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STANDARDIZATION SECTOR
OF ITU

Amendment 1
X.681
(04/95)

DATA NETWORKS AND OPEN SYSTEM COMMUNICATIONS

OSI NETWORKING AND SYSTEM ASPECTS – ABSTRACT SYNTAX NOTATION ONE (ASN.1)

INFORMATION TECHNOLOGY – ABSTRACT SYNTAX NOTATION ONE (ASN.1) – INFORMATION OBJECT SPECIFICATION

AMENDMENT 1: RULES OF EXTENSIBILITY

Amendment 1 to
ITU-T Recommendation X.681

(Previously "CCITT Recommendations")

FOREWORD

ITU (International Telecommunication Union) is the United Nations Specialized Agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the ITU. Some 179 member countries, 84 telecom operating entities, 145 scientific and industrial organizations and 38 international organizations participate in ITU-T which is the body which sets world telecommunications standards (Recommendations).

The approval of Recommendations by the Members of ITU-T is covered by the procedure laid down in WTSC Resolution No. 1 (Helsinki, 1993). In addition, the World Telecommunication Standardization Conference (WTSC), which meets every four years, approves Recommendations submitted to it and establishes the study programme for the following period.

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. The text of ITU-T Recommendation X.681, Amendment 1, was approved on 10th of April 1995. The identical text is also published as ISO/IEC International Standard 8824-2.

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NOTE

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

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ITU-T X-SERIES RECOMMENDATIONS

DATA NETWORKS AND OPEN SYSTEM COMMUNICATIONS

(February 1994)

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Superseded by a more recent version

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Superseded by a more recent version

Summary

This amendment describes how to write an ASN.1 module to allow new information objects to be added to an information object set after the definition of the ASN.1 module, and as late as during the execution of the programme that uses the object set.

Introduction

This Recommendation | International Standard documents the changes to ITU-T Rec. X.681 | ISO/IEC 8824-2 needed to support the ASN.1 Rules of Extensibility.

The ASN.1 Rules of Extensibility in ITU-T Rec. X.680/Amd.1 | ISO/IEC 8824-1/Amd. 1 describe how to write an ASN.1 module in such a way to allow a phased migration to a new version of an ASN.1 specification. The new version may differ from the previous version by new components being added to a SET, SEQUENCE or CHOICE, new enumeration being added to an enumerated type, an by constraints on a subtype specification being relaxed.

This Recommendation | International Standard describes how to write an ASN.1 module in such a way as to allow new information objects to be added to an information object set after the definition of the ASN.1 module, and as late as during the execution of the program that uses the object set. By defining the object set as extensible, the designer makes the statement that the contents of the object set were not fully known at the time the ASN.1 specification was written, and therefore, means possibly outside the scope of ASN.1 must be provided by an implementor to add objects to the object set and to remove previously added objects from the object set.

INTERNATIONAL STANDARD

ITU-T RECOMMENDATION

INFORMATION TECHNOLOGY –
ABSTRACT SYNTAX NOTATION ONE (ASN.1) –
INFORMATION OBJECT SPECIFICATION

AMENDMENT 1
(to Rec. X.681 | ISO/IEC 8824-2)

Rules of extensibility

1   Scope

This Recommendation | International Standard documents the changes to ITU-T Rec. X.681 | ISO/IEC 8824-2 needed to support the ASN.1 Rules of Extensibility.

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 editions of the Recommendations and Standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards. The Telecommunications Standardization Bureau of the ITU maintains a list of currently valid ITU-T Recommendations.

2.1   Identical Recommendations | International Standards

–   ITU-T Recommendation X.680 (1994) | ISO/IEC 8824-1:1995, *Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation.*

–   ITU-T Recommendation X.680/Amd. 1 (1995) | ISO/IEC 8824-1/Amd. 1:1995, *Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation – Amendment 1: Rules of extensibility.*

–   ITU-T Recommendation X.681 (1994) | ISO/IEC 8824-2:1995, *Information technology – Abstract Syntax Notation One (ASN.1): Information object specification.*

–   ITU-T Recommendation X.682 (1994) | ISO/IEC 8824-3:1995, *Information technology – Abstract Syntax Notation One (ASN.1): Constraint specification.*

3   Changes to Introduction

{Add the following text to the Introduction of ITU-T Rec. X.681 | ISO/IEC 8824-2 immediately before the existing paragraph which begins "Annex A, which ...":}

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 implementors 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 implementor 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.

4   Changes to Definitions

{Add the following text after 3.1}

3.1 *bis*   Information object specification

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

–   extension marker

{Add the following definition to ITU-T Rec. X.681 | ISO/IEC 8824-2, maintaining the alphabetical order of definitions. Note that the alphabetic character appearing in the clause number below will be changed to an appropriate numeric character when the definition is added to the base publication:}

3.4.3a   extensible object set: An object set with an extension marker.

5   Changes to Object Set Definition

{Change 12.2 to read:}

The information object set, which shall be of the class referenced by "DefinedObjectClass", is that defined by the construct "ObjectSet"

ObjectSet ::= "{" ObjectSetSpec "}"
ObjectSetSpec ::= ElementSetSpecs | "..."

"ElementSetSpecs" is specified in ITU-T Rec. X.680 | ISO/IEC 8824-1 clause 44 and enables an information object set to be specified in terms of information objects or sets thereof of the governing class. There shall be at least one information object in the set unless the second alternative of "ObjectSetSpec" is specified. In the latter case the presence of the ellipses is an indication that the object set is initially empty but will have objects dynamically added to it by the application program.

NOTE – Unlike extensible types such as set or sequence, or extensible subtype constraints, which are static in respect to the set of "understood" values being set for each version of the ASN.1 specification, an extensible object set can grow and contract dynamically within a given version. Indeed, it may expand and contract within a given instance of use of an application program as it dynamically defines or undefines objects.

{Add the following text after 12.2}

12.2 *bis*   If an extensible object set, A, is referenced in the definition of another object set, B, its extension marker is inherited by B.

12.2 *bis*   If a "ValueSetFromObjects" (see clause 15) is defined using an extensible object set, the resulting value set does not inherit the extension marker from the object set.

12.2 *quater*   If a type is constrained by a table constraint (see 10.3 of ITU-T Rec. X.682 | ISO/IEC 8824-3) and the object set referenced in the table constraint is extensible, the type does not inherit the extension marker from the object set. If the type is meant to be extensible then an extension marker shall be explicitly added to its "ElementSetSpecs".

6   Changes to ABSTRACT-SYNTAX Definition

{Change B.2 to read:}

The ABSTRACT-SYNTAX information object class is defined as:

ABSTRACT-SYNTAX ::= CLASS {
    &id   OBJECT IDENTIFIER,
    &Type,
    &property   BIT STRING {handles-invalid-encodings(0)} DEFAULT {}
} WITH SYNTAX {
    &Type IDENTIFIED BY &id [HAS PROPERTY &property]
}

The &id field of each ABSTRACT-SYNTAX is the abstract syntax name, while the &Type field contains the single ASN.1 type whose values make up the abstract syntax. The property "handles-invalid-encodings" indicates that the invalid encodings are not to be treated as an error during the decoding process, and the decision on how to treat such invalid encodings is left up to the application.

{Add the following tutorial annex to ITU-T Rec. X.681 | ISO/IEC 8824-2}

Annex A

Tutorial annex on the ASN.1 model of object set extension

(This annex does not form an integral part of this Recommendation | International Standard)

A.1 Extensible object sets

An ASN.1 specification can define information object sets and such object sets can be marked extensible by means of an extension marker. Use of an extension marker with object sets differ from such use with types in that it often indicates that an application is required to dynamically add/remove objects to/from the object set. Table and component relation constraints which are not satisfied are not in themselves considered errors if the object set is extensible. In such cases, it is not an error if the value of the referenced type is not found in the object set, but if it is found, then the constraint imposed on the referencing type must be satisfied.