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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.

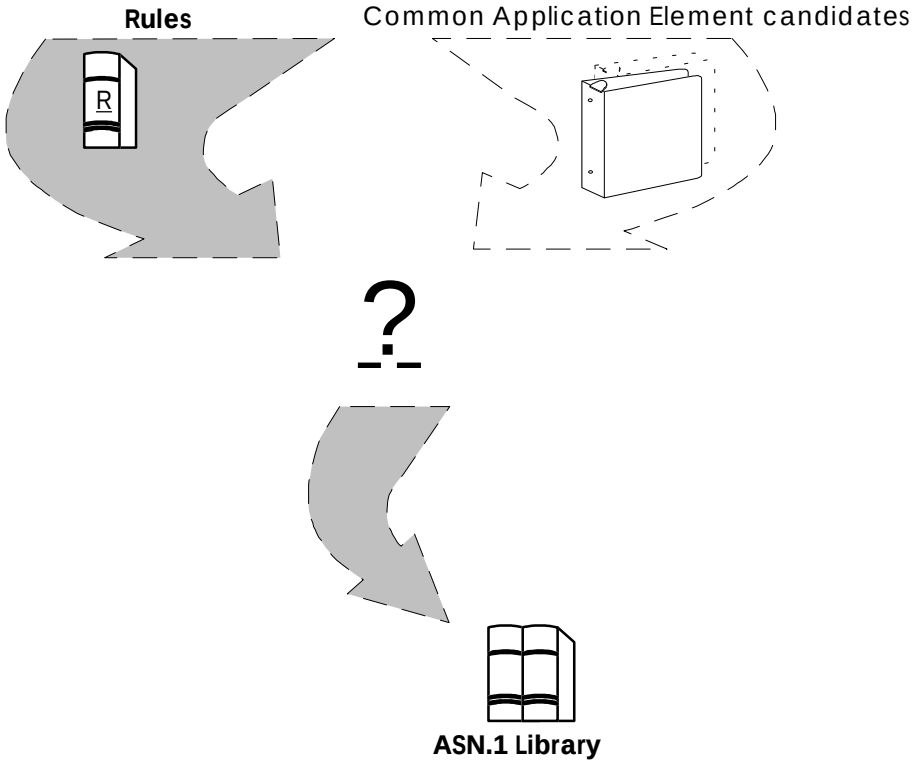

Figure 1: Library rules and their relation to the ASN.1 library:

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.

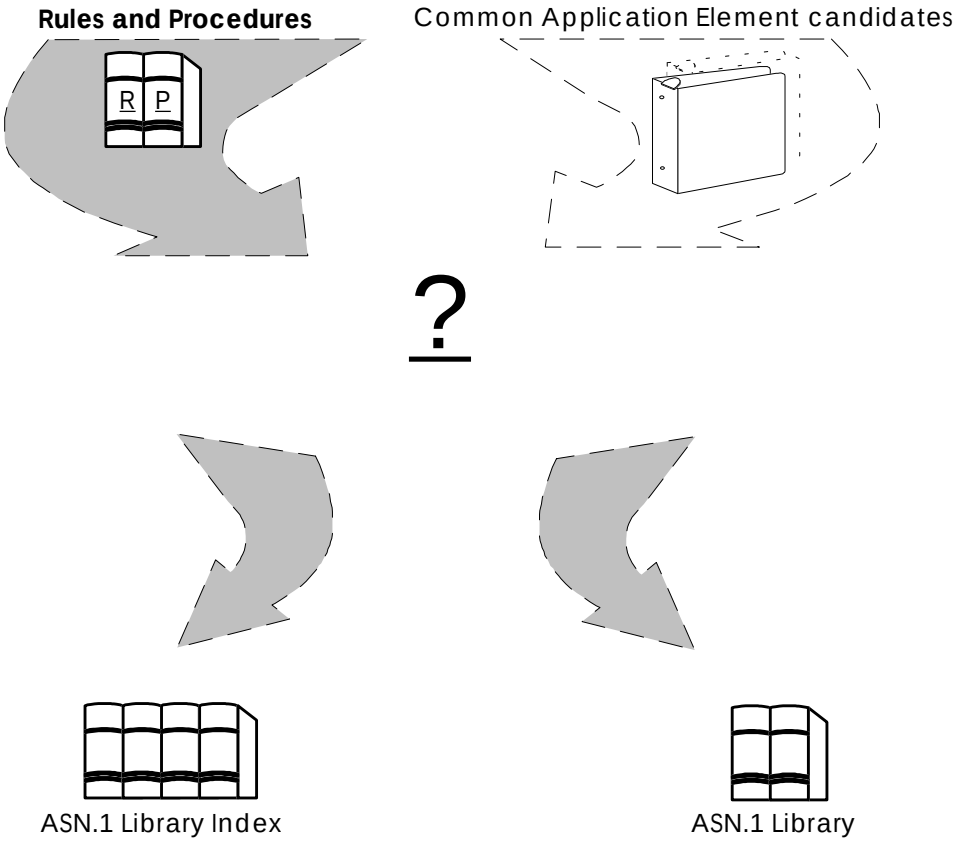

Figure 2: Library procedures and their relation to the library and the library index

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.

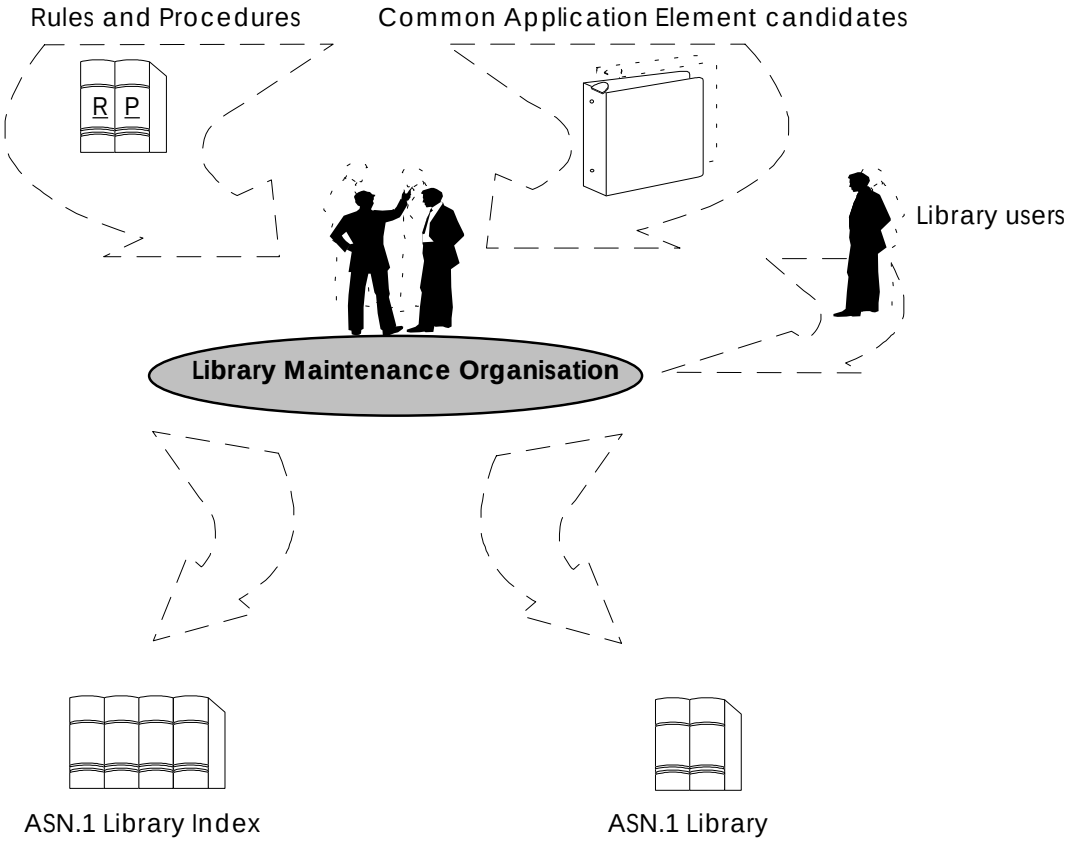

Figure 3: The LMO in its context

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.

5 Rule definitions

The rules stated in this TCR-TR shall be valid for any version of the library and the library index at any time. No other rules exist for the library or the library index.

5.1 Library rules

This subclause and any following subclauses define a set of rules applicable to the ASN.1 library and its index.

Rule 1: The library shall be an ETS, both concerning contents and structure.

The rule is motivated by reasons of use ability. A reference to a library item can be made from an ETS. An ETS can not reference non-standardized elements, therefore the library has to be an ETS.

5.1.1 Library structure

Rule 2: The ASN.1 library will be paper based.

The rule is motivated by the fact that all standards (ETSs) are paper based.

NOTE: An electronic version of the library may exist in parallel with the paper-based version.

Rule 3: The library shall consist of a collection of ASN.1 modules into which related library elements are grouped.

The rule is motivated by reasons of clarity.

Rule 4: The library and all its modules shall be collected in one document. These modules are the main contents of the ETSI-LIB.

This rule is motivated by reasons of maintenance. To maintain several documents is both costly and can be a source for redundancies and errors.

Rule 5: One module acts as the public interface to the library and this module is called the root. This root imports and exports every library element defined in any other library module belonging to the library.

The rule is motivated by data encapsulation. The internal structure of the library should neither be known nor used outside. This gives the LMO the maximum freedom for the internal structure of the library.

5.1.2 Library contents

Rule 6: The library shall only contain validated ASN.1.

The rule is motivated by reasons of correctness. According to the definition of the term "validated ASN.1" this means that the elements shall comply with ITU-T Recommendation X.680 [2], additionally the guidance given in ETR 060 [3] shall be followed.

NOTE 1: While the syntactic and semantic correctness according to ASN.1 can be checked by a tool, it is the responsibility of the LMO to verify that ETR 060 [3] is followed.

Rule 7: The library elements shall be identified as common application elements by the LMO.

The motivation of this rule is to limit the number of elements in the library to only cover the most common ones. Almost any accepted definition is an investment in the future and it is the LMO's choice to judge whether a requested definition is likely to be used by more than the requesting standard.

Rule 8: Every library element shall only be defined once in the library. No library element shall have a syntactical or semantical duplicate defined elsewhere in the library.

This rule is motivated by reasons of soundness.

NOTE 2: While the syntactical uniqueness can be checked by a tool, it is the responsibility of the LMO to verify the semantical uniqueness of a library element.

Rule 9: Every library element of type integer, octet string, bit string, character string, sequence of and set of shall have a reasonable size- or value constraint.

The rule is motivated by implementation and testing limitations. None of them shall be based on error-prone assumptions on the data size, since there is an elegant way to actually define reasonable constrains. Guidance on sub-typing is found in ETR 060 [3], subclause 5.4.

Rule 10: If one library element in different versions of the library or different library elements in one version of the library share a common property, this shared common property shall be expressed in terms of ASN.1 sub-typing.

This rule ensures, that the interconnection of library elements will be visible. Keeping track of the relationship to the different library element is a very important factor for the reusability. Without sub-typing the relationship of two library items might not be obvious, which would exclude potential users from being notified upon requested changes that might affect them.

In order to achieve a sound library every kind of sub-typing should be applied, including inner sub-typing and components of. Guidance on sub-typing is found in ETR 060 [3], subclause 5.4.

This rule is motivation by means of type equivalence. An library element including the property of another library element shall reference that library element by name and not re-define the definition of that library element, since reusability is the main aim of the library.

Rule 11: A library element shall not re-define a semantical equivalent library element. In such cases sub-typing or type references shall be used.

Rule 12: The library shall be self-contained. Library elements may only reference other library elements in the library. No reference to any definition outside the library is allowed.

The motivation of this rule is that the library should not depend on other standards that are subject of change. A change of the library has to be clear to every user and should never be hidden in some other document.

5.2 Library index rules

This subclause defines a set of rules applicable to the library index. It is the duty of the LMO to either apply the rules defined in here or issue a revised version of this TCR-TR.

Rule 13: The library index shall be an ETR, both concerning contents and structure.

The LIB-INDEX will capture the history and relations of events performed upon the library. This information has no binding impact outside ETSI. However it is significant for maintaining the library over time. That document was chosen to be an ETR in order to reflect the fact that is will be updated more often than any other library document.

NOTE: The LMO may later decide to change the LIB-INDEX into an data base application.

5.2.1 Library index structure

Rule 14: The library index will be paper based.

The rule is motivated by the fact that all ETRs are paper based.

NOTE: An electronic version of the library index may exist in parallel with the paper based version.

Rule 15: All library index items shall be collected in one document, the LIB-INDEX.

The rule is motivated by reasons of maintenance. To maintain several documents is both costly and can be a source for redundancies and errors.

5.2.2 Library index contents

Rule 16: The library index shall, for every library element, list the corresponding standards and recommendations that import this definition (users). Additionally it shall list standards and recommendations that do not import these definitions but rather define them themselves (definers).

This rule is motivated by the intentions of the library. Without such a list, it is impossible to track down all parties involved when a change to a library element is requested.

5.3 Library Maintenance Organization (LMO) rules

This subclause defines all rules needed for maintaining and changing the contents of the library as well as the library index. No administrative procedures are defined.

NOTE: It is possible to extend this TCR-TR with all rules and definitions needed to define the structure of the LMO as well as its internal administrative behaviour.

It is obvious that a cross-committee group or organization close connected to the ETSI secretariat shall maintain the library and its index. They have to ensure that the rules and procedures defined here-in are obeyed executed correctly.

5.3.1 Maintaining the library

Rule 17: The technical responsibility for maintaining the library lies with LMO. The LMO may delegate this responsibility to any other organization, but it shall keep the overall technical co-ordination and responsibility of the maintenance.

To have one named organization maintaining the library and the library index will ease the use of the library as well as clarifying responsibility to the outside world. However, by supporting delegation of responsibility will not only proclaim the existence of the library, but also link befitting knowledge to the organization.

Rule 18: Only the LMO shall process the procedures that modify the library.

By delegating the responsibility of maintaining the library, conflicts in performing procedures that modifies the library may arise between different sub-organizations connected to the LMO. To avoid these conflicts to happen, only the LMO shall be qualified to performing procedures that modify the library.

5.3.2 Maintaining the library index

Rule 19: Only the LMO shall process the procedures that modify the library index.

By delegating the responsibility of maintaining the library index, conflicts in performing procedures that modifies the library index may arise between different sub-organizations connected to the LMO. To avoid these conflicts to happen, only the LMO shall be qualified to performing procedures that modify the library index.

5.3.3 Library user support

Rule 20: The use of library elements shall be traceable by updating LIB-INDEX whenever such reference is requested.

This rule is motivated for capturing the history and relations of events performed to the library.

Rule 21: Whenever an library user makes a reference to some element residing in the library, that reference has to be made through the public interface as defined in ETSI-LIB. No direct reference to any specific module residing inside the library is allowed.

As no other possibility exist for referencing library elements, this is the only allowed method. Any other method is illegal and registers the referencing part as a re-definer of the referenced library element.

5.3.4 Version handling

It is important to have rules for handling different versions of these documents in a proper way.

Rule 22: The responsibility for maintaining the versions falls on the LMO.

As only the LMO may produce new versions of the LIB-R&P, ETSI-LIB and the LIB-INDEX, the LMO shall be responsible for the version management of these documents.

Rule 23: At a specific moment LIB-R&P, ETSI-LIB and LIB-INDEX shall each have a version number sequence added to the document title. This dependency is described by adding a version number sequence to the title of each document as follows:

LIB-R&P	Version X;
ETSI-LIB	Version X.Y;
LIB-INDEX	Version X.Y.Z.

where X, Y and Z are the version numbers of current version of LIB-R&P, ETSI-LIB and LIB-INDEX respectively.

This rule is motivated by the need of traceability between each documents, which is of great importance. The soundness of the library index is defined by the library and the correctness of the library is defined by this TCR-TR. It must thereby be possible to trace this flow of dependency.

The procedural behaviour of updating the different versions is described in clause 7.

6 Procedure definitions

The procedures defined in this TCR-TR are a set of procedures that shall be used to change the library the library index in terms of contents and structure. No other procedures exist for the library or the library index. All other procedures needed to support the LMO in its work shall be defined by that LMO.

NOTE: A BNF of the library procedures as well as a procedural semantic definition is given in annex B.

Rule 24: Every library procedure is addressed to the latest version of the library. No library procedure is addressed to the library index directly.

This rule clarifies that only one version of the library can exist at a specific moment in time.

In case of inconsistency between the procedure definitions stated below and the procedural semantic definition is given in annex B, the latter takes precedence.

6.1 Request

The Request procedure is a procedure targeting the LMO.

Rule 25: The Request procedure shall contain one of the following library procedure:

- register;
- de-register;
- modify;
- remove.

It is the duty of the LMO to execute the library procedure embedded in the Request.

This rule is motivated by the need of executability of a library request. As a library request only can contain on single library procedure, the execution of that library request will either succeed or fail depending on the embedded library procedure. If a library request contains more that one library procedure, the execution result of that library request may be unpredictable.

Rule 26: The result of performing the embedded library procedure shall be returned to the initiator of the library request.

If a library request modifies the ETSI-LIB, the LIB-INDEX or both, and thereby creates an interim version of these documents, the final version of that document shall be returned to the initiator of the Request and not an interim version.

6.1.1 Register

Register is a library procedure that registers the initiator as a user of a library element. If the library element is not present in the requested version of the library it is added to the library. If the library element is present in the requested version of the library no change to the library is done. In both cases, the procedure Register updates the library index with a new library element, the initiator, being a user of the registered library element.

Rule 27: If a Register library request contains substructure definitions, their registered users shall be the definition containing the reference to that substructure.

The result of executing the library procedure Register is an interim version of LIB-INDEX with the initiator of the Register request registered as a user of its request argument, and a possibly interim version of the ETSI-LIB containing a new library element.

6.1.2 De-register

The procedure De-register de-registers a user of a library element from the LIB-INDEX. The library is unchanged and an interim version of the LIB-INDEX is produced with the initiator removed as a user of the library element.

De-register's results are an unchanged ETSI-LIB and an interim version of the LIB-INDEX.

NOTE: If the de-registered user was the last one to use the particular library element, it is up to the LMO to execute a Remove procedure.

6.1.3 Modify

Modify is a library procedure that modifies a library element residing in the library. The Modify procedure can be seen as an execution performed in two steps:

Step 1: Execute library procedure De-register with the original library element as its argument in order to remove the initiator of the request from the LIB-INDEX as a user of the library element.

Step 2: Execute library procedure Register with the modified version of the library element in order to add the new library element to the library and register the initiator as a user of that library element.

NOTE 1: No interim version of the library or the LIB-INDEX shall exist between Step 1 and Step 2.

The result of executing the library procedure Modify is an interim version of the LIB-INDEX and an interim version of the ETSI-LIB containing a new library element.

Rule 28: Any modification request shall comply with the compatibility rules defined in ETR 060 [3].

This rule is motivated by stable upgrading. Newer standards shall be able to receive messages from their older counterparts. Should for any reason the need for incompatible definitions arise, such a request shall be expressed via the Request procedure. It is then the responsibility of the LMO to accept or reject this request.

Rule 29: The ASN.1 identifier of the modified library element shall be the one from the original element.

The name of a specific library item shall continually denote the latest version of that library element. To avoid re-naming of library elements processed in a Modify procedure, the element name shall be aligned to the modified version and the original library element shall be renamed.

Rule 30: The Modify procedure shall rename the ASN.1 identifier of the original library element to

identifier "-v" X "-" Y

where X and Y are the version numbers of current version of this TCR-TR and ETSI-LIB respectively.

NOTE 2: Unless requested, all library internal users continue to use the old version of the identifier. That means, a change is not automatically propagated. However, all external users that would be affected (directly or indirectly) if the change was propagated should be notified and asked to consider to become users of the new definition.

This rule ensure that newer standards can automatically reference the most recent version of any library element, while keeping track of the applied changes.

EXAMPLE: The definition:

```
ISDN-AddressString ::= OCTET STRING (SIZE (1 .. 9))
```

in library version 99 upon being modified shall lead to the following definitions in version 100:

```
ISDN-AddressString ::= OCTET STRING (SIZE (1 .. 20))
ISDN-AddressString-v1-99 ::= ISDN-AddressString (SIZE (1 .. 9))
```

NOTE 3: It may seem unnecessary to keep `ISDN-AddressString-v1-99`, as every user registered for the old definition will still reference version 99 of the library. However, these users may later upgrade to the newest version of the library. Since they were users of the version 99 it is immediately transparent to them that `ISDN-AddressString` has been changed; hence it is their choice to either register as user of `ISDN-AddressString` or `ISDN-AddressString-v1-99`.

6.1.4 Remove

Remove is a library procedure used by the LMO only. Its purpose is to allow the LMO to delete a library element from the library that is no longer in use or no longer being requested for registration.

Rule 31: The initiator of the Request shall only be the LMO itself.

This rule will secure the contents of the library.

Rule 32: The Remove procedure can only be performed if no Register requests are present for the element that is to be removed from the library.

This rule will easy the work for the LMO. As a Remove procedure removes an item from the library and a Register procedure may add an element to the library (and thereby creating an interim version of the ETSI-LIB) a Remove and a Register procedure may not be requested at the same time for the same library element.

Rule 33: The Remove procedure can only be performed if no users are registered for the element that is to be removed from the library.

This rule will guarantee sound library index. For every library user registered in the library index, the library element the user is registered for has to be present in the library.

The result of executing the library procedure Remove is an interim version of the LIB-INDEX and an interim version of the ETSI-LIB containing one library element removed from the library.

6.2 Execution of multiple requests

As the execution of library procedure Request creates a new version of either the ETSI-LIB, the LIB-INDEX or both, execution of multiple Requests has to be defined.

When the LMO receives a set of requests where each request contains a library procedure it is the responsibility of the LMO to detect similarities, errors and contradictions in these Requests according to:

– other received requests;
– elements residing in the library.

Rule 34: Multiple Requests shall be executed sequentially, arranged in some order accomplished by LMO that resolves any contradictions.

The result of executing a set of Requests is one possible new version of the LIB-INDEX and one possible new version of the ETSI-LIB.

NOTE 1: After executing a set of Requests, it is possible that the library is unchanged. This can occur when the set of Requests only contains de-register procedures or when the set of Requests consists of Register procedures for a library element already residing in the library. In these cases the execution of multiple Requests does not resolve to a new version of the ETSI-LIB.

NOTE 2: As the Remove procedure may stand in conflict with other library requests, it is suggested to execute all Remove procedures last in the chain of library requests.

6.3 Version handling

6.3.1 New version of this TCR-TR

Rule 35: Whenever a new version of ETSI-LIB or LIB-INDEX is issued the rules and procedures of this TCR-TR shall be applicable. Otherwise they shall be withdrawn.

This rule ensures the consistency between the three documents, since both ETSI-LIB and LIB-INDEX are derived form the templates in annex D and annex E. However in exceptional cases the LMO may choose to modify this TCR-TR accordingly instead.

6.3.2 New version of ETSI-LIB

Rule 36: Whenever a new version of this TCR-TR is issued the rules and procedures shall be applicable to the ETSI-LIB. This has to be verified by the LMO and in order to reflect the numbering scheme ETSI-LIB shall be re-issued as well.

This rule ensures the consistency between the three documents, since ETSI-LIB is derived form the template in annex D.

6.3.3 New version of LIB-INDEX

Rule 37: Whenever a new version of this TCR-TR is issued the rules and procedures shall be applicable to the LIB-INDEX. This has to be verified by the LMO and in order to reflect the numbering scheme LIB-INDEX shall be re-issued as well.

This rule ensures the consistency between the three documents, since LIB-INDEX is derived form the template in annex E.

6.4 Naming convention of documents

A new version of the this TCR-TR, ETSI-LIB or the LIB-INDEX is created when its contents is modified. The LMO has to have a library procedure for this version handling. This version handling procedure is defined in this subclause.

In the context of the library there exist the three following documents:

LIB-R&P	this TCR-TR;
ETSI-LIB	containing the library;
LIB-INDEX	containing the library index.

Of all the three document listed above, the LIB-R&P has the highest precedence and the LIB-INDEX the lowest from a version number point of view. At a specific moment all these three documents will each have a version number sequence as follows:

LIB-R&P	Version X;
ETSI-LIB	Version X.Y;
LIB-INDEX	Version X.Y.Z;

where X, Y and Z are the version numbers of current version of LIB-R&P, ETSI-LIB and LIB-INDEX respectively.

Any change to any number in the version number sequence shall apply to all documents with lower precedence. Any successor to that version number in the version number sequence is reset to 1.

NOTE: Version number 0 is reserved for templates as defined in annex D and annex E.

EXAMPLE:

current versions:	LIB-R&P	Version 1;
	ETSI-LIB	Version 1.3;
	LIB-INDEX	Version 1.3.2,
if LIB-R&P changes:	LIB-R&P	Version 2;
	ETSI-LIB	Version 2.1;
	LIB-INDEX	Version 2.1.1,
if ETSI-LIB changes:	LIB-R&P	Version 1;
	ETSI-LIB	Version 1.4;
	LIB-INDEX	Version 1.4.1,
if LIB-INDEX changes:	LIB-R&P	Version 1;
	ETSI-LIB	Version 1.3;
	LIB-INDEX	Version 1.3.3.

When a new version of a document is generated, the templates in annex D and annex E may be used as defined in clause 7.

7 Managing documents

This clause describes a convenient procedure for managing the two documents ETSI-LIB and LIB-INDEX. The procedure described below make use of the templates provided in annex D and annex E. These templates shall be used when a new version of the ETSI-LIB or LIB-INDEX is produced.

The motivation for these templates is that the they will ease the work for the LMO when new versions are produced. The major task for the LMO shall be to focus on the library and the library index in terms of contents, correctness, completeness, etc., and not spend time on managing documents. It is also important to mention that different versions of the ETSI-LIB and/or LIB-INDEX must be transparent to any reader/user of this TCR-TR. To preserve similarities between different versions will heavily impact the useability of the library.

Throughout the templates provided in annex D and annex E, respectively, *italics* are used for information that is not meant to be part of the resulting ETSI-LIB or LIB-INDEX. It is introduced to clarify how to accomplish this task. Therefore, any italic text shall be deleted from the final document. Where plain text is used, it is meant to be found in the resulting ETSI-LIB or LIB-INDEX as it is.

The provided templates are structured like true ETS and ETR documents. However, in order to fit into the scheme of an annex to a TCR-TR, the numbering scheme could not be met. Nevertheless, the titles used will fit the ones from the respective documents.

At any time the ETSI-LIB and the LIB-INDEX shall be instances of the templates in annex D and annex E, respectively. General changes or modification to the ETSI-LIB and the LIB-INDEX shall be reflected in annex D and annex E, respectively.

A new version of the ETSI-LIB and/or the LIB-INDEX is issued when:

- the library/library index main contents has been modified;
- general modifications to the document and its body text are required.

In the first case, a new version of the document will only contain modifications to the actual library/library index. No changes to the body text of the document are performed and therefore no changes to the corresponding template residing in this TCR-TR.

In the latter case, changes to the body text are required. These changes should be expressed in the corresponding templates in order to enhance the templates and thereby its useability for future versions.

NOTE: If the change/modification has a major impact on the structure and/or contents of the document, it is strongly recommended that changes to the body text shall be revealed in corresponding template of the document residing in this TCR-TR. In that case, a new version of this TCR-TR is attained.

Annex A: Summary of rules

A.1 List of rules applicable to the ASN.1 library

Rule 1: The library shall be an ETS, both concerning contents and structure.

Rule 2: The ASN.1 library will be paper based.

Rule 3: The library shall consist of a collection of ASN.1 modules into which related library elements are grouped.

Rule 4: The library and all its modules shall be collected in one document. These modules are the main contents of the ETSI-LIB.

Rule 5: One module acts as the public interface to the library and this module is called the root. This root imports and exports every library element defined in any other library module belonging to the library.

Rule 6: The library shall only contain validated ASN.1.

Rule 7: The library elements shall be identified as common application elements by the LMO.

Rule 8: Every library element shall only be defined once in the library. No library element shall have a syntactical or semantical duplicate defined elsewhere in the library.

Rule 9: Every library element of type integer, octet string, bit string, character string, sequence of and set of shall have a reasonable size- or value constraint.

Rule 10: If one library element in different versions of the library or different library elements in one version of the library share a common property, this shared common property shall be expressed in terms of ASN.1 sub-typing.

Rule 11: A library element shall not re-define a semantical equivalent library element. In such cases sub-typing or type references shall be used.

Rule 12: The library shall be self-contained. Library elements may only reference other library elements in the library. No reference to any definition outside the library is allowed.

Rule 13: The library index shall be an ETR, both concerning contents and structure.

Rule 14: The library index will be paper based.

Rule 15: All library index items shall be collected in one document, the LIB-INDEX.

Rule 16: The library index shall, for every library element, list the corresponding standards and recommendations that import this definition (users). Additionally it shall list standards and recommendations that do not import these definitions but rather define them themselves (definers).

Rule 17: The technical responsibility for maintaining the library lies with LMO. The LMO may delegate this responsibility to any other organization, but it shall keep the overall technical co-ordination and responsibility of the maintenance.

Rule 18: Only the LMO shall process the procedures that modify the library.

Rule 19: Only the LMO shall process the procedures that modify the library index.

Rule 20: The use of library elements shall be traceable by updating LIB-INDEX whenever such reference is requested.

Rule 21: Whenever an library user makes a reference to some element residing in the library, that reference has to be made through the public interface as defined in ETSI-LIB. No direct reference to any specific module residing inside the library is allowed.

Rule 22: The responsibility for maintaining the versions falls on the LMO.

Rule 23: At a specific moment LIB-R&P, ETSI-LIB and LIB-INDEX shall each have a version number sequence added to the document title. This dependency is described by adding a version number sequence to the title of each document as follows:

LIB-R&P	Version X;
ETSI-LIB	Version X.Y;
LIB-INDEX	Version X.Y.Z.

where X, Y and Z are the version numbers of current version of LIB-R&P, ETSI-LIB and LIB-INDEX respectively.

Rule 24: Every library procedure is addressed to the latest version of the library. No library procedure is addressed to the library index directly.

Rule 25: The Request procedure shall contain one of the following library procedure:

- register;
- de-register;
- modify;
- remove.

It is the duty of the LMO to execute the library procedure embedded in the Request.

Rule 26: The result of performing the embedded library procedure shall be returned to the initiator of the library request.

Rule 27: If a Register library request contains substructure definitions, their registered users shall be the definition containing the reference to that substructure.

Rule 28: Any modification request shall comply with the compatibility rules defined in ETR 060 [3].

Rule 29: The ASN.1 identifier of the modified library element shall be the one from the original element.

Rule 30: The Modify procedure shall rename the ASN.1 identifier of the original library element to

identifier "-v" X "-" Y

where X and Y are the version numbers of current version of this TCR-TR and ETSI-LIB respectively.

Rule 31: The initiator of the Request shall only be the LMO itself.

Rule 32: The Remove procedure can only be performed if no Register requests are present for the element that is to be removed from the library.

Rule 33: The Remove procedure can only be performed if no users are registered for the element that is to be removed from the library.

Rule 34: Multiple Requests shall be executed sequentially, arranged in some order accomplished by LMO that resolves any contradictions.

Rule 35: Whenever a new version of ETSI-LIB or LIB-INDEX is issued the rules and procedures of this TCR-TR shall be applicable. Otherwise they shall be withdrawn.

Rule 36: Whenever a new version of this TCR-TR is issued the rules and procedures shall be applicable to the ETSI-LIB. This has to be verified by the LMO and in order to reflect the numbering scheme ETSI-LIB shall be re-issued as well.

Rule 37: Whenever a new version of this TCR-TR is issued the rules and procedures shall be applicable to the LIB-INDEX. This has to be verified by the LMO and in order to reflect the numbering scheme LIB-INDEX shall be re-issued as well.

Annex B: Library procedures

B.1 BNF notation of the library procedures

The compositions of all library procedures are defined by using the BNF grammar stated below:

Request ::=	ReturnValue **Request** "(" Initiator "," Procedure ")"
ReturnValue ::=	*free text*
Initiator ::=	*the initiator of the request*
Procedure ::=	Register | De-register | Modify | Remove
Register ::=	ReturnValue **Register** "(" Initiator "," Argument ")"
De-register ::=	ReturnValue **De-register** "(" Initiator "," Argument ")"
Modify ::=	ReturnValue **Modify** "(" Initiator "," ModifyArgument ")"
Remove ::=	ReturnValue **Remove** "(" Initiator "," Argument ")"
Argument ::=	*a Library element*
ModifyArgument ::=	Argument "," Argument

NOTE 1: Library procedures are defined in **bold**.

NOTE 2: The above BNF may be extended to allow more than one argument to each procedure. This might cause problems to the LMO when executing a Request containing several library procedures and/or when each library procedure contains more than one argument. It is not defined what the semantic shall be of a partly successful execution (e.g. what is the returned result of library procedure "**Request**(**Add**(LibraryElementA, LibraryElementB))" where only LibraryElementA is added to the library?).

B.2 Procedural semantics

This clause describes the execution of the defined procedures.

For every procedure described below, ETSI-LIB and LIB-INDEX are assumed to be global entities.

B.2.1 Execution of Request

ReturnValue **Request**(**LibraryProcedure**(Initiator, LibraryElement))

Step 1: If the LibraryElement is validated ASN.1 (**Rule 6**), continue with Step 2. If not, continue with Step 4.

NOTE: Step 1 may be implemented by using a tool that automatically checks the LibraryElement. A list of recommended tools can be found in TCR-TR 019 [4].

Step 2: Execute library procedure **LibraryProcedure**(Initiator, LibraryElement). Continue with Step 3.

Step 3: Let the return value be the value returned from the above **LibraryProcedure** (**Rule 26**). Continue with Step 5.

Step 4: Let the return value be a comment stating that current LibraryElement is invalid ASN.1 and thereby cannot be processed further. Continue with Step 5.

Step 5: Stop execution.

B.2.2 Execution of Register

ReturnValue **Register** (Initiator, LibraryElement)

Step 1: If the LibraryElement does not reside in current version of the library (**Rule 8**), continue with Step 2. If it does, continue with Step 5.

Step 2: If the LibraryElement is identified as a *Common Application Element* (**Rule 7**), continue with Step 3. If not, continue with Step 8.

Step 3: Create an interim version of the ETSI-LIB and add the current LibraryElement to the interim version. Continue with Step 4.

Step 4: Create an interim version of the LIB-INDEX and add the Initiator as a user of the LibraryElement (**Rule 20**). Continue with Step 5.

Step 5: Let the return value be the interim version of the ETSI-LIB and the interim version of the LIB-INDEX. Continue with Step 8.

Step 6: Create an interim version of the LIB-INDEX and add the Initiator as an user of the LibraryElement (**Rule 20**). Continue with Step 7.

Step 7: Let the return value be the interim version of the LIB-INDEX. Continue with Step 9.

Step 8: Let the return value be a comment stating that current LibraryElement is not identified as a Common Application Element. Continue with Step 9.

Step 9: Stop execution.

B.2.3 Execution of De-register

ReturnValue **De-register** (Initiator, LibraryElement)

Step 1: Create an interim version of the LIB-INDEX and delete the Initiator as being a user of the LibraryElement. Continue with Step 2.

Step 2: Let the return value be the interim version of the LIB-INDEX. Continue with Step 3.

Step 3: Stop execution.

B.2.4 Execution of Modify

ReturnValue **Modify** (Initiator, OriginalLibraryElement, ModifiedLibraryElement)

Step 1: Create an interim version of the LIB-INDEX and delete the Initiator as being a user of OriginalLibraryElement. Continue with Step 2.

Step 2: Create an interim version of the ETSI-LIB and add ModifiedLibraryElement to the interim version. Continue with Step 3.

Step 3: Reuse the interim version of the LIB-INDEX created in Step 1 and add the Initiator as being a user of ModifiedLibraryElement. Continue with Step 4.

Step 4: Reuse the interim version of the ETSI-LIB created in Step 2 and add OriginalLibraryElement with suffix equal to current version of the ETSI-LIB to the interim library (**Rule 30**). Continue with Step 5.

Step 5: Reuse the interim version of the LIB-INDEX created in Step 1 and add all users of OriginalLibraryElements as potential users of the element added in Step 4. Continue with Step 6.

Step 6: Let the return value be the interim version of the ETSI-LIB and the interim version of the LIB-INDEX. Continue with Step 6.

NOTE: All users of the modified library element shall be informed about the modification.

Step 7: Stop execution.

B.2.5 Execution of Remove

ReturnValue **Remove** (Initiator, LibraryElement)

Step 1: If current Initiator is the LMO, continue with Step 2 (**Rule 31**). If not, continue with Step 7.

NOTE 1: Only LMO is allowed to execute library procedure Remove.

Step 2: If there exists no Register requests (**Rule 32**) for current LibraryElement, continue with Step 3. If there is, continue with Step 8.

Step 3: If no user of current LibraryElement exists in current LIB-INDEX (**Rule 33**), continue with Step 6. Otherwise, continue with Step 4.

Step 4: If the current LibraryElement has not been in a Register request for a specified period set by the LMO, continue with Step 5. If not, continue with Step 9.

NOTE 2: It is the responsibility of the LMO to specify the maximum period or maximum versions a LibraryElement can reside in the library without no new users added to the LIB-INDEX using that library element.

Step 5: Create an interim version of the LIB-INDEX and delete all users using current LibraryElement. Continue with Step 6.

Step 6: Create an interim version of the ETSI-LIB and delete current LibraryElement from the interim version. Continue with Step 10.

Step 7: Let the return value be a comment stating that as the initiator is not the LMO, this procedure cannot be processed any further. Continue with Step 11.

Step 8: Let the return value be a comment stating that the LibraryElement cannot be removed as there are Register operation requested for that LibraryElement. Continue with Step 11.

Step 9: Let the return value be a comment stating that the time limit for has not expired and the LibraryElement cannot be deleted. Continue with Step 11.

Step 10: Let the return value be the interim version of the ETSI-LIB and the interim version of the LIB-INDEX. Continue with Step 11.

Step 11: Stop execution.

Annex C: Examples

C.1 Introduction

C.1.1 General concept

This annex contains examples of how the library and the library index shall be used. Different library requests, all put forward to a fictive LMO, are discussed and the corresponding actions performed by the LMO will be explained. No effort is made to describe the LMO's internal structure and behaviour.

The basis for this annex are three documents:

- LIB-R&P Version 1;
- ETSI-LIB Version 1.0 (as contained in annex D);
- LIB-INDEX Version 1.0.0 (as contained in annex E).

All these tree documents are assumed as that document's initial version and they are accordingly named Version 1, 1.0 and 1.0.0, respectively. From this initial version, several versions of the above documents will be issued as the LMO receives library requests and performs library procedures. These versions will be named Version X, X.Y and X.Y.Z respectively.

NOTE: In this annex, no changes will be made to the LIB-R&P and it will therefore only be present as LIB-R&P version 1.

The LMO will in the following examples have meetings, where library requests are collected and treated accordingly. The output of each meeting will be a new version of the ETSI-LIB and/or the LIB-INDEX. As the ETSI-LIB and the LIB-INDEX contain text that will not be changed over time, only changes and modifications made to the main contents of the ETSI-LIB and/or the LIB-INDEX are visualized in this annex.

C.1.2 About this annex

This annex is structured as follows:

First, a background is given where the objective of the ETSI library is described in a general approach. After the background, different examples are given, each example containing the below elements:

a) a table describing the incoming status of the three documents;
b) a table containing a collection of Library Requests;
c) a table describing the processing and the corresponding result of each and every Request;

NOTE 1: The order of appearance in the table described in c) might be somewhat different when compared with the table given in b). This re-arrangement of the table contents is accomplished by the LMO for the purpose of processing as many Library Requests as possible, see **Rule 34** at page 18.

d) a (possibly new) version of the ASN.1 library;
e) a (possibly new) version of the ASN.1 library index.

In each example, references are made to LIB-R&P, ETSI-LIB and LIB-INDEX when appropriate.

It is strongly recommended that the LMO revises this annex to contain more examples, thereby capturing the history and relations of events.

NOTE 2: In the examples described in this annex, new version of the ETSI-LIB and/or the LIB-INDEX are seen as input to the following example, thereby forming a chain of events, all related in terms of history and contents. For future use, it is allowed to break this chain.

C.1.3 Intended readers

This annex is intended to be read by future LMO members in order to capture the general concept of the ASN.1 library and the ASN.1 library index.

C.2 Background

At first TCR-TR 019 [4] was compiled, which evaluates different ASN.1 tools for their useability to be used by ETSI rapporteurs and protocol designers. The use of tools will support quality management within the work of producing documents containing ASN.1. Three tools were recommended. One of these, the Siemens tool[1] has been used to automatically extract and analyze the ASN.1 type definitions residing in the considered standards and recommendation.

The second goal was to set up a Common Application Element Library, a library containing ASN.1 type definitions that have a common property. The advantage of this centralized library are 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.

This resulted in three documents:

- LIB-R&P Version 1 ASN.1 library rules and procedures;
- ETSI-LIB Version 1.1 The first version of the ASN.1 library;
- LIB-INDEX Version 1.1.1 The first version of the ASN.1 library index.

The LIB-R&P Version 1 (this TCR-TR) holds a collection of rules and procedures. The rules and procedures are defined to maintain the ETSI-LIB as well as the LIB-INDEX. The ETSI-LIB Version 1.1 is the first version of the ASN.1 library and the LIB-INDEX Version 1.1.1 is the ASN.1 library index, a document maintaining library users re-definers. This LIB-INDEX is required in order to maintain history and usage of the library.

C.3 Examples

C.3.1 Example 1

Table C.1: Incoming document status

LIB-R&P	ETSI-LIB	LIB-INDEX
Version 1	Version 1.0	Version 1.0.0

Table C.2: Incoming Library Requests

No	Request	Initiator	Argument
1	Register	ETS 300 599	ISDN-AddressString ::= OCTET STRING (SIZE(1 .. 9))
2	Register	ETS 300 xxx	NoConstraintType ::= INTEGER
3	Register	ETS 300 nnn	NotValidType ::= INTEGER {a(-1), b(0), c(-1)}
4	Register	ETS 300 nnn	MyPrivateFlag ::= BOOLEAN

---

[1] TAG (TTCN - ASN.1 - GDMO) was used in version 2.10a, while TCR-TR 019 [4] evaluated version 1.7a of the same tool. However at that time it was named ASN1.

Table C.3: LMO meeting result

No	Process	Result
2	Follow procedure Register: no reasonable value-constraint given **(Rule 9)**	Request rejected due to library rule 9.
3	Follow procedure Register: - not a valid ASN.1 type definition **(Rule 6)** - no reasonable value-constraint given **(Rule 9)**	Request rejected due to library rules 6 and 9.
4	Follow procedure Register: element not identified as a common application element **(Rule 7)**	Request rejected due to library rule 7.
1	Follow procedure Register: - add element to library - subscribe initiator as element user	- ETSI-LIB Version 1.1 - LIB-INDEX Version 1.1.1

Table C.4: ASN.1 library version 1.1

```
ETSI-Library {ccitt identified-organization etsi(0) etsi-library(2)
              asn1-module(0) tcrtr-version1(1) ets-version1(1)}
DEFINITIONS IMPLICIT TAGS

::=

BEGIN

ISDN-AddressString ::= OCTET STRING (SIZE (1 .. 9))

END
```

Table C.5: ASN.1 library index version 1.1.1

Library Element	Users	Definers	Note
ISDN-AddressString	ETS 300 599		

C.3.2 Example 2

Table C.6: Incoming document status

LIB-R&P	ETSI-LIB	LIB-INDEX
Version 1	Version 1.1	Version 1.1.1

Table C.7: Incoming Library Requests

No	Request	Initiator	Argument
1	Register	ETS 300 xxx	ISDN-AddressString ::= OCTET STRING (SIZE(1 .. 9))

2	Register	ETS 300 nnn	InlineReDefinitionType ::= SEQUENCE {
			presentFlag BOOLEAN,
			addressString OCTET STRING (SIZE(1 .. 9))
			-- the ISDN-AddressString
			}

3	Remove	LMO	ISDN-AddressString

Table C.8: LMO meeting result

No	Process	Result
2	Follow procedure Register: element addressString re-defines ISDN-AddressString **(Rule 11)**	Request rejected due to library rule 11.
3	Follow procedure Remove: library element has an user subscribed to it **(Rule 32)**	Request rejected due to library rule 33.
1	Follow procedure Register: - do not add element to library **(Rule 8)** - subscribe initiator as element user	- ETSI-LIB Version 1.1 - LIB-INDEX Version 1.1.2

Table C.9: ASN.1 library version 1.1

```
ETSI-Library {ccitt identified-organization etsi(0) etsi-library(2)
              asn1-module(0) tcrtr-version1(1) ets-version1(1)}
DEFINITIONS IMPLICIT TAGS

::=

BEGIN

ISDN-AddressString ::= OCTET STRING (SIZE (1 .. 9))

END
```

Table C.10: ASN.1 library index version 1.1.2

Library Element	Users	Definers	Note
ISDN-AddressString	ETS 300 599 ETS 300 xxx		

C.3.3 Example 3

Table C.11: Incoming document status

LIB-R&P	ETSI-LIB	LIB-INDEX
Version 1	Version 1.1	Version 1.1.2

Table C.12: Incoming Library Requests

No	Request	Initiator	Argument
1	De-register	ETS 300 599	ISDN-AddressString
2	Remove	ETS 300 nnn	ISDN-AddressString

Table C.13: LMO meeting result

No	Process	Result
2	Follow procedure Remove: the initiator is not the LMO **(Rule 31)**	Request rejected due to library rule 27.
1	Follow procedure De-register: remove initiator as user of element	- ETSI-LIB Version 1.1 - LIB-INDEX Version 1.1.3

Table C.14: ASN.1 library version 1.1

```
ETSI-Library {ccitt identified-organization etsi(0) etsi-library(2)
              asn1-module(0) tcrtr-version1(1) ets-version1(1)}
DEFINITIONS IMPLICIT TAGS

::=

BEGIN

ISDN-AddressString ::= OCTET STRING (SIZE (1 .. 9))

END
```

Table C.15: ASN.1 library index version 1.1.3

Library Element	Users	Definers	Note
ISDN-AddressString	ETS 300 xxx		

C.3.4 Example 4

Table C.16: Incoming document status

LIB-R&P	ETSI-LIB	LIB-INDEX
Version 1	Version 1.1	Version 1.1.3

Table C.17: Incoming Library Requests

No	Request	Initiator	Argument 1	Argument 2
1	Modify	ETS 300 yyy	ISDN-AddressString	ISDN-AddressString ::= OCTET STRING (SIZE(1 .. 11))

Table C.18: LMO meeting result

No	Process	Result
1	Follow procedure Modify: - rename ISDN-AddressString to ISDN-AddressString-v1-1 **(Rule 29)**, and define it as subtype of the new definition **(Rule 10)** - subscribe initiator as user of element - subscribe users of old definition as possible users	- ETSI-LIB Version 1.2 - LIB-INDEX Version 1.2.1

Table C.19: ASN.1 library version 1.2

```
ETSI-Library {ccitt identified-organization etsi(0) etsi-library(2)
              asn1-module(0) tcrtr-version1(1) ets-version1(2)}
DEFINITIONS IMPLICIT TAGS

::=

BEGIN

ISDN-AddressString ::= OCTET STRING (SIZE (1 .. 11))
ISDN-AddressString-v1-1 ::= ISDN-AddressString (SIZE (1 .. 9))

END
```

Table C.20: ASN.1 library index version 1.2.1

Library Element	Users	Definers	Note
ISDN-AddressString	ETS 300 yyy		
ISDN-AddressString-v1-1	(ETS 300 xxx)		

C.3.5 Example 5

Table C.21: Incoming document status

LIB-R&P	ETSI-LIB	LIB-INDEX
Version 1	Version 1.2	Version 1.2.1

Table C.22: Incoming Library Requests

No	Request	Initiator	Argument 1

1	Register	ETS 300 qqq	UserSpecifiedSubaddress ::= SEQUENCE {
			subaddressInformation SubaddressInformation,
			oddCountIndicator BOOLEAN OPTIONAL
			-- used when the coding of subaddress is BCD
			}
			SubaddressInformation ::= OCTET STRING (SIZE(1..20))
			-- coded according to user requirements.
			-- Some networks may limit the subaddress
			-- value to some other length, e.g. 4 octets.

Table C.23: LMO meeting result

No	Process	Result
1	Follow procedure Register: - add elements to library - subscribe ETS 300 qqq as user of both UserSpecifiedSubaddress and SubaddressInformation **(Rule 26)**	- ETSI-LIB Version 1.3 - LIB-INDEX Version 1.3.1

Table C.24: ASN.1 library version 1.3

```
ETSI-Library {ccitt identified-organization etsi(0) etsi-library(2)
              asn1-module(0) tcrtr-version1(1) ets-version1(3)}
DEFINITIONS IMPLICIT TAGS

::=

BEGIN

ISDN-AddressString ::= OCTET STRING (SIZE (1 .. 11))
ISDN-AddressString-v1-1 ::= ISDN-AddressString (SIZE (1 .. 9))
UserSpecifiedSubaddress ::=
SEQUENCE {
        subaddressInformation     SubaddressInformation,
        oddCountIndicator         BOOLEAN OPTIONAL
        -- used when the coding of subaddress is BCD
}

SubaddressInformation ::= OCTET STRING (SIZE(1..20))
  -- coded according to user requirements.
  -- Some networks may limit the subaddress
  -- value to some other length, e.g. 4 octets.

END
```

Table C.25: ASN.1 library index version 1.3.1

Library Element	Users	Definers	Note
ISDN-AddressString	ETS 300 yyy		
ISDN-AddressString-v1-1	(ETS 300 xxx)		
UserSpecifiedSubaddress	ETS 300 qqq		
SubaddressInformation	UserSpecifiedSubaddress		

Annex D: Template for ETSI-LIB

D.1 Introduction to the ETSI-LIB template

This is a template for the ETSI-LIB. Every time a new ETSI-LIB is issued, it shall be derived from this annex to this TCR-TR. This template has the version number sequence X.0 where X is the version number of this TCR-TR. The rules and procedures defined in this TCR-TR shall be used to set up any version of the ETSI-LIB.

EWP: ETS 300 655

Document: ETS 300 655

Document Title: ASN.1 library definition version 0.0

Key words: ASN.1

D.2 Scope

This European Telecommunication Standard (ETS) defines the ETSI ASN.1 library. The library has been set up for two reasons:

- capture common application element definitions within ETSI in order to reduce the overall protocol maintenance effort;

- enlarge the reusability of ETSI protocols.

D.3 Normative references

The following references shall be included in any instance of this template:

[1] CCITT Recommendation X.208 [1]

[2] ITU-T Recommendation X.680 [2]

[3] ETS 300 351 [5]

NOTE: The above references are only effective in the real ETS. In order to achieve a consistent document, this annex refers to the references defined clause 2. Upon generation of the real ETS, those references have to be adjusted.

Any new reference needed for this clause shall be added to clause 2 of this TCR-TR.

D.4 Definitions and abbreviations

D.4.1 Definitions

LIB-R&P: throughout this ETS this term refers to *insert a reference to this TCR-TR*, which defines the generic template for this ETS, the procedures to change it and the rules that were applied to the library elements.

All other definitions for use within this subclause are defined in subclause 3.1. The definitions shall be copied into this place when this annex is used as a template for the ETSI-LIB.

Any new definition needed for this subclause shall also be added to subclause 3.1 of this TCR-TR.

D.4.2 Abbreviations

All abbreviations for use within this subclause are listed in the main document. The abbreviations shall be copied into this place when this annex is used as a template for the ETSI-LIB.

Any new abbreviations needed for this subclause shall be added to subclause 3.2 of this TCR-TR.

D.5 ETSI library definition

The module "ETSI-Library" is the main module of the library. Every reference from other standards to definitions contained herein shall be made using the ASN.1 import mechanism and the corresponding object identifier value of this main module. No other module of this ETS shall be referenced.

NOTE 1: ETS 300 351 [5] describes the structure of the ETSI object identifier tree. The ASN.1 library of ETSI is given a dedicated branch unlike other ETSs which have their ETS number incorporated in the object identifier value.

The ASN.1 definitions contained in this ETS can be automatically extracted from its electronic form. The resulting ASN.1 modules should be used in order to verify any other standard or recommendation with references to this ETS.

An index of users of this ETS is found in LIB-INDEX, which lists for every definition contained in this ETS the corresponding standards and recommendations that import this definition. Additionally it lists standards and recommendations that do not import these definitions but rather re-define them themselves.

NOTE 2: In order to achieve its intended use, the index needs to re-issued whenever a new version of this ETS is created following (refer to LIB-R&P for further details). Furthermore it has to be re-issued to reflect a changed outside world (e.g. new users).

D.5.1 ASN.1 module definitions of the library version 1.0

This version of the library is the interface to all standard and recommendations listed in LIB-INDEX, no changes shall be applied to any of the definitions contained herein without agreement of all the users (and possibly re-definers) of this definition.

NOTE: ASN.1 definitions ending with e.g. "-v2-3" are kept for compatibility purposes from an earlier version of this library, in the above example from version 2.3. Any definition without such a suffix is the most recent one, standards using older versions of the library have the choice to register for both, the original and the most recent one.

D.5.1.1 Interface module

The ASN.1 source lines are preceded by line-numbers at the left margin in order to enable the usage of the cross-reference in annex B.

An OBJECT IDENTIFIER is assigned only to the main module of the ETSI library in order to show that this is the only interface of the library.

```
1   ETSI-Library {ccitt identified-organization etsi(0) etsi-library(2)
2                 asn1-module(0) tcrtr-version1(1) ets-version0(0)}
3   DEFINITIONS IMPLICIT TAGS
4
5   ::=
6
7   BEGIN
8
9   -- Any Common Application Element definition
10
11  END
```

D.6 Annex A (informative): Expanded source for version 1.0

For every (Value)Assignment in the root ASN.1 module all the used defined types and defined values, which are defined within the ASN.1 module or imported from ASN.1 modules, are replaced by the constructs this type or value is composed of.

The fully expanded ASN.1 root module is itself a correct and equivalent representation of the ETSI library.

It allows an overview of all nested definitions.

The contents of this informative annex A of the ETS can be supplied automatically.

D.7 Annex B (informative): Cross reference for version 1.0

For every ASN.1 item such as identifier, type-reference or value-reference the cross-reference allows to locate all occurrences by means of module-name and line numbers. For that purpose line numbers are printed at the left margin in front of each ASN.1 source line starting with 1 for every module.

The items are sorted alphabetically in the cross-reference in a case-insensitive manner. Occurrences of an item are its definition and all its usage's such as in exports, imports or within a type or value assignment.

For every item additional information is provided such as kind of item (identifier, value reference, type reference), and tag, associated type and value if applicable.

The cross-reference for a root module includes all modules referred to directly or indirectly via imports.

The contents of this informative annex B of the ETS can be supplied automatically.

D.8 Annex C (informative): Bibliography

The rules and procedures stated in the following references were applied to this ETS:

- ETR 060 [3]

- insert a reference to this TCR-TR

The following references are given for informative purposes:

- ETR 210 [7]

- TCR-TR 019 [4]

The following references are given for informative purposes. They were the source for extracting the ASN.1 definitions contained herein:

The source documents for extracting the ASN.1 definitions shall be listed here.

Annex E: Template for LIB-INDEX

E.1 Introduction to the LIB-INDEX template

EWP: ETR 210

Document: ETR 210

Document Title: ASN.1 library index version 0.0.0

Key words: ASN.1

This template for LIB-INDEX has the version number sequence X.Y.0 where X is the version number of this TCR-TR and Y is the version number of current ETSI-LIB.

The rules and procedures defined in this TCR-TR are used to set up any version of this LIB-INDEX.

E.2 Scope

The main objective of this ETR is to establish a library index for the ASN.1 library, a library containing ASN.1 definitions as defined in ETS 300 655 [6].

Throughout this ETR the term "library" denotes the ASN.1 library as defied in ETSI-LIB, the term "user" denotes a unique ASN.1 module importing type definitions and/or value definitions from the library and the term "definer" denotes a unique ASN.1 module redefining types and/or values residing in the library.

Any version of this ETR shall contain an updated list of users importing type references and/or value references from a specified version of the library.

The purpose of the library index is:

- list all library elements;
- list all users of library elements;
- list all definers of library elements (non-users).

In *insert a reference to this TCR-TR,* a set of rules and procedures is defined for the use and maintenance of this ETR together with a template to generate this ETR. These rules and procedures apply to this ETR.

E.3 References

All references for use within this clause are listed in clause 2. The references shall be copied into this place when this annex is used as a template for the LIB-INDEX. Additionally, every document listed as user or definer of a library element shall be listed as well.

E.4 Definitions and abbreviations

E.4.1 Definitions

LIB-R&P: throughout this ETR this term refers *insert a reference to this TCR-TR*, which defines the generic template for this ETR, the procedures to change it and the rules applicable to this ETR.

All other definitions for use within this subclause are defined in subclause 3.1. The definitions shall be copied into this place when this annex is used as a template for the LIB-INDEX.

Any new definition needed for this subclause shall also be added to subclause 3.1 of this TCR-TR.

E.4.2 Abbreviations

All abbreviations for use within this subclause are listed in the main document. The abbreviations shall be copied into this place when this annex is used as a template for the ETSI-LIB.

Any new abbreviations needed for this subclause shall be added to subclause 3.2 of this TCR-TR.

E.5 ASN.1 library index

This clause lists for every library element defined in the library the corresponding standards and recommendations that import this definition. Additionally it lists standards and recommendations that do not imports these definitions but rather re-define them themselves.

Table 1: ASN.1 library index

Library Element	Users	Definers	Note

E.6 Annex A (informative): Bibliography

This ETR lists the following standards/recommendations as users of library elements:

The users of library elements shall be listed here.

This ETR lists the following standards/recommendations as re-definers of library elements:

The re-definers of library elements shall be listed here.

History

Document history		
September 1995	Consultation period	1995-09-13 to 1996-02-01
August 1996	First Edition	