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BSI Standards Publication

Information technology — ASN.1 encoding rules

Part 7: Specification of Octet Encoding Rules (OER)

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INTERNATIONAL STANDARD

ISO/IEC 8825-7

Third edition
2021-06

Information technology — ASN.1 encoding rules —

Part 7: Specification of Octet Encoding Rules (OER)

Technologies de l'information — Règles de codage ASN.1 —
Partie 7: Spécification des règles de codage des octets (OER)

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives or www.iec.ch/members_experts/refdocs)

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This third edition cancels and replaces the second edition (ISO/IEC 8825-7:2015), which has been technically revised. It also incorporates ISO/IEC 8825-7:2015/Cor 2:2017, ISO/IEC 8825-7:2015/Cor 3:2018, ISO/IEC 8825-7:2015/Cor 4:2018.

A list of all parts in the ISO/IEC 8825 series can be found on the ISO and IEC websites.

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Introduction

The publications Rec. ITU-T X.680 | ISO/IEC 8824-1, Rec. ITU-T X.681 | ISO/IEC 8824-2, Rec. ITU-T X.682 | ISO/IEC 8824-3, Rec. ITU-T 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 which have been defined using the notation specified in the above-mentioned publications. 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 are more than one set of encoding rules that can be applied to values of ASN.1 types. This Recommendation | International Standard defines two sets of Octet Encoding Rules, so-called because the encoding of every type takes a whole number of octets. Encoding and decoding data with the Octet Encoding Rules is usually faster than encoding and decoding the same data with the Basic Encoding Rules (described in Rec. ITU-T X.690 | ISO/IEC 8825-1) or the Packed Encoding Rules (described in Rec. ITU-T X.691 | ISO/IEC 8825-2).

NOTE – The encoding rules specified in this Recommendation | International Standard derive from the Octet Encoding Rules (OER) published by American Association of State Highway and Transportation Officials (AASHTO), Institute of Transportation Engineers (ITE) and National Electrical Manufacturers Association (NEMA) as NTCIP 1102:2004. In most practical cases, an implementation of this Recommendation | International Standard can interoperate with an implementation of NTCIP 1102.

Clauses 8 to 30 specify the BASIC-OER encoding of ASN.1 types.

Clause 31 specifies the CANONICAL-OER encoding of ASN.1 types.

Annex A is informative and contains examples of BASIC-OER and CANONICAL-OER encodings.

Annex B is informative and addresses the Interoperability of the encoding rules with NTCIP 1102:2004.

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INTERNATIONAL STANDARD
ITU-T RECOMMENDATION

Information technology – ASN.1 encoding rules: Specification of Octet Encoding Rules (OER)

1 Scope

This Recommendation | International Standard specifies a set of Basic Octet Encoding Rules (BASIC-OER) that may be used to derive a transfer syntax for values of the types defined in Rec. ITU-T X.680 | ISO/IEC 8824-1, Rec. ITU-T X.681 | ISO/IEC 8824-2, Rec. ITU-T X.682 | ISO/IEC 8824-3, Rec. ITU-T X.683 | ISO/IEC 8824-4. This Recommendation | International Standard also specifies a set of Canonical Octet Encoding Rules (CANONICAL-OER) which provides constraints on the Basic Octet Encoding Rules and produces a unique encoding for any given ASN.1 value. It is implicit in the specification of these encoding rules that they are also to be 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 encoding/decoding speed 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 Rec. ITU-T X.680 | ISO/IEC 8824-1.

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.

NOTE – This Recommendation | International Standard is based on ISO/IEC 10646:2003 and the Unicode standard version 3.2.0:2002. It cannot be applied using later versions of these two standards.

2.1 Identical Recommendations | International Standards

- 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)*.

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/IEC 2375:2003, *Information technology – Procedure for registration of escape sequences and coded character sets.*
- *ISO International Register of Coded Character Sets to be Used with Escape Sequences.*
- ISO/IEC 10646:2003, *Information technology – Universal Multiple-Octet Coded Character Set (UCS)*.

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3 Definitions

For the purposes of this Recommendation | International Standard, the following definitions apply.

3.1 Specification of basic notation

For the purposes of this Recommendation | International Standard, all the definitions in Rec. ITU-T X.680 | ISO/IEC 8824-1 apply.

3.2 Information object specification

For the purposes of this Recommendation | International Standard, all the definitions in Rec. ITU-T X.681 | ISO/IEC 8824-2 apply.

3.3 Constraint specification

This Recommendation | International Standard makes use of the following terms defined in Rec. ITU-T X.682 | ISO/IEC 8824-3:

a) component relation constraint;

b) table constraint.

3.4 Parameterization of ASN.1 specification

This Recommendation | International Standard makes use of the following term defined in Rec. ITU-T X.683 | ISO/IEC 8824-4:

– variable constraint.

3.5 Basic Encoding Rules (BER)

This Recommendation | International Standard makes use of the following terms defined in Rec. ITU-T X.690 | ISO/IEC 8825-1:

a) data value;

b) dynamic conformance;

c) encoding (of a data value);

d) receiver;

e) sender;

f) static conformance.

3.6 Packed Encoding Rules (PER)

This Recommendation | International Standard makes use of the following terms defined in Rec. ITU-T X.691 | ISO/IEC 8825-2:

a) canonical encoding;

b) composite type;

c) composite value;

d) known-multiplier character string type;

e) outermost type;

f) relay-safe encoding;

g) simple type;

h) textually dependent.

3.7 Additional definitions

For the purposes of this Recommendation | International Standard, the following definitions apply.

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