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**Information technology — ASN.1  
encoding rules: XML Encoding  
Rules (XER)**

*Technologies de l'information — Règles de codage ASN.1: Règles de  
codage XML (XER)*

Withdrawn

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Withholding

## 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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. 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.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

ISO/IEC 8825-4 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 6, *Telecommunications and information exchange between systems*, in collaboration with ITU-T. The identical text is published as ITU-T Rec. X.693 (11/2008).

This second edition cancels and replaces the first edition (ISO/IEC 8825-4:2002), which has been technically revised. It also incorporates the Amendments ISO/IEC 8825-4:2002/Amd.1:2004, ISO/IEC 8825-4:2002/Amd.2:2006 and ISO/IEC 8825-4:2002/Amd.3:2008.

ISO/IEC 8825 consists of the following parts, under the general title *Information technology — ASN.1 encoding rules*:

- *Part 1: Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER)*
- *Part 2: Specification of Packed Encoding Rules (PER)*
- *Part 3: Specification of Encoding Control Notation (ECN)*
- *Part 4: XML Encoding Rules (XER)*
- *Part 5: Mapping W3C XML schema definitions into ASN.1*
- *Part 6: Registration and application of PER encoding instructions*

## Introduction

ITU-T Rec. X.680 | ISO/IEC 8824-1, ITU-T Rec. X.681 | ISO/IEC 8824-2, ITU-T Rec. X.682 | ISO/IEC 8824-3, ITU-T Rec. X.683 | ISO/IEC 8824-4 together describe Abstract Syntax Notation One (ASN.1), a notation for the definition of messages to be exchanged between peer applications.

This Recommendation | International Standard defines encoding rules that may be applied to values of ASN.1 types defined using the notation specified in ITU-T Rec. X.680 | ISO/IEC 8824-1 and ITU-T Rec. X.681 | ISO/IEC 8824-2. Application of these encoding rules produces a transfer syntax for such values. It is implicit in the specification of these encoding rules that they are also to be used for decoding.

There is more than one set of encoding rules that can be applied to values of ASN.1 types. This Recommendation | International Standard defines three sets of encoding rules that use the Extensible Markup Language (XML). These encoding rules all produce an XML document compliant to W3C XML 1.0. The first set is called the Basic XML Encoding Rules (BASIC-XER). The second set is called the Canonical XML Encoding Rules (CANONICAL-XER, or CXER) because there is only one way of encoding an ASN.1 value using these encoding rules. (Canonical encoding rules are generally used for applications using security-related features such as digital signatures.) The third set is called the extended XML Encoding Rules (EXTENDED-XER). The extended XML Encoding Rules allow additional encoders options, and take account of encoding instructions that specify variations of the BASIC-XER encodings in order to support specific styles of XML documents (see below). The extended XML Encoding Rules are not canonical, and there is no canonical form for these rules defined in this Recommendation | International Standard.

There are many aspects of an XML representation of data (such as the use of XML attributes instead of child elements, or the use of white-space delimited lists) whose use is a matter of style and XML designer choice. If a type defined in an ASN.1 specification is encoded by BASIC-XER or by CXER, then there is a single fixed style used for the XML representation, with no user control of stylistic features. This Recommendation | International Standard specifies the syntax and semantics of XER encoding instructions which specify the stylistic features of the XML in an EXTENDED-XER encoding. XER encoding instructions can also be used to determine the possible insertion of XML processing instructions in an EXTENDED-XER encoding. XER encoding instructions are ignored by BASIC-XER and by CXER, but are used by EXTENDED-XER.

NOTE – "Stylistic features", such as use of attributes or white-space delimited lists, can also affect the size of an encoding and the ease with which it can be processed, so use of such features is not just a matter of style. Where such issues are important, EXTENDED-XER with encoding instructions may be preferred over BASIC-XER or CXER.

Clause 8 specifies the BASIC-XER encoding of ASN.1 types.

Clause 9 specifies the CXER encoding of ASN.1 types.

Clause 10 specifies the EXTENDED-XER encoding of ASN.1 types, referencing later clauses which define the XER encoding instructions.

Clauses 11 to 14 list and categorize the XER encoding instructions and specify the syntax for their assignment to an ASN.1 type or component using either an XER type prefix (see ITU-T Rec. X.680 | ISO/IEC 8824-1, 31.3) or an XER encoding control section (see ITU-T Rec. X.680 | ISO/IEC 8824-1, clause 54).

Clause 15 defines the order of precedence if XER encoding instructions are present in both an XER type prefix and in an XER encoding control section.

Clause 16 specifies the XER encoding instruction support for XML namespaces when using EXTENDED-XER.

Clause 17 specifies EXTENDED-XER encodings.

Clauses 18 to 39 specify:

- a) the syntax of each XER encoding instruction used in a type prefix or an XER encoding control section;
- b) restrictions on the XER encoding instructions that can be associated with a particular ASN.1 type (resulting from inheritance and multiple assignments);
- c) modifications to the XER encoding rules that are required in an EXTENDED-XER encoding when an XER encoding instruction is applied.

Annex A is informative and contains examples of BASIC-XER and CXER encodings.



Annex B is informative and contains a description of the partial XML content that is produced when constructions such as sequence and sequence-of have their surrounding tags removed, together with restrictions on EXTENDED-XER specifications that enable easy determination of the ASN.1 component that an XML element is associated with.

Annex C is informative and contains examples of XER encoding instructions and of the corresponding EXTENDED-XER encodings.

Withdrawn

**INTERNATIONAL STANDARD****ITU-T RECOMMENDATION****Information technology –  
ASN.1 encoding rules:  
XML Encoding Rules (XER)****1 Scope**

This Recommendation | International Standard specifies a set of basic XML Encoding Rules (BASIC-XER) that may be used to derive a transfer syntax for values of types defined in ITU-T Rec. X.680 | ISO/IEC 8824-1 and ITU-T Rec. X.681 | ISO/IEC 8824-2. This Recommendation | International Standard also specifies a set of Canonical XML Encoding Rules (CXER) which provide constraints on the basic XML Encoding Rules and produce a unique encoding for any given ASN.1 value. This Recommendation | International Standard further specifies a set of extended XML Encoding Rules (EXTENDED-XER) which adds further encoders options, and also allows the ASN.1 specifier to vary the encoding that would be produced by BASIC-XER. It is implicit in the specification of these encoding rules that they are also used for decoding.

The encoding rules specified in this Recommendation | International Standard:

- are used at the time of communication;
- are intended for use in circumstances where displaying of values and/or processing them using commonly available XML tools (such as browsers) is the major concern in the choice of encoding rules;
- allow the extension of an abstract syntax by addition of extra values for all forms of extensibility described in ITU-T Rec. X.680 | ISO/IEC 8824-1.

This Recommendation | International Standard also specifies the syntax and semantics of XER encoding instructions, and the rules for their assignment and combination. XER encoding instructions can be used to control the EXTENDED-XER encoding for specific ASN.1 types.

**2 Normative references**

The following Recommendations and International Standards contain provisions which, through reference in this text, constitute provisions of this Recommendation | International Standard. At the time of publication, the editions indicated were valid. All Recommendations and Standards are subject to revision, and parties to agreements based on this Recommendation | International Standard are encouraged to investigate the possibility of applying the most recent edition of the Recommendations and Standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards. The Telecommunication Standardization Bureau of the ITU maintains a list of currently valid ITU-T Recommendations.

**2.1 Identical Recommendations | International Standards**

- ITU-T Recommendation X.680 (2008) | ISO/IEC 8824-1:2008, *Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation.*
- ITU-T Recommendation X.681 (2008) | ISO/IEC 8824-2:2008, *Information technology – Abstract Syntax Notation One (ASN.1): Information object specification.*
- ITU-T Recommendation X.682 (2008) | ISO/IEC 8824-3:2008, *Information technology – Abstract Syntax Notation One (ASN.1): Constraint specification.*
- ITU-T Recommendation X.683 (2008) | ISO/IEC 8824-4:2008, *Information technology – Abstract Syntax Notation One (ASN.1): Parameterization of ASN.1 specifications.*
- ITU-T Recommendation X.690 (2008) | ISO/IEC 8825-1:2008, *Information technology – ASN.1 encoding rules: Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER).*
- ITU-T Recommendation X.691 (2008) | ISO/IEC 8825-2:2008, *Information technology – ASN.1 encoding rules: Specification of Packed Encoding Rules (PER).*

- ITU-T Recommendation X.692 (2008) | ISO/IEC 8825-3:2008, *Information technology – ASN.1 encoding rules: Specification of Encoding Control Notation (ECN)*.

## 2.2 Additional references

- IETF RFC 2045 (1996), *Multipurpose Internet Mail Extensions (MIME) Part One: Format of Internet Message Bodies*.
- IETF RFC 2141 (1997), *URN Syntax*.
- IETF RFC 2396 (1998), *Uniform Resource Identifiers (URI): Generic Syntax*.
- IETF RFC 3061 (2001), *A URN Namespace of Object Identifiers*.
- ISO/IEC 10646:2003, *Information technology – Universal Multiple-Octet Coded Character Set (UCS)*.
- The Unicode Standard, Version 3.2.0, The Unicode Consortium. (Reading, MA, Addison-Wesley)  
NOTE 1 – The graphics characters (and their encodings) defined by the above reference are identical to those defined by ISO/IEC 10646, but the above reference is included because it also specifies the names of control characters.
- W3C XML 1.0:2000, *Extensible Markup Language (XML) 1.0 (Second Edition)*, W3C Recommendation, Copyright © [6 October 2000] World Wide Web Consortium, (Massachusetts Institute of Technology, Institut National de Recherche en Informatique et en Automatique, Keio University), <http://www.w3.org/TR/2000/REC-xml-20001006>.
- W3C XML Namespaces:1999, *Namespaces in XML*, W3C Recommendation, Copyright © [14 January 1999] World Wide Web Consortium, (Massachusetts Institute of Technology, Institut National de Recherche en Informatique et en Automatique, Keio University), <http://www.w3.org/TR/1999/REC-xml-names-19990114>.

NOTE 2 – The reference to a document within this Recommendation | International Standard does not give it, as a stand-alone document, the status of a Recommendation or International Standard.

Without prejudice