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

*Technologies de l'information -- Règles de codage ASN.1: Spécification
des règles de codage des octets (OER)*

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Foreword

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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.

This second edition cancels and replaces the first edition of ISO/IEC 8825-7:2014 which has been technically revised.

ISO/IEC 8825-7 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.696 (08/2015).

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ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

X.696

(08/2015)

SERIES X: DATA NETWORKS, OPEN SYSTEM
COMMUNICATIONS AND SECURITY

OSI networking and system aspects – Abstract Syntax
Notation One (ASN.1)

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

Recommendation ITU-T X.696

ITU-T X-SERIES RECOMMENDATIONS
DATA NETWORKS, OPEN SYSTEM COMMUNICATIONS AND SECURITY

PUBLIC DATA NETWORKS	
Services and facilities	X.1–X.19
Interfaces	X.20–X.49
Transmission, signalling and switching	X.50–X.89
Network aspects	X.90–X.149
Maintenance	X.150–X.179
Administrative arrangements	X.180–X.199
OPEN SYSTEMS INTERCONNECTION	
Model and notation	X.200–X.209
Service definitions	X.210–X.219
Connection-mode protocol specifications	X.220–X.229
Connectionless-mode protocol specifications	X.230–X.239
PICS proformas	X.240–X.259
Protocol Identification	X.260–X.269
Security Protocols	X.270–X.279
Layer Managed Objects	X.280–X.289
Conformance testing	X.290–X.299
INTERWORKING BETWEEN NETWORKS	
General	X.300–X.349
Satellite data transmission systems	X.350–X.369
IP-based networks	X.370–X.379
MESSAGE HANDLING SYSTEMS	X.400–X.499
DIRECTORY	X.500–X.599
OSI NETWORKING AND SYSTEM ASPECTS	
Networking	X.600–X.629
Efficiency	X.630–X.639
Quality of service	X.640–X.649
Naming, Addressing and Registration	X.650–X.679
Abstract Syntax Notation One (ASN.1)	X.680–X.699
OSI MANAGEMENT	
Systems management framework and architecture	X.700–X.709
Management communication service and protocol	X.710–X.719
Structure of management information	X.720–X.729
Management functions and ODMA functions	X.730–X.799
SECURITY	X.800–X.849
OSI APPLICATIONS	
Commitment, concurrency and recovery	X.850–X.859
Transaction processing	X.860–X.879
Remote operations	X.880–X.889
Generic applications of ASN.1	X.890–X.899
OPEN DISTRIBUTED PROCESSING	X.900–X.999
INFORMATION AND NETWORK SECURITY	X.1000–X.1099
SECURE APPLICATIONS AND SERVICES	X.1100–X.1199
CYBERSPACE SECURITY	X.1200–X.1299
SECURE APPLICATIONS AND SERVICES	X.1300–X.1399
CYBERSECURITY INFORMATION EXCHANGE	X.1500–X.1599
CLOUD COMPUTING SECURITY	X.1600–X.1699

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For further details, please refer to the list of ITU-T Recommendations.

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

Summary

Recommendation ITU-T X.696 | ISO/IEC 8825-7 specifies two sets of binary encoding rules that can be applied to values of all ASN.1 types using less processing resources than the Basic Encoding Rules and its derivatives (described in Rec. ITU-T X.690 | ISO/IEC 8825-1) and the Packed Encoding Rules (described in Rec. ITU-T X.691 | ISO/IEC 8825-2).

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* To access the Recommendation, type the URL <http://handle.itu.int/> in the address field of your web browser, followed by the Recommendation's unique ID. For example, <http://handle.itu.int/11.1002/1000/11830-en>.

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications, information and communication technologies (ICTs). The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

Compliance with this Recommendation is voluntary. However, the Recommendation may contain certain mandatory provisions (to ensure, e.g., interoperability or applicability) and compliance with the Recommendation is achieved when all of these mandatory provisions are met. The words "shall" or some other obligatory language such as "must" and the negative equivalents are used to express requirements. The use of such words does not suggest that compliance with the Recommendation is required of any party.

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As of the date of approval of this Recommendation, ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementers are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database at <http://www.itu.int/ITU-T/ipr/>.

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CONTENTS

		<i>Page</i>
1	Scope	1
2	Normative references	1
	2.1 Identical Recommendations International Standards	1
	2.2 Additional references	1
3	Definitions	2
	3.1 Specification of basic notation	2
	3.2 Information object specification	2
	3.3 Constraint specification	2
	3.4 Parameterization of ASN.1 specification	2
	3.5 Basic Encoding Rules (BER)	2
	3.6 Packed Encoding Rules (PER)	2
	3.7 Additional definitions	2
4	Abbreviations	4
5	Convention	4
6	Encodings specified by this Recommendation International Standard	4
7	Conformance	5
8	General provisions	5
	8.1 Use of the type notation	5
	8.2 Constraints	5
	8.3 Type and value model used for encoding	7
	8.4 Types to be encoded	7
	8.5 Production of a complete OER encoding	7
	8.6 Length determinant	7
	8.7 Encoding of tags	8
9	Encoding of Boolean values	8
10	Encoding of integer values	8
11	Encoding of enumerated values	9
12	Encoding of real values	10
13	Encoding of bitstring values	11
	13.1 General	11
	13.2 Encoding of bitstring types with a fixed size	11
	13.3 Encoding of bitstring types with a variable size	11
14	Encoding of octetstring values	11
15	Encoding of the null value	11
16	Encoding of sequence values	11
17	Encoding of sequence-of values	13
18	Encoding of set values	13
19	Encoding of set-of values	13
20	Encoding of choice values	13
21	Encoding of object identifier values	13
22	Encoding of relative object identifier values	14
23	Encoding of values of the internationalized resource reference type	14
24	Encoding of values of the relative internationalized resource reference type	14
25	Encoding of values of the embedded-pdv type	14
26	Encoding of values of the external type	14
27	Encoding of values of the restricted character string types	14
28	Encoding of values of the unrestricted character string type	15

	<i>Page</i>	
29	Encoding of values of the time types.....	16
29.1	General.....	16
29.2	Optimized encoding of time subtypes with the Basic=Date property setting.....	17
29.3	Optimized encoding of time subtypes with the Basic=Time property setting.....	18
29.4	Optimized encoding of time subtypes with the Basic=Interval property setting.....	19
30	Encoding of open type values.....	20
31	Canonical Octet Encoding Rules.....	20
32	Object identifier values referencing the encoding rules.....	21
Annex A	– Example of OER encodings.....	22
A.1	ASN.1 description of the record structure.....	22
A.2	ASN.1 description of a record value.....	22
A.3	BASIC-OER and CANONICAL-OER representation of this record value.....	22
A.3.1	Hexadecimal view.....	23
A.3.2	Descriptive view.....	23
Annex B	– Interoperability with NTCIP 1102:2004.....	25
Bibliography	26

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[ISO/IEC 8825-7:2015](https://standards.iteh.ai/catalog/standards/sist/ad5250f9-4999-47d0-83c7-04e2a2c04a96/iso-iec-8825-7-2015)

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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.

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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. <https://standards.iteh.ai/catalog/standards/sist/ad5250f9-4999-47d0-83c7-10646-2003>

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 (2015) | ISO/IEC 8824-1:2015, *Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation.*
- Recommendation ITU-T X.681 (2015) | ISO/IEC 8824-2:2015, *Information technology – Abstract Syntax Notation One (ASN.1): Information object specification.*
- Recommendation ITU-T X.682 (2015) | ISO/IEC 8824-3:2015, *Information technology – Abstract Syntax Notation One (ASN.1): Constraint specification.*
- Recommendation ITU-T X.683 (2015) | ISO/IEC 8824-4:2015, *Information technology – Abstract Syntax Notation One (ASN.1): Parameterization of ASN.1 specifications.*
- Recommendation ITU-T X.690 (2015) | ISO/IEC 8825-1:2015, *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 (2015) | ISO/IEC 8825-2:2015, *Information technology – ASN.1 encoding rules: Specification of Packed Encoding Rules (PER).*

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).*