3.1 TP-BEGIN-DIALOGUE request	90
11.3.2 AF-BEGIN-DIALOGUE indication (TPPM and CPM)	91
11.3.3 TP-BEGIN-DIALOGUE response.....	92
11.3.4 AF-BEGIN-DIALOGUE (accepted) confirm on a Dialogue	93
11.3.5 AF-BEGIN-DIALOGUE (rejected, dataRI) confirm on a Dialogue.....	94
11.3.6 AF-BEGIN-DIALOGUE (rejected(user), rollbackRI) confirm	95
11.3.7 AF-BEGIN-DIALOGUE (rejected(user), rollbackRC) confirm	96
11.3.8 AF-BEGIN-DIALOGUE confirm (CPM)	96
11.3.9 SAF-ASSOCIATION-LOST indication.....	96
11.3.10 SAF-ASSOCIATION-LOST indication (CPM)	97
11.3.11 TP-END-DIALOGUE request.....	97
11.3.12 AF-END-DIALOGUE indication	98
11.3.13 AF-END-DIALOGUE indication (CPM)	100
11.3.14 TP-END-DIALOGUE response	100
11.3.15 AF-END-DIALOGUE confirm	100
11.3.16 TP-U-ERROR request.....	100
11.3.17 AF-U-ERROR indication	100
11.3.18 AF-U-ERROR confirm	101
11.3.19 TP-U-ABORT request	101
11.3.20 AF-ABORT (user, dataRI) indication	105
11.3.21 Protocol error, internal error, A[-P]-ABORT indication, AF-ABORT (provider, abortRI) indication, A-ABORT request, A-RELEASE (Result=affirmative) response, or A-RELEASE (Result=affirmative) confirm on a dialogue.....	107
11.3.22 Protocol error, internal error, A[-P]-ABORT indication, AF-ABORT (provider, abortRI) indication, A-ABORT request, A-RELEASE (Result=affirmative) response, or A-RELEASE (Result=affirmative) confirm on a channel	109
11.3.23 Protocol error, internal error, A[-P]-ABORT indication, AF-ABORT (provider, abortRI) indication, A-RELEASE (Result=affirmative) response, or A-RELEASE (Result=affirmative) confirm (CPM)	110
11.3.24 TP-GRANT-CONTROL request.....	110
11.3.25 AF-GRANT-CONTROL indication.....	110
11.3.26 TP-REQUEST-CONTROL request	111
11.3.27 AF-REQUEST-CONTROL indication	111
11.3.28 TP-HANDSHAKE request	111
11.3.29 AF-HANDSHAKE indication	111
11.3.30 TP-HANDSHAKE response	112
11.3.31 AF-HANDSHAKE confirm	112
11.3.32 TP-HANDSHAKE-AND-GRANT-CONTROL request	112
11.3.33 AF-HANDSHAKE-AND-GRANT-CONTROL indication	112
11.3.34 TP-HANDSHAKE-AND-GRANT-CONTROL response.....	113
11.3.35 AF-HANDSHAKE-AND-GRANT-CONTROL confirm.....	113
11.3.36 TP-BEGIN-TRANSACTION request	113
11.3.37 C-BEGIN indication or AF-BEGIN-TRANSACTION indication.....	114
11.3.38 C-BEGIN confirm	115
11.3.39 TP-DATA request.....	115
11.3.40 U-ASE indication	115
11.3.41 TP-DEFERRED-END-DIALOGUE request.....	116
11.3.42 TP-DEFERRED-GRANT-CONTROL request.....	116
11.3.43 AF-DEFER indication	116
11.3.44 TP-PREPARE request	117
11.3.45 TP-COMMIT request.....	117
11.3.46 AF-PREPARE indication	118
11.3.47 C-READY indication	119

11.3.48 C-COMMIT indication or C-COMMIT+C-BEGIN indication.....	119
11.3.49 AF-ABORT (user, commitRI) indication	120
11.3.50 TP-DONE request.....	120
11.3.51 C-COMMIT confirm or AF-REPORT (commitRC) indication	121
11.3.52 AF-ABORT (user, commitRC) indication or AF-ABORT-AND-REPORT (commitRC) indication	122
11.3.53 TP-ROLLBACK request	123
11.3.54 C-ROLLBACK indication or AF-REPORT (rollbackRI) indication	123
11.3.55 C-CANCEL indication.....	124
11.3.56 AF-ABORT (user/provider, rollbackRI) indication or AF-ABORT-AND-REPORT (rollbackRI) indication	124
11.3.57 C-ROLLBACK confirm or AF-REPORT (rollbackRC) indication	126
11.3.58 AF-ABORT (user/provider, rollbackRC) indication or AF-ABORT-AND- REPORT (rollbackRC) indication	127
11.3.59 AF-REPORT (dataRI) indication or AF-ABORT-AND-REPORT (dataRI) indication	128
11.3.60 TP-ONE-PHASE request	129
11.3.61 TP-READ-ONLY request	130
11.3.62 AF-NOCHANGE indication or C-NOCHANGE indication	131
11.3.63 TP-EARLY-EXIT request	132
11.3.64 AF-EARLY-EXIT indication	132
11.3.65 AF-EARLY-EXIT confirm.....	133
11.3.66 CAF-RECOVER (ready) indication	134
11.3.67 C-RECOVER (ready) indication or AF-RECOVER (ready) indication (CPM)	136
11.3.68 C-NOCHANGE confirm or AF-ABORT (user, nochangeRC) indication.....	136
11.3.69 CAF-RECOVER (commit) indication.....	137
11.3.70 C-RECOVER (commit) indication or AF-REPORT (recoverCommitRI) indication.....	139
11.3.71 C-RECOVER (commit) indication or AF-RECOVER (commit) indication or AF- REPORT (recoverCommitRI) indication(CPM)	140
11.3.72 C-RECOVER (done) confirm or AF-REPORT (recoverDoneRC) indication.....	141
11.3.73 C-RECOVER (unknown) confirm	141
11.3.74 C-RECOVER (unknown) confirm (CPM).....	141
11.3.75 C-RECOVER (retry-later) confirm	141
11.3.76 C-RECOVER (retry-later) confirm (CPM)	142
11.3.77 AF-TOKEN-GIVE (two-way-recovery) indication on a channel (TPPM)	142
11.3.78 AF-TOKEN-GIVE (two-way-recovery) indication (CPM).....	142
11.3.79 AF-TOKEN-PLEASE indication on a channel (TPPM).....	142
11.3.80 AF-TOKEN-PLEASE indication (CPM)	142
11.3.81 CAF-PLEASE request (CPM)	142
11.3.82 CAF-GIVE indication	143
11.3.83 CAF-FAIL indication	144
11.3.84 CAF-DETACH request (CPM).....	144
11.4 Internal event procedures	144
11.4.1 Delay recovery	144
11.4.2 Heuristic damage compensation for subtree.....	145
11.4.3 Restart after node crash (CPM)	145
11.4.4 Retry recovery.....	145
11.4.5 Taking a heuristic decision.....	145
11.4.6 Terminating a channel (CPM)	146
11.4.7 TPPM creation after node crash	146
11.4.8 TPPM-initiated rollback	146
11.4.9 Rewrite intermediate record.....	146
11.4.10 Lazy log forget.....	147
11.5 Common Procedures	147
11.5.1 Confirm and complete commitment	147
11.5.2 Confirming commitment	148
11.5.3 Completing commitment.....	150
11.5.4 Reporting on the commit-coordinator:root path.....	151
11.5.5 Completing ONE-PHASE and READ-ONLY	152

11.5.6	Entering READY state	153
11.5.7	Fail an outstanding CAF-PLEASE request.....	154
11.5.8	First request/response	154
11.5.9	Initiating a transaction branch	154
11.5.10	Initiating rollback at TPPM.....	156
11.5.11	Initiating transaction after rollback.....	158
11.5.12	Making commitment decision	159
11.5.13	Making one-phase commitment decision	160
11.5.14	Receiving commit order	160
11.5.15	Recording the heuristic condition	161
11.5.16	Reporting rollback to superior	162
11.5.17	Rollback next transaction	163
11.5.18	Sending commit order	164
11.5.19	Sending not-determined result from a ONE-PHASE or READ-ONLY node	167
11.5.20	Entering ONE-PHASE or READ-ONLY state.....	168
11.5.21	User protocol error	168
12	Structure and encoding of TP APDUs	169
12.1	Abstract syntax of the TP-ASE APDUs.....	169
12.2	Rules of extensibility	176
13	Conformance	176
13.1	Static conformance requirements	176
13.1.1	Conformance classes.....	176
13.1.2	Capabilities.....	179
13.1.3	Functional units	180
13.1.4	Dependencies on other standards	183
13.2	Dynamic conformance requirements	184
13.2.1	General requirements	184
13.2.2	Specific requirements.....	184
13.3	Protocol Implementation Conformance Statement	184
13.4	Receiving TP APDUs.....	184
14	Compliance.....	185
15	Precedence statement.....	185
16	Index of Actions and Events	186

Annexes

A	OSI TP protocol — State tables	194
A.1	General.....	194
A.2	Introduction.....	194
A.3	Processing rules	202
A.4	MACF state tables	204
A.5	TPASE	272
A.6	SACF	275
A.7	Predicates.....	281
B	Requirements for writing U-ASEs and application contexts.....	634
C	Scenarios	636
C.1	Introduction.....	636
C.2	Scenarios with a single dialogue (successful cases)	643
C.3	Scenarios with a single dialogue (unsuccessful cases)	655
C.4	Scenarios with a single dialogue (failure cases)	683
C.5	Collision scenarios on a single dialogue	688
C.6	Tree with multiple dialogues (successful cases)	707
C.7	Tree with multiple dialogues (unsuccessful cases)	707
C.8	Heuristic decisions and reporting	727

C.9 Scenarios for SACF.....	737
C.10 Scenarios for CPM	739
C.11 Read-only scenarios.....	744
C.12 Early-exit scenarios	756
C.13 Static one-phase commitment scenarios	771
C.14 Implicit prepare scenarios	785
C.15 TP-ROLLBACK scenarios.....	791
C.16 Dynamic Commitment scenarios.....	799
C.17 Scenarios showing token movement during transaction termination	817
C.18 Recovery context handle on dialogue scenario	819
D Summary of assigned object identifier values.....	820
E Recovery from destruction of atomic action data	821
E.1 Introduction.....	821
E.2 Recovery actions	821
F TPPM transaction states	823
F.1 TPPM transaction states.....	823
G Managing association pools by inference.....	833
G.1 Introduction	833
G.2 Definitions	833
G.3 Rules	834
G.4 Benefits	835
G.5 Suggested System Management Objects.....	836

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 10026-3 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 21, *Open systems interconnection, data management and open distributed processing*.

This third edition is a technical revision of the second edition (ISO/IEC 10026-3:1996).

This part of ISO/IEC 10026 is technically aligned with ITU-T Recommendation X.862, but is not published as identical text.

ISO/IEC 10026 consists of the following parts, under the general title *Information technology — Open Systems Interconnection — Distributed Transaction Processing*:

- *Part 1: OSI TP Model*
- *Part 2: OSI TP Service*
- *Part 3: Protocol specification*
- *Part 4: Protocol Implementation Conformance Statement (PICS) proforma* (aligned to second edition)
- *Part 5: Application context proforma and guidelines when using OSI TP*
- *Part 6: Unstructured Data Transfer*

Annexes A and B form an integral part of this part of ISO/IEC 10026. Annexes C to G are for information only.

Introduction

ISO/IEC 10026, Distributed Transaction Processing (OSI TP), is one of a set of standards produced to facilitate the interconnection of computer systems. It is related to other International Standards in the set as defined by the Reference Model for Open Systems Interconnection (ISO 7498). The Reference Model subdivides the area of standardization for interconnection into a series of layers of specification, each of manageable size.

The aim of Open Systems Interconnection (OSI) is to allow, with a minimum of technical agreement outside the interconnection standards, the interconnection of computer systems:

- a) from different manufacturers;
- b) under different management;
- c) of different levels of complexity; and
- d) of different technologies.

ISO/IEC 10026 defines an OSI TP Model, an OSI TP Service and specifies an OSI TP Protocol available within the Application Layer of the OSI Reference Model.

The OSI TP Service is an Application Layer service. It is concerned with identifiable information which can be related as distributed transactions, which involve two or more Open Systems.

ISO/IEC 10026 provides sufficient facilities to support transaction processing, and establishes a framework for coordination across multiple TP resources in separate open systems.

ISO/IEC 10026 does not specify the interface to local resources, nor does it specify an application programming interface within the local system.

Information technology — Open Systems Interconnection — Distributed Transaction Processing —

Part 3: Protocol specification

1 Scope

This part of ISO/IEC 10026 provides

- a) a statement (clauses 6 to 11) of the nature of the automaton giving the necessary behaviour of each of the participating entities which are providing the OSI TP Service, covering
 - 1) the actions to be taken on receiving request and response primitives issued by a TP Service user invocation;
 - 2) the actions to be taken on receiving indication and confirm primitives issued by the presentation service-provider;
 - 3) the actions to be taken as a result of certain events within the local system;
 - 4) the actions to be taken as a result of interactions with other ASEs;
- b) the definition (clause 12) of the abstract syntax required to convey the TP protocol control information;
- c) the conformance requirements to be met by implementations of this protocol (clause 13).

The scope of this part of ISO/IEC 10026 is limited to the interconnection of systems; it does not specify or restrict the implementation of possible interfaces within a computer system.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO/IEC 10026. 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 10026 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/IEC 7498-3:1997, *Information technology — Open Systems Interconnection — Basic Reference Model: Naming and addressing*.

- ISO/IEC 8326:1996, *Information technology — Open Systems Interconnection — Session service definition.*
- ISO/IEC 8649:1996, *Information technology — Open Systems Interconnection — Service definition for the Association Control Service Element.*
- ISO/IEC 8650-1:1996, *Information technology — Open Systems Interconnection — Connection-oriented protocol for the Association Control Service Element: Protocol specification.*
- ISO/IEC 8822:1994, *Information technology — Open Systems Interconnection — Presentation service definition.*
- ISO/IEC 8824-1:1995, *Information technology — Abstract Syntax Notation One (ASN.1): Specification of basic notation.*
- 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.*
- ISO/IEC 8824-1:1995/Cor.1:1996, *Information technology — Abstract Syntax Notation One (ASN.1): Specification of basic notation — Technical Corrigendum 1.*
- 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).*
- ISO/IEC 9072-1:1989, *Information processing systems — Text communication — Remote Operations — Part 1: Model, notation, and service definition.*
- ISO/IEC 9545:1994, *Information technology — Open Systems Interconnection — Application Layer structure.*
- ISO/IEC 9594-6:1995, *Information technology — Open Systems Interconnection — The Directory: Selected attribute types.*
- ISO/IEC 9646-1:1994, *Information technology — Open Systems Interconnection — Conformance testing methodology and framework — Part 1: General concepts.*
- ISO/IEC 9646-7:1995, *Information technology — Open Systems Interconnection — Conformance testing methodology and framework — Part 7: Implementation Conformance Statements.*
- ISO/IEC 9804:1997, *Information technology — Open Systems Interconnection — Service definition for the commitment, concurrency and recovery service element.*
- ISO/IEC 9805-1:1997, *Information technology — Open Systems Interconnection — Protocol specification for the commitment, concurrency and recovery service element: Protocol specification.*
- ISO/IEC 10731:1994, *Information technology — Open Systems Interconnection — Basic Reference Model — Conventions for the definition of OSI services.*