

CONTENTS

	<i>Page</i>
Foreword	viii
Introduction	ix
SECTION 1 – GENERAL	1
1 Scope	1
2 Normative references	2
2.1 Identical Recommendations International Standards	2
2.2 Paired Recommendations International Standards equivalent in technical content.....	2
2.3 Other references.....	3
3 Definitions	3
3.1 Communication definitions	3
3.2 Basic Directory definitions.....	3
3.3 Distributed operation definitions	3
3.4 Replication definitions	3
4 Abbreviations	4
5 Conventions	4
SECTION 2 – OVERVIEW OF THE DIRECTORY MODELS	6
6 Directory Models.....	6
6.1 Definitions.....	6
6.2 The Directory and its users.....	6
6.3 Directory and DSA Information Models	7
6.4 Directory Administrative Authority Model.....	8
SECTION 3 – MODEL OF DIRECTORY USER INFORMATION	9
7 Directory Information Base	9
7.1 Definitions.....	9
7.2 Objects.....	10
7.3 Directory entries	10
7.4 Directory Information Tree (DIT).....	10
8 Directory entries.....	11
8.1 Definitions.....	11
8.2 Overall structure	13
8.3 Object classes.....	14
8.4 Attribute Types.....	16
8.5 Attribute Values.....	16
8.6 Attribute Type Hierarchies.....	16
8.7 Friend attributes.....	17
8.8 Contexts	17
8.9 Matching rules.....	18
8.10 Entry collections	21
8.11 Compound entries and families of entries.....	22
9 Names	23
9.1 Definitions.....	23
9.2 Names in general	23
9.3 Relative Distinguished Names	23
9.4 Name matching.....	25
9.5 Names returned during operations	25
9.6 Names held as attribute values or used as parameters	25
9.7 Distinguished Names	26
9.8 Alias Names.....	27
10 Hierarchical groups.....	27
10.1 Definitions.....	27
10.2 Hierarchical relationship.....	28
10.3 Sequential ordering of a hierarchical group	28

	<i>Page</i>
SECTION 4 – DIRECTORY ADMINISTRATIVE MODEL.....	30
11 Directory Administrative Authority model.....	30
11.1 Definitions.....	30
11.2 Overview.....	30
11.3 Policy	31
11.4 Specific administrative authorities	31
11.5 Administrative areas and administrative points	32
11.6 DIT Domain policies	34
11.7 DMD policies.....	34
SECTION 5 – MODEL OF DIRECTORY ADMINISTRATIVE AND OPERATIONAL INFORMATION	36
12 Model of Directory Administrative and Operational Information	36
12.1 Definitions.....	36
12.2 Overview.....	36
12.3 Subtrees	37
12.4 Operational attributes.....	39
12.5 Entries	40
12.6 Subentries.....	40
12.7 Information model for collective attributes.....	41
12.8 Information model for context defaults.....	42
SECTION 6 – THE DIRECTORY SCHEMA.....	43
13 Directory Schema	43
13.1 Definitions.....	43
13.2 Overview.....	43
13.3 Object class definition.....	45
13.4 Attribute type definition	46
13.5 Matching rule definition	49
13.6 Relaxations and tightenings.....	51
13.7 DIT structure definition	57
13.8 DIT content rule definition.....	59
13.9 Context type definition.....	61
13.10 DIT Context Use definition	62
13.11 Friends definition	63
14 Directory System Schema	63
14.1 Overview.....	63
14.2 System schema supporting the administrative and operational information model.....	64
14.3 System schema supporting the administrative model	64
14.4 System schema supporting general administrative and operational requirements.....	65
14.5 System schema supporting access control	67
14.6 System schema supporting the collective attribute model	67
14.7 System schema supporting context assertion defaults	68
14.8 System schema supporting the service administration model.....	68
14.9 System schema supporting hierarchical groups.....	68
14.10 Maintenance of system schema	69
14.11 System schema for first-level subordinates.....	70
15 Directory schema administration	70
15.1 Overview.....	70
15.2 Policy objects	70
15.3 Policy parameters.....	70
15.4 Policy procedures.....	71
15.5 Subschema modification procedures	71
15.6 Entry addition and modification procedures.....	72
15.7 Subschema policy attributes	72

	<i>Page</i>
SECTION 7 – DIRECTORY SERVICE ADMINISTRATION	78
16 Service Administration Model.....	78
16.1 Definitions.....	78
16.2 Service-type/user-class model.....	78
16.3 Service-specific administrative areas.....	79
16.4 Introduction to search-rules	80
16.5 Subfilters.....	80
16.6 Filter requirements	81
16.7 Attribute information selection based on search-rules	81
16.8 Access control aspects of search-rules	81
16.9 Contexts aspects of search-rules	82
16.10 Search-rule specification	82
16.11 Matching restriction definition.....	90
16.12 Search-validation function	90
SECTION 8 – SECURITY	91
17 Security model.....	91
17.1 Definitions.....	91
17.2 Security policies	91
17.3 Protection of Directory operations	92
18 Basic Access Control	93
18.1 Scope and application	93
18.2 Basic Access Control model.....	93
18.3 Access control administrative areas	95
18.4 Representation of Access Control Information	98
18.5 ACI operational attributes	103
18.6 Protecting the ACI.....	104
18.7 Access control and Directory operations	104
18.8 Access Control Decision Function.....	104
18.9 Simplified Access Control	106
19 Rule-based Access Control.....	106
19.1 Scope and application	106
19.2 Rule-based Access Control model	107
19.3 Access control administrative areas	107
19.4 Security Label	107
19.5 Clearance	109
19.6 Access Control and Directory operations	109
19.7 Access Control Decision Function.....	110
19.8 Use of Rule-based and Basic Access Control.....	110
20 Data Integrity in Storage	110
20.1 Introduction	110
20.2 Protection of an Entry or Selected Attribute Types.....	110
20.3 Context for Protection of a Single Attribute Value	112
SECTION 9 – DSA MODELS.....	113
21 DSA Models.....	113
21.1 Definitions.....	113
21.2 Directory Functional Model	113
21.3 Directory Distribution Model	114

	<i>Page</i>
SECTION 10 – DSA INFORMATION MODEL.....	116
22 Knowledge.....	116
22.1 Definitions.....	116
22.2 Introduction.....	116
22.3 Knowledge References.....	117
22.4 Minimum Knowledge.....	119
22.5 First Level DSAs.....	120
23 Basic Elements of the DSA Information Model.....	120
23.1 Definitions.....	120
23.2 Introduction.....	120
23.3 DSA Specific Entries and their Names.....	121
23.4 Basic Elements.....	122
24 Representation of DSA Information.....	124
24.1 Representation of Directory User and Operational Information.....	124
24.2 Representation of Knowledge References.....	125
24.3 Representation of Names and Naming Contexts.....	131
SECTION 11 – DSA OPERATIONAL FRAMEWORK.....	133
25 Overview.....	133
25.1 Definitions.....	133
25.2 Introduction.....	133
26 Operational bindings.....	133
26.1 General.....	133
26.2 Application of the operational framework.....	134
26.3 States of cooperation.....	135
27 Operational binding specification and management.....	136
27.1 Operational binding type specification.....	136
27.2 Operational binding management.....	137
27.3 Operational binding specification templates.....	137
28 Operations for operational binding management.....	139
28.1 Application-context definition.....	139
28.2 Establish Operational Binding operation.....	140
28.3 Modify Operational Binding operation.....	142
28.4 Terminate Operational Binding operation.....	143
28.5 Operational Binding Error.....	144
28.6 Operational Binding Management Bind and Unbind.....	145
Annex A – Object identifier usage.....	146
Annex B – Information Framework in ASN.1.....	149
Annex C – SubSchema Administration Schema in ASN.1.....	159
Annex D – Service Administration in ASN.1.....	163
Annex E – Basic Access Control in ASN.1.....	167
Annex F – DSA Operational Attribute Types in ASN.1.....	171
Annex G – Operational Binding Management in ASN.1.....	174
Annex H – Enhanced security.....	178
Annex I – The Mathematics of Trees.....	181
Annex J – Name Design Criteria.....	182

	<i>Page</i>
Annex K – Examples of various aspects of schema	184
K.1 Example of an attribute hierarchy	184
K.2 Example of a subtree specification.....	184
K.3 Schema specification	185
K.4 DIT content rules	186
K.5 DIT context use	187
Annex L – Overview of basic access control permissions.....	188
L.1 Introduction	188
L.2 Permissions required for operations	188
L.3 Permissions affecting error.....	189
L.4 Entry level permissions	189
L.5 Entry level permissions	190
Annex M – Examples of access control	192
M.1 Introduction	192
M.2 Design principles for Basic Access Control	192
M.3 Introduction to example.....	192
M.4 Policy affecting the definition of specific and inner areas	193
M.5 Policy affecting the definition of DACDs.....	195
M.6 Policy expressed in prescriptiveACI attributes	197
M.7 Policy expressed in subentryACI attributes.....	202
M.8 Policy expressed in entryACI attributes	203
M.9 ACDF examples	204
M.10 Rule-based Access Control	206
Annex N – DSE type combinations	207
Annex O – Modelling of knowledge	209
Annex P – Names held as attribute values or used as parameters	214
Annex Q – Subfilters	215
Annex R – Compound entry name patterns and their use.....	216
Annex S – Naming concepts and considerations.....	218
S.1 History tells us	218
S.2 A new look at name resolution.....	218
Annex T – Alphabetical index of definitions.....	224
Annex U – Amendments and corrigenda.....	226