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Information technology — ASN.1 encoding rules —

Part 6: Registration and application of PER encoding instructions

Technologies de l'information — Règles de codage ASN.1 —

Partie 6: Enregistrement et application des instructions de codage PER

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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 document 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 X.695 (02/2021).

This fourth edition cancels and replaces the third edition (ISO/IEC 8825-6:2015), which has been technically revised.

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

Rec. ITU-T X.680 | ISO/IEC 8824-1 makes syntactic provision for the application of encoding instructions to modify the behaviour of a particular set of encoding rules, identified by an encoding reference (see Rec. ITU-T X.680 | ISO/IEC 8824-1).

Rec. ITU-T X.691 | ISO/IEC 8825-2 specifies the BASIC-PER and CANONICAL-PER encoding rules, each with two variants: the ALIGNED variant and the UNALIGNED variant. The PER encoding instructions allow minor variations to be made in parts of the UNALIGNED variant of a BASIC-PER and CANONICAL-PER encoding. They have no effect on the ALIGNED variant of these encodings.

NOTE – The purpose of PER encoding instructions is to ease the task of producing an ASN.1 specification, which when encoded by the UNALIGNED variant of a PER encoding produces bit-patterns that exactly match those of a legacy protocol. It is unusual for the ALIGNED variant to be used for this purpose, and so for simplicity all PER encoding instructions have no effect on the ALIGNED variant.

This Recommendation | International Standard specifies the use of type prefixes and encoding control sections (see Rec. ITU-T X.680 | ISO/IEC 8824-1, 31.3 and clause 54) to associate one or more PER encoding instructions with an ASN.1 type. Where an encoding instruction is associated with an ASN.1 type, specific clauses in Rec. ITU-T X.691 | ISO/IEC 8825-2 are amended according to the specification of the encoding instruction. These mechanisms are similar to those for the application of XER encoding instructions specified in Rec. ITU-T X.693 | ISO/IEC 8825-4.

This Recommendation | International Standard also specifies the procedures for the operation of a Registration Authority to receive, record and publish the specification of PER encoding instructions that are agreed from time to time. The Registration Authority is the ITU Telecommunication Standardization Bureau, and the form of publication is an Implementers' Guide for ASN.1. This Guide will be available freely on an ITU-T web-site.

This Recommendation | International Standard also specifies the procedures to be used for the approval of new PER encoding instructions. Broadly, these procedures involve the prior publication in the Implementers' Guide of a proposed new encoding instruction, with a later publication announcing that the new encoding instruction has been approved by a simple resolution of the relevant Study Group of ITU-T and the relevant Sub-Committee of ISO/IEC JTC 1.

Clauses 6 to 9 specify the operation of the Registration Authority for PER encoding instructions.

Clauses 10 to 13 specify the application of PER encoding instructions to an ASN.1 specification.

Annex A is informative and contains an example of the application of PER encoding instructions using encoding prefixes.

Annex B is informative and contains an example of the application of the same PER encoding instructions using an encoding control section.

Annex C is informative and summarizes the productions defined in this Recommendation | International Standard.

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INTERNATIONAL STANDARD
ITU-T RECOMMENDATION

Information technology – ASN.1 encoding rules: Registration and application of PER encoding instructions

1 Scope

This Recommendation | International Standard:

a) specifies the information needed and the format to be used for specifying PER encoding instructions;

b) specifies the mechanisms for approving new PER encoding instructions from time to time and the operation of the Registration Authority for PER encoding instructions;

c) specifies the means of associating a PER encoding instruction with an ASN.1 type using both type prefixes and an encoding control section.

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

– 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.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.

3 Definitions

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

3.1 associated encoding instructions (for a type): A set of PER encoding instructions associated with a type.

3.2 final encoding instructions (for a type): The set of PER encoding instructions associated with a type as a result of the complete ASN.1 specification, and which are applied in producing encodings of that type.

3.3 identifying keyword: A word or hyphenated word that identifies a PER encoding instruction.

3.4 inherited encoding instructions: PER encoding instructions that are associated with the type identified by a type reference.

3.5 Joint ITU-T | ISO/IEC JTC1 Collaborative Team for ASN.1: A group established in accordance with Rec. ITU-T A.23, Annex A and ISO/IEC JTC 1 Directives Edition 5 Version 2.0, subclause 2.6.4 and Annex K, clause 8 to progress work on Joint Text in relation to Abstract Syntax Notation One (ASN.1).

3.6 PER encoding instructions (PER EIs): Notation used to change the unaligned PER encoding of a type (or of a component of a type).

NOTE – PER encoding instructions are included in either a PER type prefix (see Rec. ITU-T X.680 | ISO/IEC 8824-1, 31.3) or a PER encoding control section (see Rec. ITU-T X.680 | ISO/IEC 8824-1, clause 54).

3.7 PER EI proposal: A proposal for a new PER encoding instruction that is progressing to either the REJECTED or the APPROVED state.

3.8 PER EI change proposal: A proposal for deletion of or change to an APPROVED PER encoding instruction that is progressing to either the REJECTED or the APPROVED state.

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NOTE – PER EI change proposals are expected to be rare occurrences, and due consideration will be needed to backwards compatibility considerations.

3.9 **prefixed encoding instructions**: PER encoding instructions that are assigned using a type prefix (see Annex A and Rec. ITU-T X.680 | ISO/IEC 8824-1, 31.3).

NOTE – Prefixed encoding instructions can delete, replace, or add to the associated encoding instructions of a type.

3.10 **relevant Study Group**: The ITU-T Study Group that is responsible for the Joint ITU-T | ISO/IEC JTC1 Collaborative Team for ASN.1.

3.11 **relevant Sub-Committee**: The ISO/IEC JTC1 Sub-Committee that is responsible for the Joint ITU-T | ISO/IEC JTC1 Collaborative Team for ASN.1.

3.12 **targeted encoding instructions**: PER encoding instructions that are assigned using a target list in a PER encoding control section (see Annex B and Rec. ITU-T X.680 | ISO/IEC 8824-1, clause 54).

NOTE – Targeted encoding instructions can delete, replace, or add to the associated encoding instructions of a type.

4 Abbreviations

For the purposes of this Recommendation | International Standard, the following abbreviations apply:

ASN.1	Abstract Syntax Notation One
ECN	Encoding Control Notation
EI	Encoding Instruction
PER	Packed Encoding Rules

5 Notation

5.1 This Recommendation | International Standard references and uses the notation defined by Rec. ITU-T X.680 | ISO/IEC 8824-1, clause 5 for the specification of the syntax of PER encoding instructions via a set of productions.

5.2 All lexical items used in these productions are defined in Rec. ITU-T X.680 | ISO/IEC 8824-1, clause 12.

5.3 In accordance with Rec. ITU-T X.680 | ISO/IEC 8824-1, 31.3.2, this Recommendation | International Standard specifies the "EncodingInstruction" production (see 11.2).

NOTE – The "`[`" and "`]`" lexical items never appear in an "EncodingInstruction" production.

5.4 In accordance with Rec. ITU-T X.680 | ISO/IEC 8824-1, 54.4, this Recommendation | International Standard specifies the "EncodingInstructionAssignmentList" production (see 12.1.2).

NOTE – The **`END`** and **`ENCODING-CONTROL`** lexical items never appear in the "EncodingInstructionAssignmentList" production.

6 Information to be provided to specify a PER encoding instruction

6.1 The specification of a PER encoding instruction shall consist of the following information:

a) a short informative title (such as "Use and size of a length field ");

b) the value for the identifying keyword, which shall be distinct from that used for any earlier PER EI;

c) an illustration of the syntax of the EI, enclosed in square brackets ("[" and "]");

d) a simple description of the EI and its purpose;

e) a full specification of the types to which this EI applies and its effect in each case;

f) a complete specification of an "EIDetail" production (see 11.4), with the semantics associated with each element;

g) either:

1) an amendment to specific text in Rec. ITU-T X.691 | ISO/IEC 8825-2 that shall be applied to the encoding of any type to which the EI is applicable (see d) above) and that has this EI in its set of final encoding instructions; or

NOTE 1 – If the EI is not applicable to the type, then the amendment is not applied in the encoding of that type.

2) an ECN specification of the effects of the encoding instruction; or

3) any other clear and implementable statement of the effects of the EI;

4) any combination of 1) to 3).

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