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Information technology — ASN.1 encoding rules —

Part 5: Mapping W3C XML schema definitions into ASN.1

Technologies de l'information — Règles de codage ASN.1 —
Partie 5: Mappage en ASN.1 des définitions de schéma XML du W3C

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This fourth edition cancels and replaces the third edition (ISO/IEC 8825-5:2015), which has been technically revised.

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Introduction

This Recommendation | International Standard specifies version 1 and version 2 of a mapping from a W3C XML Schema definition (an XSD Schema) into an Abstract Syntax Notation One (ASN.1) schema. The mappings can be applied to any XSD Schema. Both mappings specify the generation of one or more ASN.1 modules containing type definitions, together with ASN.1 XER encoding instructions. These are jointly described as an ASN.1 schema for Extensible Markup Language (XML) documents. This ASN.1 schema (produced by either version of the mapping), when used with the ASN.1 Extended XML Encoding Rules (EXTENDED-XER), can be used to generate and to validate the same set of W3C XML 1.0 documents as the original XSD Schema. The resulting ASN.1 types and encodings support the same semantic content as the XSD Schema. Thus ASN.1 tools can be used interchangeably with XSD tools for the generation and processing of the specified XML documents.

Other standardized ASN.1 encoding rules, such as the Distinguished Encoding Rules (DER) or the Packed Encoding Rules (PER), can be used in conjunction with this standardized mapping, but produce encodings for version 2 of the mapping that differ from (and are less verbose than) those produced by version 1 for XSD constructs involving dates and times or wildcards.

The combination of this Recommendation | International Standard with ASN.1 Encoding Rules provides fully standardized and vendor-independent compact and canonical binary encodings for data originally defined using an XSD Schema.

The ASN.1 schema provides a clear separation between the specification of the information content of messages (their abstract syntax) and the precise form of the XML document (e.g., use of attributes instead of elements). This results in both a clearer and generally a less verbose schema than the original XSD Schema.

Annex A forms an integral part of this Recommendation | International Standard, and is an ASN.1 module containing a set of ASN.1 type assignments that correspond to each of the XSD built-in types for version 1 of the mapping. Mappings of XSD Schemas into ASN.1 schemas either import the type reference names of those type assignments or include the type definitions in-line.

Annex B also forms an integral part of this Recommendation | International Standard and provides the ASN.1 module for version 2 of the mapping.

Annex C does not form an integral part of this Recommendation | International Standard, and summarizes the object identifier, OID internationalized resource identifier and object descriptor values assigned in this Recommendation | International Standard.

Annex D does not form an integral part of this Recommendation | International Standard, and gives examples of the mapping of XSD Schemas into ASN.1 schemas.

Annex E does not form an integral part of this Recommendation | International Standard, and describes the use of the mapping defined in this Recommendation | International Standard, in conjunction with standardized ASN.1 Encoding Rules, to provide compact and canonical encodings for data defined using an XSD Schema.

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INTERNATIONAL STANDARD
ITU-T RECOMMENDATION

Information technology – ASN.1 encoding rules: Mapping W3C XML schema definitions into ASN.1

1 Scope

This Recommendation | International Standard specifies two versions of a mapping from any XSD Schema into an Abstract Syntax Notation One (ASN.1) schema. The ASN.1 schema for both versions support the same semantics and validate the same set of XML documents.

This Recommendation | International Standard specifies the final XER encoding instructions that are to be applied as part of the defined mapping to ASN.1 types, but does not specify which syntactic form is to be used for the specification of those final XER encoding instructions, or the order or manner of their assignment.

NOTE – Implementers of tools generating these mappings may choose any syntactic form or order of assignment that results in the specified final XER encoding instructions being applied. Examples in this Recommendation | International Standard generally use the type prefix form, but use of an XER Encoding Control Section may be preferred for the mapping of a complete XSD Schema, as a matter of style.

There are different ways (syntactically) of assigning XER encoding instructions for use in EXTENDED-XER encodings (e.g., use of ASN.1 type prefix encoding instructions or use of an XER encoding control section). The choice of these syntactic forms is a matter of style and lies outside the scope of this Recommendation | International Standard.

2 Normative references

The following Recommendations | International Standards and W3C specifications 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, International Standards and W3C specifications 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, International Standards and W3C specifications 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. The W3C maintains a list of currently valid W3C specifications. 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.

2.1 Identical Recommendations | International Standards

NOTE – The complete set of ASN.1 Recommendations | International Standards is listed in this clause, as these documents can all be applicable in particular uses of this Recommendation | International Standard. Where these are not directly referenced in the body of this Recommendation | International Standard, a † symbol is added to the reference.

- Recommendation ITU-T X.680 (2021) |ISO/IEC 8824-1:2021, *Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation.*
- Recommendation ITU-T X.681 (2021) | ISO/IEC 8824-2:2021, *Information technology – Abstract Syntax Notation One (ASN.1): Information object specification*.
- Recommendation ITU-T X.682 (2021) | ISO/IEC 8824-3:2021, *Information technology – Abstract Syntax Notation One (ASN.1): Constraint specification*.
- Recommendation ITU-T X.683 (2021) | ISO/IEC 8824-4:2021, *Information technology – Abstract Syntax Notation One (ASN.1): Parameterization of ASN.1 specifications*.
- Recommendation ITU-T X.690 (2021) | ISO/IEC 8825-1:2021, *Information technology – ASN.1 encoding Rules: Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER)*.
- Recommendation ITU-T X.691 (2021) | ISO/IEC 8825-2:2021, *Information technology – ASN.1 encoding rules: Specification of Packed Encoding Rules (PER)*.
- Recommendation ITU-T X.692 (2021) | ISO/IEC 8825-3:2021, *Information technology – ASN.1 encoding rules: Specification of Encoding Control Notation (ECN)*.
- Recommendation ITU-T X.693 (2021) | ISO/IEC 8825-4:2021, *Information technology – ASN.1 encoding rules: XML Encoding Rules (XER)*.

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– Recommendation ITU-T X.891 (2005) | ISO/IEC 24824-1:2007, *Information technology – Generic applications of ASN.1: Fast infoset.*

NOTE – The references above shall be interpreted as references to the identified Recommendations | International Standards together with all their published amendments and technical corrigenda.

2.2 Additional references

– ISO 8601:2019, *Date and time – Representation for information interchange – Part 1: Basic rules*.

– W3C XML 1.0:2008, *Extensible Markup Language (XML) 1.0* (Fifth Edition), W3C Recommendation, Copyright © [26 November 2008] World Wide Web Consortium (Massachusetts Institute of Technology, Institut National de Recherche en Informatique et en Automatique, Keio University), http://www.w3.org/TR/xml/.

– 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.

– W3C XML Information Set:2004, XML *Information Set* (Second Edition), W3C Recommendation, Copyright © [4 February 2004] World Wide Web Consortium (Massachusetts Institute of Technology, Institut National de Recherche en Informatique et en Automatique, Keio University), http://www.w3.org/TR/xml-infoset/.

– W3C XML Schema:2004, *XML Schema Part 1: Structures* (Second Edition), W3C Recommendation, Copyright © [28 October 2004] World Wide Web Consortium (Massachusetts Institute of Technology, Institut National de Recherche en Informatique et en Automatique, Keio University), http://www.w3.org/TR/xmlschema-1/.

– W3C XML Schema:2004, *XML Schema Part 2: Datatypes* (Second Edition), W3C Recommendation, Copyright © [28 October 2004] World Wide Web Consortium (Massachusetts Institute of Technology, Institut National de Recherche en Informatique et en Automatique, Keio University), http://www.w3.org/TR/xmlschema-2/.

NOTE – When the reference "W3C XML Schema" is used in this Recommendation | International Standard, it refers to W3C XML Schema Part 1 and W3C XML Schema Part 2.

– IETF RFC 2396 (1998), *Uniform resource identifiers (URI): Generic syntax*.

– IETF RFC 3066 (2001), *Tags for the Identification of Languages*.

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