SLOVENSKI STANDARD
SIST ETSI/TCR-TR 046 E1:2005

01-april-2005

Pravila in postopki za knjiġnico ASN.1 - Razliį ica 1

ASN.1 library rules and procedures; Version 1

Ta slovenski standard je istoveten z: TCRTR 046 Edition 1

ICS:

33.020	Telekomunikacije na splošno	Telecommunications in general

SIST ETSI/TCR-TR 046 E1:2005 **en**

ETSI TECHNICAL COMMITTEE REFERENCE TECHNICAL REPORT

TCR-TR 046

August 1996

Source: ETSI TC-SPS

Reference: DTR/SPS-02026

ICS: 33.100.60

Key words: ASN.1

ASN.1 library rules and procedures; Version 1

ETSI

European Telecommunications Standards Institute

ETSI Secretariat

Postal address: F-06921 Sophia Antipolis CEDEX - FRANCE
Office address: 650 Route des Lucioles - Sophia Antipolis - Valbonne - FRANCE
X.400: c=fr, a=atlas, p=etsi, s=secretariat - **Internet:** secretariat@etsi.fr

Tel.: +33 92 94 42 00 - Fax: +33 93 65 47 16

Contents

Foreword

This Technical Committee Reference Technical Report (TCR-TR) has been produced by the Signalling Protocols and Switching (SPS) Technical Committee (TC) of the European Telecommunications Standards Institute (ETSI) following consultation with all TC/STC Chairmen.

A TCR-TR is a deliverable for use inside ETSI which records output results of ETSI Technical Committee (TC) or Sub-Technical Committee (STC) studies which are not appropriate for European Telecommunication Standard (ETS), Interim European Telecommunication Standard (I-ETS) or ETSI Technical Report (ETR) status. They can be used for guidelines, status reports, co-ordination documents, etc. They are to be used to manage studies inside ETSI and shall be mandatorially applied amongst the concerned TCs. They shall also be utilized by the TC with overall responsibility for a study area for co-ordination documents (e.g. models, reference diagrams, principles, structures of standards, framework and guideline documents) which constitute the agreed basis for several, if not all, TCs and STCs to pursue detailed standards.

Introduction

Reuse of common application elements

The growing complexity of telecommunication systems requires advanced methods for design, implementation and testing as well as maintenance. Telecommunication products often interact with others by exchanging messages or by sharing some common property. Errors, omissions or common property mismatches in telecommunication standards are often costly to correct. Moreover, if errors are not detected, and permeate in telecommunication products, they may lead to loss of property and revenue. Therefore it is important, to assure that telecommunication standards interact correctly and that they do share as many common properties as possible.

International standardization organizations have developed formal notations, such as Abstract Syntax Notation One (ASN.1) in CCITT Recommendation X.208, for the definition of messages exchanged between telecommunication systems. The use of ASN.1 in specifications of telecommunication systems has increased heavily over the last years. As different telecommunication standards may define the same common application element, one definition in each standard, several definitions for a single element will exist. This will lead to double-definitions and possibly complicated interworking between standards as one standard may change an intended common definition in some later stage.

The problem with double-definitions and complicated interworking between standards can be solved by setting up a centralized ASN.1 library and a corresponding library index. The library will contain all definitions of common property elements and all standards can use that definition by reference. The library index will keep track of the use of the library elements. To accomplish this centralized library, and the library index, three topics have to be discussed:

Topic 1: What is the library contents and how is it structured?
Topic 2: How are changes to the library performed?
Topic 3: Who shall maintain the library?

Topic 1 aims the domain of rules. There have to be rules stating what shall be in the library and what shall not. Of course, only "correct" ASN.1 shall appear in the library but other requirements have to be met as well! The answer to topic 1 will be a collection of rules that, when applied, preserve the soundness of the library and the correctness of its contents.

Topic 2 covers the domain of procedures. The procedural behaviour when applying the rules, changing the library contents or maintaining the library has to be defined.

Topic 3 aims the domain of responsibility. Subjects as maintenance, ownership and version handling of the library and the library index must be defined.

The need to ease the potential reuse of these common property definitions and to detect multiple definitions of common application elements is obvious. Therefore, rules, procedures and responsibilities have to be defined and implemented in order to support reuse of common application elements as well as detection of multiple definitions.

This TCR-TR presents a set of rules and procedures that support the reusability of common application elements. Following these rules and procedures will ensure that no duplicate definitions of common application elements will exist. The maintenance of telecommunication standards and test specifications will be easier, thereby guaranteeing that exactly the same common properties will be shared. This may lead to important cost reduction in the development and maintenance of telecommunication standards.

About this TCR-TR

This TCR-TR is structured as follows:

Clauses 1 to 3 contain the scope of this TCR-TR; the references, definitions and abbreviations used in this TCR-TR.

Clause 4 describes the general concept in terms of needed rules and procedures. The ownership and maintenance of the library is discussed in subclause 4.4.

Clause 5 defines a set of rules that preserves a sound and valid library.

Clause 6 defines a set of procedures that can be applied to the library and the library index.

Clause 7 describes a procedure for managing the corresponding ETS 300 655 and ETR 210 by using templates defined in this TCR-TR.

The following annexes are provided in this TCR-TR:

- Annex A gives a summary of the rules defined in this TCR-TR;
- Annex B gives a BNF description and the procedural semantics of the library procedures;
- Annex C is a collection of examples considering the usage of the library and the library index;
- Annex D presents a template for ETS 300 655;
- Annex E presents a template for ETR 210.

Intended audience

This TCR-TR targets the group of persons which will maintain the ASN.1 library and the ASN.1 library index.

1 Scope

The main objective of this Technical Committee Reference Technical Report (TCR-TR) is to establish a set of rules and procedures applicable to the ASN.1 library as well as to the ASN.1 library index. It also defines the scope for a group, responsible of the library and its maintenance.

The main assignment of the ASN.1 library and the ASN.1 library index is to support the reuse of common application elements as well as to detect multiple definitions within ETSI protocol standards. Therefore, this TCR-TR is restricted to define rules and procedures for common application elements defined and used within ETSI. However, any common application element defined outside ETSI may be included in the ASN.1 library. This implies that these external elements will be redefined in the ASN.1 library as, from an ETSI point of view, definitions of common application elements always shall reside in the ASN.1 library. In parallel, the ASN.1 library index will keep track of such (external) definers.

ASN.1 definitions have in most cases limited applicability outside the protocol they define. To achieve a more extensive use of the definitions residing in the ASN.1 library and thereby support the design of new protocols, the definitions residing in the ASN.1 library shall be as generic as possible.

This TCR-TR gives guidance for contributions to the ASN.1 library. While ETSI as a whole will gain more consistent and interoperable ASN.1 protocols by the adoption of the rules and procedures defined herein, this TCR-TR does not force or restrict in any way a committee to participate in the process of increased reusability.

Throughout this TCR-TR the term "library" denotes the ASN.1 library, the term "library index" denotes the ASN.1 library index and the term "library element" denotes an ASN.1 definition residing in the library.

2 References

This TCR-TR incorporates by dated and undated reference, provisions from other publications. These references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this TCR-TR only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

[1] CCITT Recommendation X.208 (1988): "Specification of abstract syntax notation one (ASN.1)" (technically aligned with ISO 8824)".

[2] ITU-T Recommendation X.680 (1994): "Information technology - Open System Interconnection - Abstract Syntax Notation One (ASN.1): Specification of Basic Notation" (also published as ISO/IEC 8824-1).

[3] ETR 060 (1995): "Signalling Protocols and Switching (SPS); Guidelines for using Abstract Syntax Notation One (ASN.1) in telecommunication application protocols" (to be endorsed as TCR-TR 047).

[4] TCR-TR 019: "Signalling Protocols and Switching (SPS); evaluation of ASN.1 tools for use as syntax and semantic checkers".

[5] ETS 300 351 (1994): "ETSI object identifier tree; Rules and registration procedures".

[6] ETS 300 655: "ASN.1 library definition".

[7] ETR 210: "ASN.1 library index".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of this TCR-TR, the following definitions apply:

ASN.1 definition: A definition resulting from one of the alternatives for an ASN.1 "Assignment" as defined by ITU-T Recommendation X.680 [2].

common application element: An ASN.1 type definition or ASN.1 value definition that can or is commonly used in other ASN.1 modules.

ETSI-LIB: The most recent ETS containing the current version of the ASN.1 library, hence ETS 300 655 [6].

LIB-INDEX: The most recent ETR containing the current version of index to the ASN.1 library, hence ETR 210 [7].

LIB-R&P: This term refers to the rules and procedures defined for the ASN.1 library, hence the most recent version of this TCR-TR.

Library Maintenance Organization (LMO): An organization maintaining the ASN.1 library and the ASN.1 library index.

library module: An ASN.1 module containing one or several Common Application Element definitions.

library procedures: A set of procedures that modify the ASN.1 library as well as the ASN.1 library index in terms of contents and structure.

library rules: A set of rules applicable to the ASN.1 library that preserves the soundness and structure of the library.

validated ASN.1: ASN.1 definitions are valid if they conform with the guidelines defined in ETR 060 [3]. For the purpose of this TCR-TR these guidelines are to be considered as binding. Validation is done by the LMO.

3.2 Abbreviations

For the purposes of this TCR-TR, the following abbreviations apply:

ASN.1	Abstract Syntax Notation One
BNF	Backus-Naur Form
ETR	ETSI Technical Report
ETS	European Telecommunication Standard
LIB	Library
LMO	Library Maintenance Organization
R&P	Rules and Procedures

4 General concept

4.1 Overview

The use of ASN.1 when defining application elements has increased over the last years. It is therefore proposed to collect commonly used application elements defined in ASN.1, register them and store them in a centralized library. The advantage of this centralized library is twofold:

- the collection and registration of ASN.1 definitions ensures the reusability of these elements. Duplicate definitions in different documents that bear the potential risk of inconsistencies are avoided;

- the formalized collection procedures for ASN.1 definitions only allow the registration of elements that are sound according to some rules. Hence the correctness and soundness of the ASN.1 library is preserved and thereby any use of library items.

To accomplish such a centralized library three topics have to be discussed:

- library rules;
- library procedures;
- library maintenance.

The following subclauses aim these topics and explain the scope and the domain of each topic, showing that all topics have to be discussed and the answers have to be implemented to set up a centralized ASN.1 library.

4.2 Library rules

Library rules define the boundary of the library and its contents as well as its structure. In this TCR-TR, rules are defined as statements that define and restrict the contents of the library and its boundaries.

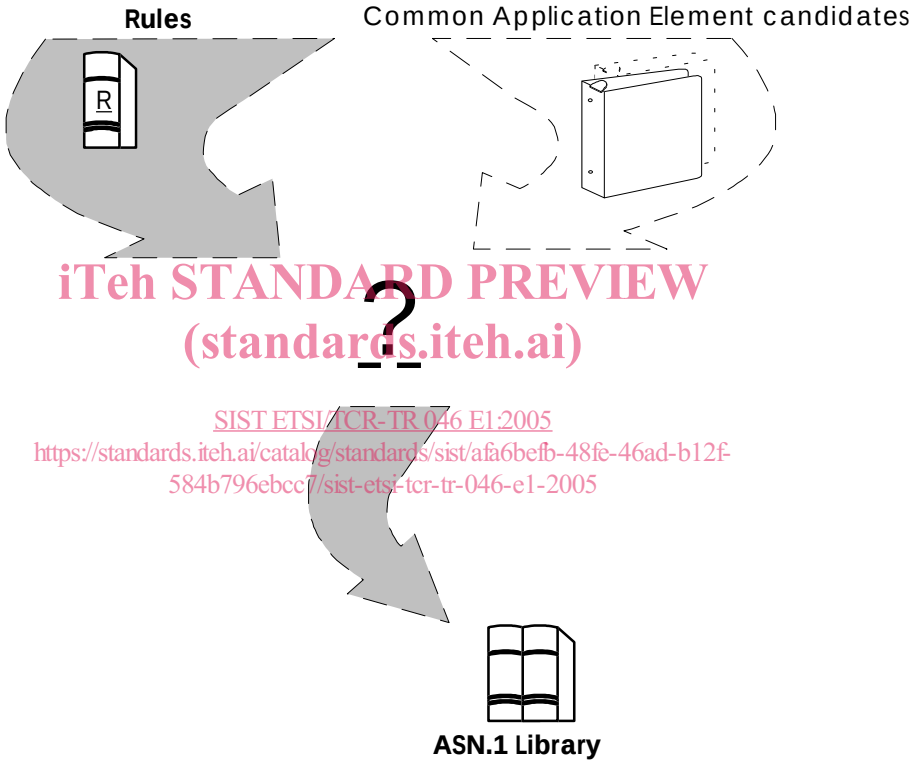

Figure 1: Library rules and their relation to the ASN.1 library:

EXAMPLE: Is this definition, suggested for the library, validated ASN.1?

A rule is of static nature. Applying rules to the above question will result in an answer that has to be strictly "Yes" or "No". A "No" will lead to the rejection of the above suggestion.

NOTE: Library rules are statements that ensure the correctness of the library and the library index.

The rules stated in this TCR-TR shall be obeyed. The addition or change of rules should always be reflected by a new edition of this TCR-TR.

The rules defined in this TCR-TR may be applicable to a possible electronic (informative) library existing in parallel with ETSI-LIB.

4.3 Library procedures

The need for defining procedures to maintain the library is quite obvious. Without pre-defined procedures one can not guarantee a sound library and a sound maintenance. While a rule is of a static nature, a procedure has a more dynamic behaviour. A procedure simply states how to get from state A to state B, where state A and B are both valid states.

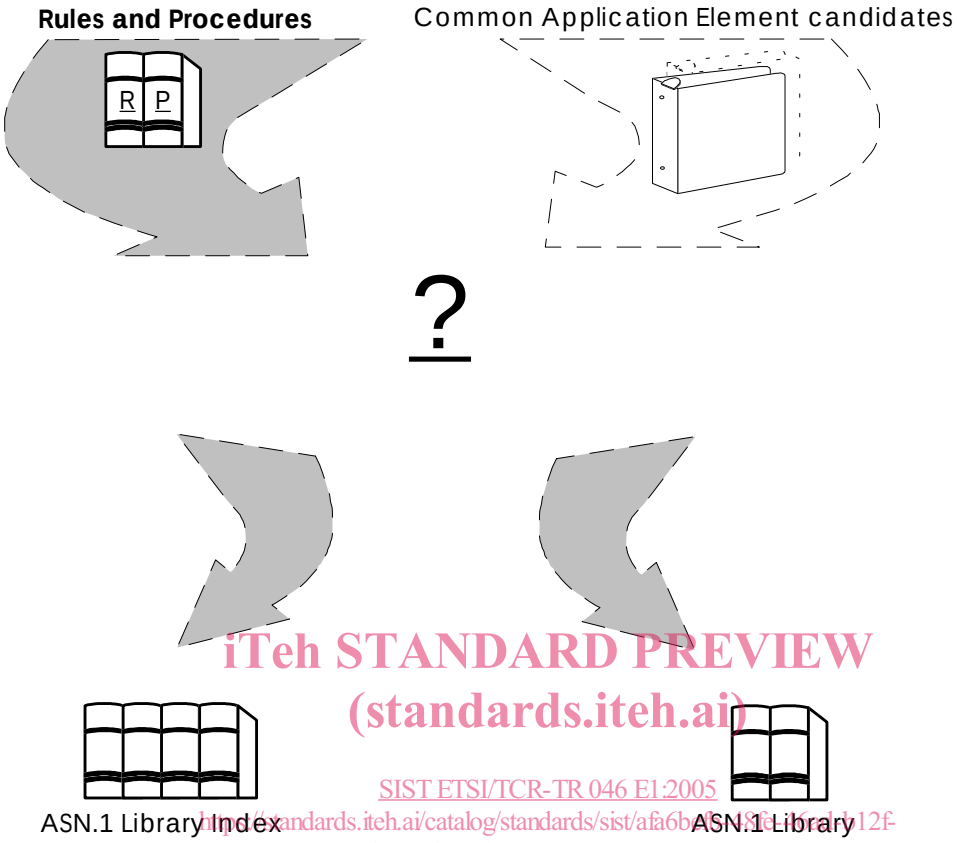

Figure 2: Library procedures and their relation to the library and the library index

EXAMPLE: How is an element added to the library?

If there exists a library, valid according to some rules, the question stated above is a request to move the library from a valid state to another valid state with one element added. The procedural behaviour of this request can now be seen as a sequential execution of a set of rules.

As some procedures need to have knowledge of the contents of the library, a library index has to be set up in parallel with the actual library. While the library only contains library elements, the index contains a list of what is in the library, who is using a particular library element, etc. The index has rules and procedures attached to it just as the library.

NOTE 1: Library procedures are operations on the library index and the library.

NOTE 2: From a global point of view, the library index exists only for internal use.

The procedures described in this TCR-TR may be applicable to a possible electronic (informative) library existing in parallel with ETSI-LIB.

4.4 Library maintenance organization

Having rules and procedures defined for validating the library and the library index as well as for maintaining the library, the need for a centralized organization performing these procedures and obeying the rules is obvious and clear. Any user of the library has to know whom to target a library request to. Therefore, the responsibility for collecting, verifying and registration these common application elements as well as maintaining the centralized library shall be held by a LMO.

The scope of the LMO is to act as the owner and maintainer of the library. Through them change requests shall be addressed (i.e. adding or deleting library elements). Any change to the library shall be done according to the rules and procedures defined in this TCR-TR.

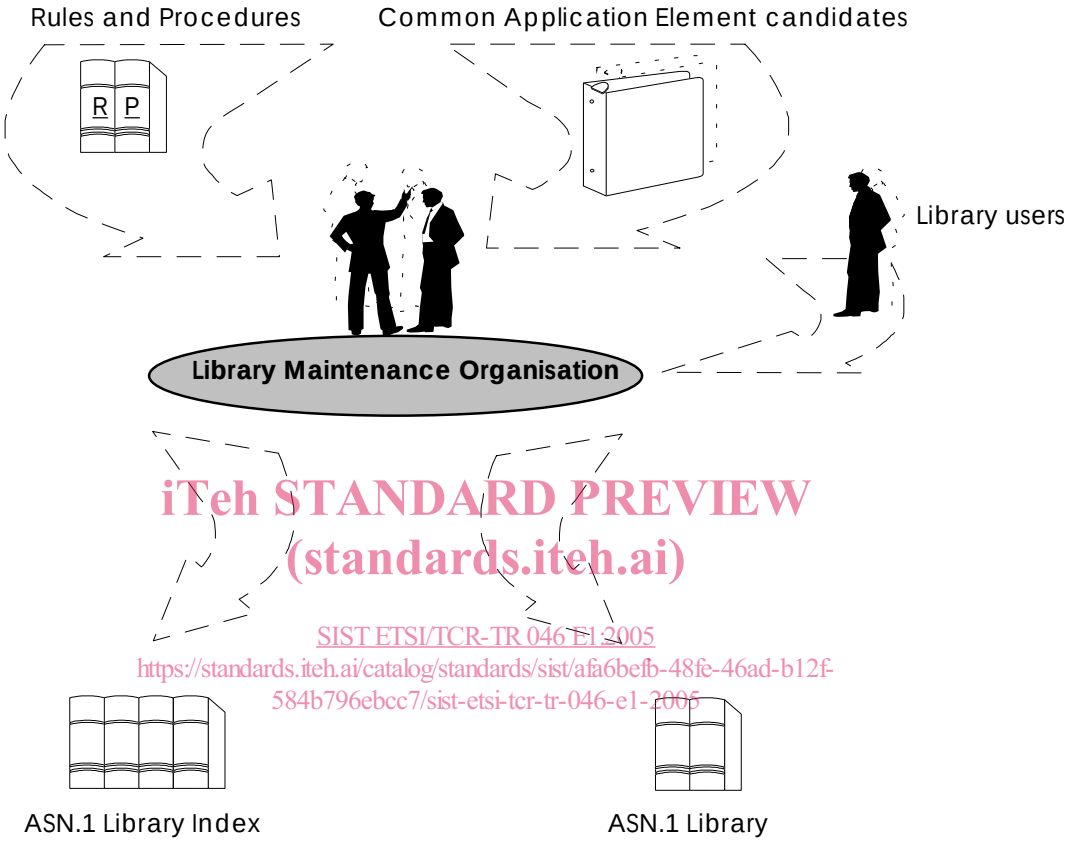

Figure 3: The LMO in its context

4.5 Conclusion

The LMO will achieve a sound ASN.1 library with a valid contents by using the rules and procedures defined in this TCR-TR. Of course, that organization may change the rules, procedures or their scope of responsibility at any time. However, these changes shall lead to a new version or a replacement of this TCR-TR. One single document containing all rules and procedures for the LMO will ease the duty of that organization.