

---

---

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

**Part 4:  
Parameterization of ASN.1  
specifications**

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

*Partie 4: Paramétrage des spécifications de la notation de syntaxe  
abstraite numéro un*

This document is a preview generated by EBS



**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](mailto:copyright@iso.org)  
Website: [www.iso.org](http://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](http://www.iso.org/directives) or [www.iec.ch/members\\_experts/refdocs](http://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](http://www.iso.org/patents)) or the IEC list of patent declarations received (see [patents.iec.ch](http://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](http://www.iso.org/iso/foreword.html). In the IEC, see [www.iec.ch/understanding-standards](http://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.683 (02/2021).

This sixth edition cancels and replaces the fifth edition (ISO/IEC 8824-4:2015), which has been technically revised. It also incorporates ISO/IEC 8824-4:2015/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](http://www.iso.org/members.html) and [www.iec.ch/national-committees](http://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 Information object specification .....	1
3.3 Constraint specification .....	1
3.4 Additional definitions .....	1
4 Abbreviations .....	2
5 Convention .....	2
6 Notation .....	2
6.1 Assignments .....	2
6.2 Parameterized definitions .....	2
6.3 Symbols .....	3
7 ASN.1 lexical items .....	3
8 Parameterized assignments .....	3
9 Referencing parameterized definitions .....	5
10 Abstract syntax parameters .....	7
Annex A – Examples .....	9
A.1 Example of the use of a parameterized type definition .....	9
A.2 Example of use of parameterized definitions together with an information object class .....	9
A.3 Example of parameterized type definition that is finite .....	10
A.4 Example of a parameterized value definition .....	11
A.5 Example of a parameterized value set definition .....	11
A.6 Example of a parameterized class definition .....	11
A.7 Example of a parameterized object set definition .....	12
A.8 Example of a parameterized object set definition .....	12
Annex B – Summary of the notation .....	13

## Introduction

Application designers need to write specifications in which certain aspects are left undefined. Those aspects will later be defined by one or more other groups (each in its own way), to produce a fully defined specification for use in the definition of an abstract syntax (one for each group).

In some cases, aspects of the specification (for example, bounds) may be left undefined even at the time of abstract syntax definition, being completed by the specification of International Standardized Profiles or functional profiles from some other body.

NOTE 1 – It is a requirement imposed by this Recommendation | International Standard that any aspect that is not solely concerned with the application of constraints has to be completed prior to the definition of an abstract syntax.

In the extreme case, some aspects of the specification may be left for the implementer to complete, and would then be specified as part of the Protocol Implementation Conformance Statement.

While the provisions of Rec. ITU-T X.681 | ISO/IEC 8824-2 and Rec. ITU-T X.682 | ISO/IEC 8824-3 provide a framework for the later completion of parts of a specification, they do not of themselves solve the above requirements.

Additionally, a single designer sometimes requires to define many types, or many information object classes, or many information object sets, or many information objects, or many values, which have the same outer level structure, but differ in the types, or information object classes, or information object sets, or information objects, or values, that are used at an inner level. Instead of writing out the outer level structure for every such occurrence, it is useful to be able to write it out once, with parts left to be defined later, then to refer to it and provide the additional information.

All these requirements are met by the provision for parameterized reference names and parameterized assignments by this Recommendation | International Standard.

The syntactic form of a parameterized reference name is the same as that of the corresponding normal reference name, but the following additional considerations apply:

- When it is assigned in a parameterized assignment statement, it is followed by a list of dummy reference names in braces, each possibly accompanied by a governor; these reference names have a scope which is the right-hand side of the assignment statement, and the parameter list itself.  
NOTE 2 – This is what causes it to be recognized as a parameterized reference name.
- When it is exported or imported, it is followed by a pair of empty braces to distinguish it as a parameterized reference name.
- When it is used in any construct, it is followed by a list of syntactic constructions, one for each dummy reference name, that provide an assignment to the dummy reference name for the purposes of that use only.

Dummy reference names have the same syntactic form as the corresponding normal reference name, and can be used anywhere on the right-hand side of the assignment statement that the corresponding normal reference name could be used. All such usages are required to be consistent.

**INTERNATIONAL STANDARD  
ITU-T RECOMMENDATION**

**Information Technology – Abstract Syntax Notation ONE (ASN.1):  
Parameterization of ASN.1 specifications**

## **1 Scope**

This Recommendation | International Standard is part of Abstract Syntax Notation One (ASN.1) and defines notation for parameterization of ASN.1 specifications.

## **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.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*.

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 following definitions apply.

### **3.1 Specification of basic notation**

This Recommendation | International Standard uses the terms defined in Rec. ITU-T X.680 | ISO/IEC 8824-1.

### **3.2 Information object specification**

This Recommendation | International Standard uses the terms defined in Rec. ITU-T X.681 | ISO/IEC 8824-2.

### **3.3 Constraint specification**

This Recommendation | International Standard uses the terms defined in Rec. ITU-T X.682 | ISO/IEC 8824-3.

### **3.4 Additional definitions**

**3.4.1 normal reference name:** A reference name defined, without parameters, by means of an "Assignment" other than a "ParameterizedAssignment". Such a name references a complete definition and is not supplied with actual parameters when used.

**3.4.2 parameterized reference name:** A reference name defined using a parameterized assignment, which references an incomplete definition and which, therefore, must be supplied with actual parameters when used.

**3.4.3 parameterized type:** A type defined using a parameterized type assignment and thus whose components are incomplete definitions which must be supplied with actual parameters when the type is used.