
**Information technology — Abstract
Syntax Notation One (ASN.1) —**

**Part 2:
Information object specification**

*Technologies de l'information — Notation de syntaxe abstraite
numéro un (ASN.1) —*

Partie 2: Spécification des objets informationnels





COPYRIGHT PROTECTED DOCUMENT

© ISO/IEC 2021

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier; Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

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.

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)

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents) or the IEC list of patent declarations received (see patents.iec.ch).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html. In the IEC, see www.iec.ch/understanding-standards.

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.681 (02/2021).

This sixth edition cancels and replaces the fifth edition (ISO/IEC 8824-2:2015), which has been technically revised. It also incorporates ISO/IEC 8824-2:2015/Cor 1:2018.

A list of all parts in the ISO/IEC 8824 series can be found on the ISO and IEC websites.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html and www.iec.ch/national-committees.

CONTENTS

	<i>Page</i>
Introduction	iv
1 Scope	1
2 Normative references	1
2.1 Identical Recommendations International Standards	1
3 Definitions	1
3.1 Specification of basic notation	1
3.2 Constraint specification	1
3.3 Parameterization of ASN.1 specification	1
3.4 Additional definitions	2
4 Abbreviations	3
5 Convention	3
6 Notation	3
6.1 Assignments	3
6.2 Types	3
6.3 Values	4
6.4 Elements	4
7 ASN.1 lexical items	4
7.1 Information object class references	4
7.2 Information object references	4
7.3 Information object set references	4
7.4 Type field references	4
7.5 Value field references	4
7.6 Value set field references	5
7.7 Object field references	5
7.8 Object set field references	5
7.9 Word	5
7.10 Additional keywords	5
8 Referencing definitions	5
9 Information object class definition and assignment	6
10 Syntax List	9
11 Information object definition and assignment	12
12 Information object set definition and assignment	14
13 Associated tables	15
14 Notation for the object class field type	16
15 Information from objects	18
Annex A – The TYPE-IDENTIFIER information object class	21
Annex B – Abstract syntax definitions	22
Annex C – The instance-of type	23
Annex D – Examples	25
D.1 Example usage of simplified OPERATION class	25
D.2 Example usage of "ObjectClassFieldType"	26
D.3 Illustrate usage of objects and object sets	27
Annex E – Tutorial annex on the ASN.1 model of object set extension	28
Annex F – Summary of the notation	29

Introduction

An application designer frequently needs to design a protocol which will work with any of a number of instances of some class of information objects, where instances of the class may be defined by a variety of other bodies, and may be added to over time. Examples of such information object classes are the "operations" of Remote Operations Service (ROS) and the "attributes" of the OSI Directory.

This Recommendation | International Standard provides notation which allows information object classes as well as individual information objects and information object sets thereof to be defined and given reference names.

An information object class is characterized by the kinds of fields possessed by its instances. A field may contain:

- an arbitrary type (a type field); or
- a single value of a specified type (a fixed-type value field); or
- a single value of a type specified in a (named) type field (a variable-type value field);
- a non-empty set of values of a specified type (a fixed-type value set field); or
- a non-empty set of values of a type specified in a (named) type field (a variable-type value set field); or
- a single information object from a specified information object class (an object field);
- an information object set from a specified information object class (an object set field).

A fixed-type value field of an information object class may be selected to provide unique identification of information objects in that class. This is called the identifier field for that class. Values of the identifier field, if supplied, are required to be unique within any information object set that is defined for that class. They may, but need not, serve to unambiguously identify information objects of that class within some broader scope, particularly by the use of object identifier as the type of the identifier field.

An information object class is defined by specifying:

- the names of the fields;
- for each field, the form of that field (type, fixed-type value, variable-type value, fixed-type value set, variable-type value set, object, or object set);
- optionality and default settings of fields;
- which field, if any, is the identifier field.

An individual information object in the class is defined by providing the necessary information for each field.

The notation defined herein permits an ASN.1 type to be specified by reference to a field of some information object class – the object class field type. In Rec. ITU-T X.682 | ISO/IEC 8824-3, notation is provided to enable this type to be restricted by reference to some specific information object set.

It can be useful to consider the definition of an information object class as defining the form of an underlying conceptual table (the associated table) with one column for each field, and with a completed row defining an information object. The form of the table (determined by the information object class specification) determines the sort of information to be collected and used to complete some protocol specification. The underlying conceptual table provides the link between those specifying information objects of that class and the protocol which needs that information to complete its specification. Typically, the actual information object set used to complete a particular protocol specification will be a parameter of that protocol (see Rec. ITU-T X.683 | ISO/IEC 8824-4).

The "InformationFromObjects" notation referencing a specific object or object set (probably a parameter) can be used to extract information from cells of conceptual tables.

This Recommendation | International Standard:

- Specifies a notation for defining an information object class, and for identifying it with a reference name (see clause 9).
- Specifies a notation by which the definer of an information object class can provide a defined syntax for the definition of information objects of that class; a default notation is provided for classes for which no defined syntax has been defined (see clause 10).
- Specifies a notation for defining an information object, and for assigning it to a reference name (see clause 11), and provides analogous notation for an object set (see clause 12).
- Defines the "associated table" for an object or object set of a class (see clause 13).

- Specifies notation for the object class field type and its values (see clause 14).
NOTE – These constructs enable an ASN.1 type to be specified using a named field of a named information object class. Constraints on that type to restrict it to values related to a specific information object set appear in Rec. ITU-T X.682 | ISO/IEC 8824-3.
- Specifies notation for extracting information from objects (see clause 15).

The set of information objects used in defining an object set may be partially or entirely unknown at the time of definition of an ASN.1 specification. Such cases occur, for example, in network management where the set of managed objects varies while the network manager is executing. This Recommendation | International Standard specifies the rules for inclusion of an *extension marker* in the definition of object sets to signal to implementers the intention of the designer that the contents of the object set is not fully defined in the ASN.1 specification. When an object set is defined with an extension marker, the implementer must provide means, possibly outside the scope of ASN.1, for dynamically adding objects to the object set and removing previously added objects from the object set.

Annex A, which is an integral part of this Recommendation | International Standard, specifies the information object class whose object class reference is **TYPE-IDENTIFIER**. This is the simplest useful class, with just two fields, an identifier field of type object identifier, and a single type field which defines the ASN.1 type for carrying all information concerning any particular object in the class. It is defined herein because of the widespread use of information objects of this form.

Annex B, which is an integral part of this Recommendation | International Standard, specifies the notation for defining an abstract syntax (composed of the set of values of a single ASN.1 type) by the definition of an appropriate information object.

Annex C, which is an integral part of this Recommendation | International Standard, specifies the notation for the instance-of type (the **INSTANCE OF** notation).

Annex D, which is not an integral part of this Recommendation | International Standard, provides examples on how to use the notation described in this Recommendation | International Standard.

Annex E, which is not an integral part of this Recommendation | International Standard, provides a summary of the ASN.1 model of object set extension.

Annex F, which is not an integral part of this Recommendation | International Standard, provides a summary of the notation defined herein.

Information technology – Abstract Syntax Notation One (ASN.1): Information object specification

1 Scope

This Recommendation | International Standard is part of Abstract Syntax Notation One (ASN.1) and provides notation for specifying information object classes, information objects and information object sets.

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.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*.

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