Information technology - Abstract Syntax Notation One (ASN.1) - Part 1: Specification of basic notation

Contents

Page

Introduction viii

1 Scope 1

2 Normative references 1
- 2.1 Identical Recommendations | International Standards 1
- 2.2 Additional references 2

3 Definitions 2
- 3.1 International Object Identifier tree specification 2
- 3.2 Information object specification 2
- 3.3 Constraint specification 3
- 3.4 Parameterization of ASN.1 specification 3
- 3.5 Structure for identification of organizations 3
- 3.6 Universal Multiple-Octet Coded Character Set (UCS) 3
- 3.7 Representation of dates and times 3
- 3.8 Additional definitions 4

4 Abbreviations 9

5 Notation 9
- 5.1 General 9
- 5.2 Productions 10
- 5.3 The alternative collections 10
- 5.4 Non-spacing indicator 10
- 5.5 Example of a production 10
- 5.6 Layout 10
- 5.7 Recursion 11
- 5.8 References to permitted sequences of lexical items 11
- 5.9 References to a lexical item 11
- 5.10 Short-hand notations 11
- 5.11 Value references and the typing of values 12

6 The ASN.1 model of type extension 12

7 Extensibility requirements on encoding rules 12

8 Tags 13

9 Encoding instructions 14

10 Use of the ASN.1 notation 15

11 The ASN.1 character set 15

12 ASN.1 lexical items 16
- 12.1 General rules 16
- 12.2 Type references 17
- 12.3 Identifiers 17
- 12.4 Value references 17
- 12.5 Module references 17
- 12.6 Comments 17
- 12.7 Empty lexical item 18
- 12.8 Numbers 18
- 12.9 Real numbers 18
- 12.10 Binary strings 18
- 12.11 XML binary string item 18
- 12.12 Hexadecimal strings 18
- 12.13 XML hexadecimal string item 19
- 12.14 Character strings 19
- 12.15 XML character string item 20
- 12.16 The simple character string lexical item 22

12.17 Time value character strings 22
12.18 XML time value character string item 22
12.19 The property and setting names lexical item 22
12.20 Assignment lexical item 22
12.21 Range separator 22
12.22 Ellipsis 22
12.23 Left version brackets 23
12.24 Right version brackets 23
12.25 Encoding references 23
12.26 Integer-valued Unicode labels 23
12.27 Non-integer Unicode labels 23
12.28 XML end tag start item 23
12.29 XML single tag end item 23
12.30 XML boolean true item 23
12.31 XML boolean extended-true item 24
12.32 XML boolean false item 24
12.33 XML boolean extended-false item 24
12.34 XML real not-a-number item 24
12.35 XML real infinity item 24
12.36 XML tag names for ASN.1 types 25
12.37 Single character lexical items 26
12.38 Reserved words 26
13 Module definition 27
14 Referencing type and value definitions 31
15 Notation to support references to ASN.1 components 32
16 Assigning types and values 33
17 Definition of types and values 35
18 Notation for the boolean type 38
19 Notation for the integer type 38
20 Notation for the enumerated type 39
21 Notation for the real type 41
22 Notation for the bitstring type 42
23 Notation for the octetstring type 44
24 Notation for the null type 44
25 Notation for sequence types 45
26 Notation for sequence-of types 48
27 Notation for set types 50
28 Notation for set-of types 51
29 Notation for choice types 52
30 Notation for selection types 54
31 Notation for prefixed types 54
31.1 General 54
31.2 The tagged type 55
31.3 The encoding prefixed type 55
32 Notation for the object identifier type 56
33 Notation for the relative object identifier type 58
34 Notation for the OID internationalized resource identifier type 59
35 Notation for the relative OID internationalized resource identifier type 60
36 Notation for the embedded-pdv type 60
37 Notation for the external type 62

38 The time type 63
38.1 General 63
38.2 Time properties and settings of time abstract values 63
38.3 Basic value notation and XML value notation for time abstract values with specified property settings 67
38.4 Useful time types 71
39 The character string types 72
40 Notation for character string types 73
41 Definition of restricted character string types 73
42 Naming characters, collections and property category sets 77
43 Canonical order of characters 81
44 Definition of unrestricted character string types 82
45 Notation for types defined in clauses 46 to 48 83
46 Generalized time 83
47 Universal time 84
48 The object descriptor type 85
49 Constrained types 86
50 Element set specification 87
51 Subtype elements 89
51.1 General 89
51.2 Single value 90
51.3 Contained subtype 90
51.4 Value range 90
51.5 Size constraint 91
51.6 Type constraint 91
51.7 Permitted alphabet 91
51.8 Inner subtyping 92
51.9 Pattern constraint 93
51.10 Property settings 93
51.11 Duration range 94
51.12 Time point range 95
51.13 Recurrence range 95
52 The extension marker 95
53 The exception identifier 97
54 Encoding control sections 98
A.1 Definition 99
A.2 Metacharacters 99
B.1 General 103
B.2 The ASN.1 defined time types module 103
C.1 The need for the value mapping concept (tutorial introduction) 108
C.2 Value mappings 110
C.3 Identical type definitions 111
C.4 Specification of value mappings 113
C.5 Additional value mappings defined for the character string types 113
C.6 Specific type and value compatibility requirements 114
C.7 Examples 115
C.7.2 Example 1 115
C.7.3 Example 2 115
C.7.4 Example 3 115
C.7.5 Example 4 115
C.7.6 Example 5 115
C.7.7 Example 6 116

D.1 Values assigned in this Recommendation | International Standard 117
D.2 Object identifiers in the ASN.1 and encoding rules standards 117
F.1 General 120
F.2 Use of the International Object Identifier tree by the object identifier (OBJECT IDENTIFIER) type 120
F.3 Use of the International Object Identifier tree by the OID internationalized resource identifier (OID-IRI) type 120
G.1 Example of a personnel record 121
G.1.1 Informal description of Personnel Record 121
G.1.2 ASN.1 description of the record structure 121
G.1.3 ASN.1 description of a record value 122
G.2 Guidelines for use of the notation 122
G.2.1 Boolean 123
G.2.2 Integer 123
G.2.3 Enumerated 123
G.2.4 Real 124
G.2.5 Bit string 124
G.2.6 Octet string 126
G.2.7 UniversalString, BMPString and UTF8String 126
G.2.8 CHARACTER STRING 127
G.2.9 Null 128
G.2.10 Sequence and sequence-of 128
G.2.11 Set and set-of 130
G.2.12 Tagged 132
G.2.13 Choice 133
G.2.14 Selection type 135
G.2.16 Embedded-pdv 136
G.2.17 External 136
G.2.18 Instance-of 136
G.2.19 Object identifier 137
G.2.20 OID internationalized resource identifier 137
G.2.21 Relative object identifier 137
G.3 Value notation and property settings (TIME type and useful time types) 137
G.3.1 Date 137
G.3.2 Time of day 138
G.3.3 Date and time of day 138
G.3.4 Time interval 139
G.3.5 Recurring interval 140
G.4 Identifying abstract syntaxes 140
G.5 Subtypes 141
H.1 Character string support in ASN.1 145
H.2 The UniversalString, UTF8String and BMPString types 145
H.3 On ISO/IEC 10646 conformance requirements 146
H.4 Recommendations for ASN.1 users on ISO/IEC 10646 conformance 146
H.5 Adopted subsets as parameters of the abstract syntax 147
H.6 The CHARACTER STRING type 147
I.1 Overview 148
I.2 Meaning of version numbers 149
I.3 Requirements on encoding rules 150
I.4 Combination of (possibly extensible) constraints 150
I.4.1 Model 150
I.4.2 Serial application of constraints 150
I.4.3 Use of set arithmetic 151
I.4.4 Use of the Contained Subtype notation 152
J.1 The collections of ASN.1 types for times and dates 153
J.2 ISO 8601 key concepts 153
J.3 Abstract values of the TIME type 154
J.4 Time properties of the time abstract values 155
J.5 Value notation 155

J.6 Use of the ASN.1 subtype notation 156
J.7 The property settings subtype notation 156
K.1 General 158
K.2 Analyzing the full string 158
K.3 Analysis of a string containing an interval 159
K.4 Analysis of a string containing a date 159
K.5 Analysis of a string containing a year 160
K.6 Analysis of a string containing a century 160
K.7 Analysis of a string containing a time 160
K.8 Analysis of a string containing a simple time 161