

# ISO/IEC 8825-4:2021-06 (E)

## Information technology - ASN.1 encoding rules - Part 4: XML Encoding Rules (XER)

| <b>Contents</b> |   | <b>Page</b> |
|-----------------|---|-------------|
| 1               | Scope .....   | 1           |
| 2               | Normative references .....  | 1           |
| 2.1             | Identical Recommendations   International Standards .....                             | 1           |
| 2.2             | Additional references .....   | 2           |
| 3               | Definitions .....   | 2           |
| 3.1             | ASN.1 Basic Encoding Rules (BER) .....  | 2           |
| 3.2             | Additional definitions .....  | 2           |
| 4               | Abbreviations .....   | 4           |
| 5               | Encodings specified by this Recommendation   International Standard .....             | 4           |
| 6               | Encoding instructions specified by this Recommendation   International Standard ..... | 5           |
| 7               | Conformance .....   | 5           |
| 8               | Basic XML encoding rules .....  | 5           |
| 8.1             | Production of a complete BASIC-XER encoding .....                                     | 5           |
| 8.2             | The XML prolog .....  | 6           |
| 8.3             | The XML document element .....  | 6           |
| 8.4             | Encoding of the EXTERNAL type .....   | 7           |
| 8.5             | Encoding of the open type .....   | 7           |
| 8.6             | Decoding of types with extension markers .....  | 7           |
| 9               | Canonical XML encoding rules .....  | 7           |
| 9.1             | General rules for canonical XER .....   | 7           |
| 9.2             | Real values .....   | 8           |
| 9.3             | Bitstring value .....   | 8           |
| 9.4             | Octetstring value .....   | 8           |
| 9.5             | Sequence value .....  | 8           |
| 9.6             | Set value .....   | 8           |
| 9.7             | Set-of value .....  | 8           |
| 9.8             | Object identifier value .....   | 9           |
| 9.9             | Relative object identifier value .....  | 9           |
| 9.10            | GeneralizedTime .....   | 9           |
| 9.11            | UTCTime .....   | 9           |
| 9.12            | Open type value .....   | 10          |
| 9.13            | The TIME type and the useful time types .....   | 10          |
| 10              | Extended XML encoding rules .....   | 10          |
| 10.1            | General .....   | 10          |
| 10.2            | EXTENDED-XER conformance .....  | 11          |
| 10.3            | Structure of an EXTENDED-XER encoding .....   | 13          |
| 11              | Notation, character set and lexical items used in XER encoding instructions .....     | 13          |
| 12              | Keywords .....  | 14          |
| 13              | Assigning an XER encoding instruction to an ASN.1 type using a type prefix .....      | 15          |
| 14              | Assigning an XER encoding instruction using an XER encoding control section .....     | 17          |
| 14.1            | The encoding instruction assignment list .....  | 17          |

|      |   |    |
|------|---|----|
| 14.2 | Identification of the targets for an XER encoding instruction using a target list ..... | 18 |
| 15   | Multiple assignment of XER encoding instructions .....                                  | 23 |
| 15.1 | Order in which multiple assignments are considered .....                                | 23 |
| 15.2 | Effect of assigning a negating encoding instruction .....                               | 24 |
| 15.3 | Multiple assignment of encoding instructions with multiple categories .....             | 24 |
| 15.4 | Multiple assignment of XER encoding instructions of the same category .....             | 24 |
| 15.5 | Permitted combinations of final encoding instructions .....                             | 25 |
| 16   | XER encoding instruction support for XML namespaces and qualified names .....           | 26 |
| 17   | Specification of EXTENDED-XER encodings .....   | 27 |
| 17.1 | The XML document element .....  | 28 |
| 17.2 | The "TypeNameOrModifiedTypeName" production .....                                       | 28 |
| 17.3 | The "AttributeList" production .....  | 28 |
| 17.4 | The "ExtendedXMLValue" production .....   | 28 |
| 17.5 | The "ExtendedXMLChoiceValue" production .....   | 30 |
| 17.6 | The "ExtendedXMLSequenceValue" and "ExtendedXMLSetValue" productions .....              | 30 |
| 17.7 | The "ExtendedXMLSequenceOfValue" and "ExtendedXMLSetOfValue" productions .....          | 31 |
| 17.8 | The "ModifiedXMLIntegerValue" production .....  | 32 |
| 17.9 | The "ModifiedXMLRealValue" production .....   | 32 |
| 18   | The ANY-ATTRIBUTES encoding instruction .....   | 33 |
| 18.1 | General .....   | 33 |
| 18.2 | Restrictions .....  | 34 |
| 18.3 | Effect on encodings .....   | 34 |
| 19   | The ANY-ELEMENT encoding instruction .....  | 35 |
| 19.1 | General .....   | 35 |
| 19.2 | Restrictions .....  | 35 |
| 19.3 | Effect on encodings .....   | 36 |
| 20   | The ATTRIBUTE encoding instruction .....  | 37 |
| 20.1 | General .....   | 37 |
| 20.2 | Restrictions .....  | 37 |
| 20.3 | Effect on encodings .....   | 37 |
| 21   | The BASE64 encoding instruction .....   | 39 |
| 21.1 | General .....   | 39 |
| 21.2 | Restrictions .....  | 39 |
| 21.3 | Effect on encodings .....   | 39 |
| 22   | The DECIMAL encoding instruction .....  | 40 |
| 22.1 | General .....   | 40 |
| 22.2 | Restrictions .....  | 40 |
| 22.3 | Effect on encodings .....   | 40 |
| 23   | The DEFAULT-FOR-EMPTY encoding instruction .....  | 41 |
| 23.1 | General .....   | 41 |

|      |   |    |
|------|---|----|
| 23.2 | Restrictions.....                             | 41 |
| 23.3 | Effect on encodings.....                      | 42 |
| 24   | The ELEMENT encoding instruction.....         | 43 |
| 24.1 | General.....                                  | 43 |
| 24.2 | Restrictions.....                             | 43 |
| 24.3 | Effect on encodings.....                      | 43 |
| 25   | The EMBED-VALUES encoding instruction.....    | 43 |
| 25.1 | General.....                                  | 43 |
| 25.2 | Restrictions.....                             | 43 |
| 25.3 | Effect on encodings.....                      | 44 |
| 26   | The GLOBAL-DEFAULTS encoding instruction..... | 44 |
| 26.1 | General.....                                  | 44 |
| 26.2 | Restrictions.....                             | 45 |
| 26.3 | Effect on encodings.....                      | 45 |
| 27   | The LIST encoding instruction.....            | 45 |
| 27.1 | General.....                                  | 45 |
| 27.2 | Restrictions.....                             | 45 |
| 27.3 | Effect on encodings.....                      | 46 |
| 28   | The NAME encoding instruction.....            | 46 |
| 28.1 | General.....                                  | 46 |
| 28.2 | Restrictions.....                             | 47 |
| 28.3 | Effect on encodings.....                      | 48 |
| 29   | The NAMESPACE encoding instruction.....       | 48 |
| 29.1 | General.....                                  | 48 |
| 29.2 | Restrictions.....                             | 49 |
| 29.3 | Effect on encodings.....                      | 49 |
| 30   | The PI-OR-COMMENT encoding instruction.....   | 50 |
| 30.1 | General.....                                  | 50 |
| 30.2 | Restrictions.....                             | 50 |
| 30.3 | Effect on the encodings.....                  | 50 |
| 31   | The TEXT encoding instruction.....            | 51 |
| 31.1 | General.....                                  | 51 |
| 31.2 | Restrictions.....                             | 51 |
| 31.3 | Effect on encodings.....                      | 52 |
| 32   | The UNTAGGED encoding instruction.....        | 52 |
| 32.1 | General.....                                  | 52 |
| 32.2 | Restrictions.....                             | 53 |
| 32.3 | Effect on encodings.....                      | 53 |
| 33   | The USE-NIL encoding instruction.....         | 54 |
| 33.1 | General.....                                  | 54 |
| 33.2 | Restrictions.....                             | 54 |
| 33.3 | Effect on encodings.....                      | 55 |
| 34   | The USE-NUMBER encoding instruction.....      | 55 |
| 34.1 | General.....                                  | 55 |
| 34.2 | Restrictions.....                             | 55 |

|         |      |  |    |
|---------|------|--|----|
|         | 34.3 | Effect on encodings.....   | 55 |
| 35      |      | The USE-ORDER encoding instruction .....   | 56 |
|         | 35.1 | General.....   | 56 |
|         | 35.2 | Restrictions.....  | 56 |
|         | 35.3 | Effect on encodings.....   | 57 |
| 36      |      | The USE-QNAME encoding instruction .....   | 57 |
|         | 36.1 | General.....   | 57 |
|         | 36.2 | Restrictions.....  | 58 |
|         | 36.3 | Effect on encodings.....   | 58 |
| 37      |      | The USE-TYPE encoding instruction.....   | 58 |
|         | 37.1 | General.....   | 58 |
|         | 37.2 | Restrictions.....  | 58 |
|         | 37.3 | Effect on encodings.....   | 59 |
| 38      |      | The USE-UNION encoding instruction.....  | 59 |
|         | 38.1 | General.....   | 59 |
|         | 38.2 | Restrictions.....  | 59 |
|         | 38.3 | Effect on encodings.....   | 60 |
| 39      |      | The WHITESPACE encoding instruction .....  | 61 |
|         | 39.1 | General.....   | 61 |
|         | 39.2 | Restrictions.....  | 61 |
|         | 39.3 | Effect on encodings.....   | 61 |
| 40      |      | Identification of the encoding rules .....                                       | 62 |
| Annex A |      | Examples of BASIC-XER and CXER encodings .....                                   | 63 |
|         | A.1  | ASN.1 description of the record structure.....                                   | 63 |
|         | A.2  | ASN.1 description of a record value .....  | 63 |
|         | A.3  | Basic XML representation of this record value.....                               | 63 |
|         | A.4  | Canonical XML representation of this record value .....                          | 64 |
| Annex B |      | – Partial XML content and deterministic encodings .....                          | 65 |
|         | B.1  | Partial XML content.....   | 65 |
|         | B.2  | Recommended restrictions on encodings producing partial XML element content..... | 65 |
| Annex C |      | – Examples of extended-XER encodings using XER encoding instructions.....        | 68 |
|         | C.1  | Introduction.....  | 68 |
|         | C.2  | Simple examples .....  | 68 |
|         | C.3  | More complex examples .....  | 69 |