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Telecommunications management network

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**Guidelines for Implementation Conformance  
Statement proformas for tML schemas**

ITU-T Recommendation M.3031

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## **ITU-T Recommendation M.3031**

### **Guidelines for Implementation Conformance Statement proformas for tML schemas**

#### **Summary**

This Recommendation provides guidelines for defining Schema Implementation Conformance Statement (SICS) proformas for any tML-based interface information specifications. The Schema Implementation Conformance Statement (SICS) specifies how an implementation is conformant to the proformas defined for a tML schema definition.

#### **Source**

ITU-T Recommendation M.3031 was approved on 14 July 2004 by ITU-T Study Group 4 (2001-2004) under the ITU-T Recommendation A.8 procedure.

#### **Keywords**

eXtensible Markup Language, ICS proforma, Implementation Conformance Statement, telecommunications Markup Language, tML schema.

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# ITU-T Recommendation M.3031

## Guidelines for Implementation Conformance Statement proformas for tML schemas

### 1 Scope

This Recommendation provides guidelines for defining Schema Implementation Conformance Statement (SICS) proformas for any tML-based interface information specifications. The Schema Implementation Conformance Statement (SICS) specifies how an implementation is conformant to the proformas defined for a tML schema definition.

### 2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

- [1] ITU-T Recommendation X.291 (1995), *OSI conformance testing methodology and framework for protocol Recommendations for ITU-T applications – Abstract test suite specification*.
- [2] ITU-T Recommendation X.296 (1995), *OSI conformance testing methodology and framework for protocol Recommendations for ITU-T applications – Implementation conformance statements*.
- [3] ITU-T Recommendation X.724 (1996) | ISO/IEC 10165-6:1997, *Information technology – Open Systems Interconnection – Structure of management information: Requirements and guidelines for implementation conformance statement proformas associated with OSI management*.
- [4] ITU-T Recommendation M.3030 (2002), *Telecommunications Markup Language (tML) framework*.
- [5] W3C, *eXtensible Markup Language (XML) 1.0 (Second Edition)*, 6 October 2000.
- [6] W3C, *XML Schema Part 0: Primer*, 2 May 2001.
- [7] W3C, *XML Schema Part 1: Structures*, 2 May 2001.
- [8] W3C, *XML Schema Part 2: Datatypes*, 2 May 2001.
- [9] W3C, *Namespaces in XML*, 14 January 1999.
- [10] W3C, *XML Path Language (XPath) Version 1.0*, 16 November 1999.

### **3 Definitions**

#### **3.1 Implementation conformance statements definitions**

This Recommendation makes use of the following terms defined in ITU-T Rec. X.296 [2]:

- a) (ICS) item;
- b) (ICS) question;
- c) status (value);
- d) (support) answer.

### **4 Abbreviations and acronyms**

This Recommendation uses the following abbreviations:

ICS	Implementation Conformance Statement
ITU-T	International Telecommunication Union – Telecommunication Standardization Sector
SICS	Schema Implementation Conformance Statement
tML	telecommunications Markup Language
W3C	World Wide Web Consortium
XML	eXtensible Markup Language

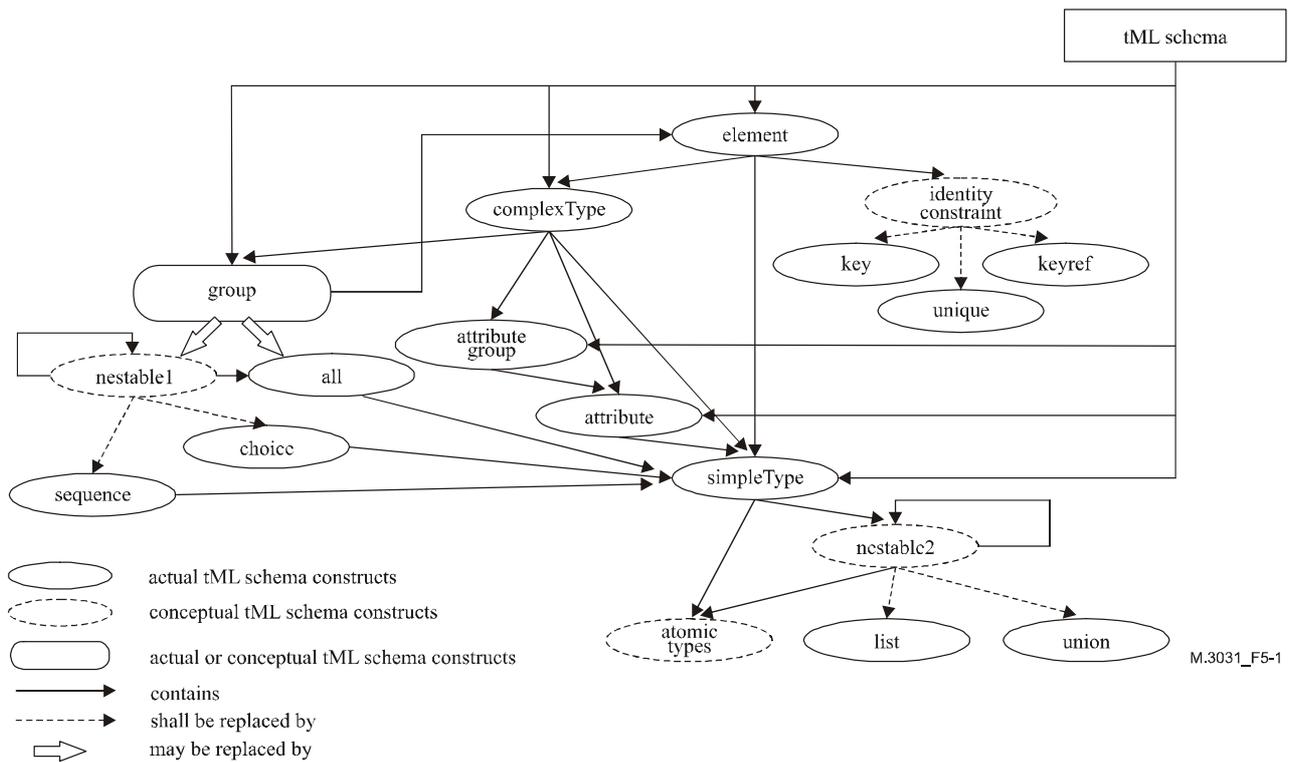
### **5 tML schema ICS proformas**

tML schema is used as a template for defining tML-based interface information. The SICS proformas must express the tML schema features such as schema elements and attributes. This clause introduces the features of tML schema and specifies the SICS proformas according to these language features.

#### **5.1 Schema overview**

tML schemas [4] express shared vocabularies and allow machines to carry out rules made by people. They provide a means for defining the structures, contents and semantics of tML documents, and define the cardinality of an element (e.g., the number of its possible occurrences) with some precision. This element may or may not have attributes, text children and sub-elements. An ordered sequence of sub-elements shall be considered if the element contains sub-elements. The definition of the target namespace [9] and several default options can also be held. tML schemas use a reference to an element or an attribute somewhat comparable to cloning an object.

According to the schema syntax specifications [6][7][8], the containment relationship among these constructs can be illustrated as in Figure 5-1.



**Figure 5-1/M.3031 – Containment relationship in tML schema specification**

NOTE 1 – Figure 5-1 illustrates the schema constructs that are related to conformance statements. Some constructs, which have nothing to do with schema conformance, such as annotation, are not shown in this figure. A conceptual tML schema construct will always be replaced by an actual tML schema construct. The "group" can be viewed as either actual or conceptual tML schema constructs according to specific schema definitions. That is, "group" can appear as an individual construct, or may be replaced by another actual schema construct.

NOTE 2 – All tML built-in simple types can be found in 2.3 of W3C XML Schema Part 0: Primer [6], which can be used for replacement in the "atomic types" in Figure 5-1.

The ICS proformas must represent the relationships shown above.

## 5.2 Guidelines for specification of SICS proformas

Proforma specifications shall follow the style as documented in the following clauses. Proforma specifications shall provide the information required by this Recommendation. Additional tables may be included for other information, if needed.

There are three levels of documentation pertaining to SICS, namely:

- a) Guidelines or recommendation tools for the production of SICS proformas;
- b) A SICS proforma, associated with a standard related to tML-based network management. This is to be entered by a supplier of the implementation. A completed SICS proforma is a SICS;
- c) A SICS prepared by a supplier of the implementation as part of a conformance claim to a standard related to tML-based network management.

In the scope of this Recommendation, only the guidelines for item b are provided.

### 5.2.1 General instructions for SICS proforma specification

This Recommendation provides instructions to construct a tML-based management interface ICS proforma specification. SICS proformas include six sub-proformas: element support proforma, type support proforma, attribute support proforma, identity constraint support proforma, complex type replacement support proforma, and substitution group support proforma. All these proformas are in a tabular form that are similar to the proformas specified in ITU-T Rec. X.724 | ISO/IEC 10165-6 [3].

Clause 5.2.2 describes the SICS proforma for element. Clause 5.2.3 describes the SICS proforma for type. Clause 5.2.4 describes the SICS proforma for attribute. Clause 5.2.5 describes the SICS proforma for identity constraint. Clause 5.2.6 describes the SICS proforma for complex type replacement. Clause 5.2.7 describes the SICS proforma for substitution group. Annex A provides an example of SICS proforma specification, which is to be entered by a supplier of an implementation.

The following common notations, defined in ITU-T Recs X.291 [1] and X.296 [2] are used for the status value column in this Recommendation:

- m Mandatory;
- o Optional;
- c Conditional;
- x Prohibited ("x" stands for "excluded");
- Not applicable or out of the scope of this Recommendation.

NOTE 1 – The notations 'c', 'm', 'o' and 'x' are prefixed by a "c:" when nested under a conditional or optional item of the same table.

NOTE 2 – The notation 'c' standing for Conditional shall be followed by a number to specify a unique condition, e.g., c1, c3. Different numbers are standard for different conditions, and these conditions shall be clearly stated somewhere in the ICS proforma document.

NOTE 3 – The notation 'o' may be suffixed by ".n" (where 'n' is a unique number) for mutually exclusive or selectable options among a set of status values. The requirement for this numbered set shall be explicitly stated, preferably in a footnote to the relevant table.

The following common notations, defined in ITU-T Recs X.291 [1] and X.296 [2] are used for the support answer column:

- Y Implemented;
- N Not implemented;
- No answer required;
- Ig The item is ignored (i.e., processed syntactically but not semantically).

The SICS proforma specification is formed by copying clauses 5.2.2, 5.2.3, 5.2.4, 5.2.5, 5.2.6 and 5.2.7, completing the tables except for the "Support" and "Additional information" columns, and extending the remaining tables to meet the requirements of the interface specification. SICS proformas shall provide tables for all the instantiable elements, and their supporting types and attributes, which are defined in a tML-based interface information model. These types can be defined using a variety of methods which can be found in Section 4.5 of W3C Recommendation XML Schema Part 0: Primer [6].

To form a SICS from a SICS proforma, the supplier of the implementation shall fill in the "Support" and, if appropriate, the "Additional information" columns of all the tables in the SICS proformas.

### 5.2.2 Element support proforma

The purpose of the proforma for element is to provide a mechanism for a supplier of an implementation who claims conformance to a schema element definition to provide conformance information in a standard form.

The element support proforma is shown in Table 5-1:

**Table 5-1/M.3031 – Element support table**

Index	Identifier	Content model	Values	Nilable	Status	Support	Additional information

where:

- The "Index" field is assigned a unique number for each instantiable root element defined in a tML-based interface information model. This index may be referenced in other tables.
- The "Identifier" field is used to identify the name of the element.
- The "Content model" field is provided to identify the content model of the element, which can be one of "empty", "any", "mixed", or "children". See 6.8 for details. The content mode is further expanded in the successive supporting tables.
- The "Values" field is used to identify the fixed or default value of this element, if it is defined in the tML schema. See 6.13 for details.
- The "Nilable" field is used to identify whether the value of this element can be set to nil or not. This field may be entered either "true" or "false".
- The "Status" field is provided to identify the conformance requirement for this element. For each instantiable non-abstract element, if it is mandatory, the "Status" shall be entered 'm'; if it is optional, this field shall be entered 'o' (it may be suffixed by ".n" for some specific conditions, see 5.2.1 for details.); if its occurrence in an instance tML document is under a specific condition, this field shall be entered 'c' followed by a unique number; if it is not instantiable, there will not be such a table for it.
- The "Additional information" field is used for the implementor to provide some implementation-specific information about this element.

### 5.2.3 Type support proforma

The purpose of the proforma for type is to provide a mechanism for a supplier of an implementation who claims conformance to a Schema type definition of an element to provide conformance information in a standard form. This table is an expansion for element support table, when the element is of a Schema type "complexType" or "simpleType". This table is expanded by the type information of the complex type and the sub-elements or sub-types it contains in a nested way.

The type support proforma is shown in Table 5-2:

**Table 5-2/M.3031 – Type support table**

Index	Identifier	Type/ Content model	Order	Nilable	Abstract	Con- straints	Values	Status	Support	Additional information

where:

- "Index" is the unique reference for a type within the element, or the unique reference for a sub-element within a complex type.
- The "Identifier" field is used to identify the name of a type or the name of a sub-element that is contained in a complex type.

- The "Type/Content model" field is used to identify the type name of an element, or the category of a simple type of a sub-element. If the row denotes a simple type, this field shall be entered the base type of the simple type, and "union" or "list" could also be entered with the base type if this simple type is such an expansion to one of the basic types; in such a case, more rows are required for the detailed descriptions for the constraints for the simple type; if the row denotes a complex type, this field shall be entered "complexType", or "group" when this is a reference to a group; if the row denotes a sub-element, this field shall be entered the type name of the element type. See 6.9 for details.
- The "Order" field is used to specify the way that the sub-elements may appear in the content model of the complex type, which may be one of the following: "sequence", "choice", "all".  
NOTE – This field is valid only when the row denotes a complex type. See 6.16 for details.
- The "Nillable" field is used to specify whether the value of the sub-element can be set to nil or not, when the row denotes a sub-element.
- The "Abstract" field is used to specify whether the complex type or the sub-element is abstract or not. This field may be entered either "true" or "false".
- The "Constraints" field is used to specify the possible constraints for the corresponding table item. The constraints may be divided into three kinds, which are the constraints for a complex type, the constraints for a sub-element, and the constraints for a simple type respectively. "block" or "-" may be applied to the constraints for complex types; "minOccurs" and "maxOccurs" may be applied to those for sub-elements; and all the applicable facets may be applied to those for elements with simple types; when multiple facets are specified in the tML schema, all of them shall be listed in this field with appropriate prefixes. See 6.12 for details.
- The "Values" field is used to identify the fixed or default value (if it is defined in the tML schema) when the row denotes a sub-element. See 6.13 for details.
- The "Additional information" field is used for implementors to indicate some implementation-specific information about a type or a sub-element.

#### 5.2.4 Attribute support proforma

The purpose of the proforma for attribute is to provide a mechanism for a supplier of an implementation who claims conformance to a schema attribute definition in a complex type to provide conformance information in a standard form. This table is an expansion for "Type support table" when the complex type or any complex types of its contained sub-elements have attributes defined. This table is expanded by the attributes information defined in the complex type or in the types of its contained sub-elements in a nested way.

The attribute support proforma is shown in Table 5-3, which is to be applied per complex type that contains attributes:

**Table 5-3/M.3031 – Attribute support table**

Index	Subindex	Identifier	Type	Use	Constraints	Values	Status	Support	Additional information

where:

- "Index" is the unique reference for the complex type that has such an attribute definition or declaration.
- The "Subindex" field is to describe the reference of each attribute of the complex type, which is formed by connecting the index of corresponding complex type and a unique number with a delimiter '!'.  
The "Identifier" field is used to identify the name of the attribute.
- The "Type" field is used to identify the type name and its base type of the attribute. As attribute can just be of a simple type, this field has the same semantic for simple types as described in 5.2.3 for the same column. See also 6.10 for details.
- The "Use" field is used to indicate the restrictions on the occurrence of the attribute in an instance document, and it shall be entered the value specified in the tML schema for this attribute, if applicable.
- The "Constraints" field is used to identify the applicable facets for the simple type of the attribute. This field has the same semantic for simple types as described in 5.2.3 for the same column. See also 6.12 for details.
- The "Values" field is used to specify the fixed or default value of this attribute, if it is defined in the tML schema. See 6.13 for details.
- The "Additional information" field is to provide a space for the implementor to add some implementation-specific information about this attribute.

### 5.2.5 Identity constraint support proforma

The purpose of the proforma for identity constraint is to provide a mechanism for a supplier of an implementation who claims conformance to a schema identity constraint definition in an element to provide conformance information in a standard form. This table is an expansion for the element support table, when the element and/or its contained sub-elements have identity constraints defined in the tML schema. This table is expanded by the identity information of the element and/or the sub-elements it contains in a nested way.

The identity constraint support proforma is shown in Table 5-4, which is to be applied per element that contains identity constraints:

**Table 5-4/M.3031 – Identity constraint support table**

<b>Index</b>	<b>Identifier</b>	<b>Category</b>	<b>Selector</b>	<b>Field</b>	<b>Status</b>	<b>Support</b>	<b>Additional information</b>

where:

- "Index" is the unique reference of this identity constraint within an element.
- The "Identifier" field is used to identify the name of the identity constraint.
- The "Category" field is used to identify the kind of uniqueness identity, which may be one of the following: "unique", "key", or "keyref". See 6.11 for details.
- The "Selector" field is used to identify the scope of the selected element for uniqueness identity, which is an XPath<sup>1</sup> expression.

<sup>1</sup> The XPath concept can be found in XML Path Language 1.0 [10].

- The "Field" field is to identify the parts (attributes or elements) relative to each selected element that has to be unique within the scope of the set of selected elements.
- The "Additional information" is to provide a space for the implementor to add some implementation-specific information about the identity constraint.

### 5.2.6 Complex type replacement support proforma

The purpose of the proforma for "complex type replacement" is to provide a mechanism for a supplier of an implementation who claims conformance to a schema complex type replacement definition to provide conformance information in a standard form. This table is a normative annex to the type support table, when the complex type of an element may be replaced by its derived type(s) in an instance document. This table is expanded by the information of all the suitable types that are derived from this complex type and is followed by another "Type support table" to describe the details for each item.

The complex type replacement support proforma is shown in Table 5-5:

**Table 5-5/M.3031 – Complex type replacement support table**

Index	Identifier	Derivation	Status	Support	Additional information

where:

- "Index" is the unique reference for the derived type within this normative annex.
- The "Identifier" field is used to indicate the name of the derived complex type.
- The "Derivation" field is used to indicate the way by which this type has extended the original complex type, which can be "extension" or "restriction".
- The "Additional information" is to provide a space for the implementor to add some implementation-specific information about the complex type replacement.

### 5.2.7 Substitution group support proforma

The purpose of the proforma for "substitution group" is to provide a mechanism for a supplier of an implementation who claims conformance to a schema substitution group definition to provide conformance information in a standard form. This table is a normative annex to the type support table, when one or more sub-elements of the complex type may be replaced by their substitution elements in an instance document. This table is expanded by the information of all the possible elements that have been defined as a substitution group for this element. This table is followed by another "Type support table" to describe the details for each element and their types.

The substitution group support proforma is shown in Table 5-6:

**Table 5-6/M.3031 – Substitution group support table**

Index	Substitutable element	Status	Support	Additional information

where:

- "Index" is the unique reference for this derived type within this normative annex.
- The "Substitutable element" field is used to indicate the name of the element that can be a substitution for the element in an instance document.
- The "Additional information" is to provide a space for the implementor to add some implementation-specific information about the substitution group.

## **6 Instructions for completing the SICS proforma**

This clause gives the instructions for completing each column defined in 5.2 and its subclauses. These instructions can be divided into two classes; one is the instruction for developing the ICS proforma specification, and the other is for the implementors to complete the proformas.

### **6.1 The "Element Support Table"**

In a complete tML-based interface information model there are one or more root elements. Corresponding to each root element there shall be an "Element Support table" in the ICS proforma. Each table is assigned a unique index within the scope of an ICS proforma document.

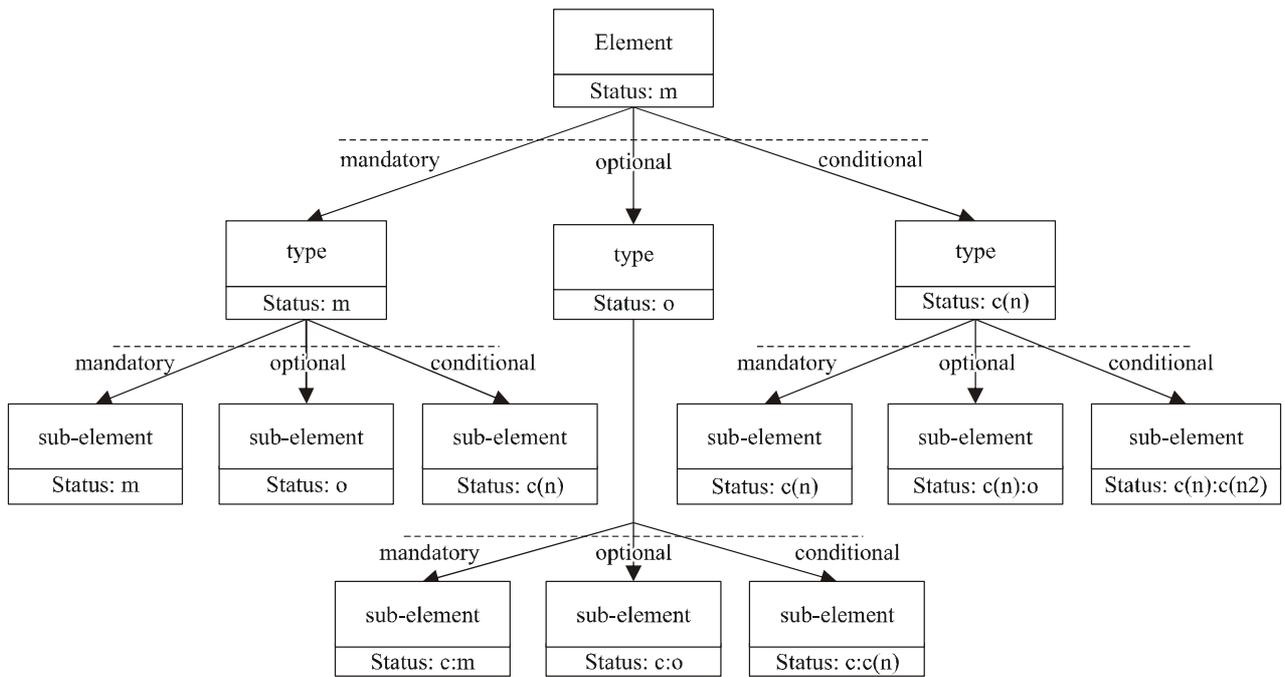
### **6.2 The "Type Support Table"**

When elements or types include nested definitions of direct and/or indirect child, the expansion of the child is not repeated more than once. Instead, after expanding once, a reference is made in the "Additional Information" column to the index where the definition is expanded. In other words, this approach avoid repeating the contents multiple times within the same table.

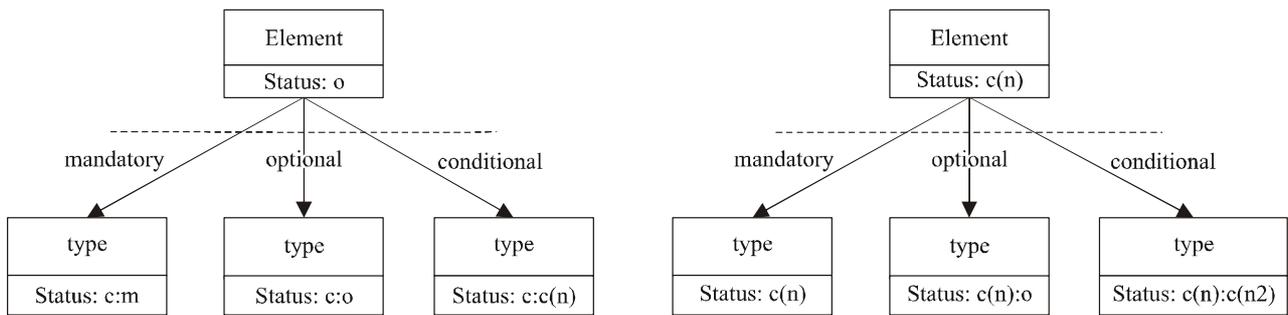
### **6.3 The "Status" column**

This column specifies the conformance requirements and indicates the level of support required for conformance to a specific tML schema. The values are the ones defined in 5.2.1.

Figure 6-1 illustrates the status of tML schema constructs with containment relationships according to different conformance requirements:



(a) The root element is mandatory



(b) The root element is optional

(c) The root element is conditional

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**Figure 6-1/M.3031 – The status diagram for contained constructs**

Guidelines for completing this field are as follows:

- a) For the "Element support table", if it is mandatory, the "Status" field shall be entered 'm'; if it is optional, this field shall be entered 'o' (it may be suffixed by ".n" for some specific conditions, see 5.2.1 for details); if its occurrence in an instance document is under a specific condition, this field shall be entered 'c' followed by a unique number. If this element is substitutable, the same rules described in item f shall be applied.
- b) For the "Type support table", if the row denotes a type, the status of the item is shown in Figure 6-1: this field shall be entered the same value as entered in "Element support table", except that when the element with this type is optional, this field shall be entered the status of the type with "c:" as the prefix. The same rule is also applicable for the constructs that have a containment relationship between them, that is, the status of a contained construct is subject to the status of its containing construct. If the row denotes a sub-element, the status follows the same rule as described above, which is also shown in Figure 6-1. If a sub-element is abstract, this field shall be entered 'x'. Otherwise, if the status of its containing type is conditional, this field is composed of the numbers starting with the value of the containing type and includes its own conformance requirements. If the status of its

containing type is 'm', this field shall be entered its own conformance requirement. If the complex type is replaceable, the same rules described in item f shall be applied.

- c) For "Attribute support table", the completing rule follows the same one as described in item b for sub-element. The default policy for the requirements is: when the "Use" field for this attribute is entered "required", its status is mandatory; if the "Use" field is entered "optional", its status is also optional; if the "Use" field is entered "prohibited", its status is also prohibited.
- d) For "Identity constraint support table", the completing rule follows the same one as described in item b for simple types.
- e) For "Complex type replacement support table", and "Substitution group support table", if there are no specific constraints specified for the type or element to be replaced or substituted (in the "Element support table" or "Type support table"), the default value for "Status" field in these two tables is optional (it may be suffixed by ".n" for some specific conditions, see 5.2.1 for details). If the type or element (sub-element) to be replaced or substituted is abstract, the default value for "Status" field in these two tables is mandatory. The default value may be changed according to the actual usage allowed or prohibited stated in the tML-based interface specification.
- f) If a root element, sub-element or complex type is substitutable or replaceable, the "status" column of the item shall be entered 'o' (it may be suffixed by ".n" for some specific conditions, see 5.2.1 for details).

#### **6.4 The "Support" column**

This column shall be completed by the supplier or implementor to indicate the support level of implementation of each item. The available selections for this field are listed in 5.2.1.

If an item is mandatory, the "Support" column must be entered 'Y' for a conformant claim. Otherwise, this column may be entered either 'Y' or 'N'.

#### **6.5 The "Index" column**

Each line within the SICS proforma is numbered at the left-hand edge of the line. This numbering is included as a means of uniquely identifying all possible implementation details within the SICS proforma.

The means of referring to individual responses is done by the following sequence.

- a) A reference to the super-clause of the item;
- b) The delimiting character ':';
- c) A unique number.

An example of the use of this notation is illustrated in Annex A.

The "Index" column exhibits the containment relationship between the constructs within the scope of a root element. The containment relationship is illustrated in 5.1: Schema overview.

#### **6.6 The "Subindex" column**

This column has the same format as the "Index" column. It is composed of numbers starting with the value in the "Index" field and includes the hierarchy down one or two levels. For the following example shown in Table 6-1, the value of the "Index" field is "2", and the "Subindex" field are entered "2.2" and "2.2.1", respectively.

**Table 6-1/M.3031 – An example for the usage of "Subindex" column**

Index	Subindex	Identifier	Type	Use	Constraints	Values	Status	Support	Additional information
2	2.2	postcode	simpleType	optional			o		
	2.2.1		string		length=6		c:m		

### 6.7 The "Identifier" column

This column specifies the name or identifier of a specific item in the appropriate table.

- a) For the "Element support table", this field shall be entered the name of the element<sup>2</sup>.
- b) For the "Type support table", if the row denotes a complex type or a simple type, this field shall be entered the name of the type. If the row denotes a sub-element, this field shall be entered the name of the sub-element.
- c) For the "Attribute support table", this field shall be entered the name of the attribute.
- d) For the "Identity constraint support table", this field shall be entered the name for this constraint, or left empty when the constraint is unnamed.
- e) For the "Complex type replacement support table", this field shall be entered the name of the complex type replacing the original type.
- f) For the "Substitution group support table", this field shall be entered the name of the element that is declared as a substitution group of the specified element.

### 6.8 The "Content model" column

The "Content model" field in the "Element support table" shall be entered the content model of the element. The valid values for the content model are "empty", "any", "mixed", or "children". If the element is empty, that is, the element has no content at all, this field shall be entered "empty"; if there is no constraint on its content in any way, this field shall be entered "any"; if character data may appear alongside sub-elements and is not confined to the deepest sub-elements, this field shall be entered "mixed"; otherwise, if it contains sub-elements, this field shall be entered "children".

### 6.9 The "Type/Content model" column

The "Type/Content model" column of the "Type support table" (which is to be entered in the proforma specification if applicable) contains the type or content model information of a specific item. If the row denotes a simple type, this field shall be entered the base type of the simple type. Besides the built-in types, this field may also be entered "union" or "list", with its base atomic types followed in a bracket if this simple type is such an expansion to one of the built-in basic types; if the row denotes a complex type, this field shall be entered "complexType"; if the row denotes a group, this field shall be entered "group"; if the row denotes a sub-element, this field shall be entered either the content model of the sub-element (see 6.8 for the possible values), when its type is a complex type, or the base type of the simple type, when its type is a simple type.

### 6.10 The "Type" column

The "Type" column of the "Attribute support table" contains the type information of an attribute. This field shall be entered the name of the simple type and the base type of the attribute, or just the base type of the attribute when the simple type is unnamed. The completing instructions follow the same rules as described in 6.9 for simple type.

---

<sup>2</sup> The name of the element should include the namespace information for uniqueness, if applicable. The same rule also applies to names of types or sub-elements.

### 6.11 The "Category" column

The "Category" column of the "Identity constraint support table" contains the category for the uniqueness identity type information of a specific item. The value of the uniqueness identity must be one of the following: "unique", "key", or "keyref". When an attribute is marked with "key" in the identity constraint, its value must be unique and cannot be set to nil.

### 6.12 The "Constraints" column

The "Constraints" columns of the tables (which are to be entered in the proforma specification if applicable) contain the constraints for the specific item.

- a) For the "Attribute support table", this field shall be entered the information of applicable facets<sup>3</sup> for the simple type. When multiple facets are specified in the tML schema, all values shall be listed in this field with the corresponding facet as the prefix, for example: "maxInclusive=20", "totalDigits=4". When the type is an enumeration, all the possible values shall be listed in this field in a bracket with the prefix "enum=", e.g., "enum={one, two, three}".
- b) For the "Type support table", the constraints may be divided into three kinds: the constraints for a complex type, the constraints for a sub-element, or the constraints for a simple type. When the row denotes a simple type, the completing instructions follow the same rules as described in item a. When the row denotes a complex type, and the "block" attribute is specified for this type in the tML schema, the value of the "block" attribute, which may be "restriction", "expansion", or "all", shall be entered in this field with the prefix "block=", otherwise '-' shall be applied. When the row denotes a sub-element, and the value of "minOccurs" and/or "maxOccurs" is defined, this field shall contain these values with the corresponding prefixes. If the sub-element is of a simple type, the possible facets constraints for its type shall also be listed in this field in a sub-unit, which follows the same rules as specified in item a. In Annex A, there is an example showing this usage.

### 6.13 The "Values" column

The "Values" columns of the tables (which are to be entered in the proforma specification if applicable) contain the predefined special values for the specific item. This field shall be entered the "fixed" or "default" values for an element of a simple type or an attribute, if the values are defined in the tML schema. The value is prefixed by either "fixed=" or "default=". This rule applies to "Element support table", "Type support table", and "Attribute support table".

### 6.14 The "Additional information" column

This column contains additional information provided by suppliers not contained anywhere else. In the following cases, extra information shall be entered according to the tML schema.

For "Type Support table", if the row denotes a complex type that may be replaced by any of its derived types in an instance document, a reference to the corresponding "Complex type replacement support table" shall be entered in this field. If the row denotes an element that can be replaced by any of its substitutable elements in an instance document, a reference to the corresponding "Substitution group support table" shall be entered in this field, e.g., "See Annex A x.x". If the row denotes a type or element that regards itself as a direct or indirect child, the table will stop expanding for this branch. However, information shall be entered in this field, indicating the index of its direct or indirect parent.

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<sup>3</sup> All the facet definitions can be found in Annex B in W3C XML Schema Part 0: Primer [6].

### **6.15 The "Use" column**

The valid values for the "Use" column in the "Attribute support table" are "required", "optional", and "prohibited". If the attribute must appear once, this field shall be entered "required"; if the attribute may appear once or not at all, it shall be entered "optional"; if the attribute must not appear, it shall be entered "prohibited".

### **6.16 The "Order" column**

The valid values for the "Order" column in the "Type support table" are "sequence", "choice", and "all", when the row denotes a complex type. If one or more of the sub-elements defined in a complex type must appear in a predefined order, this field shall be entered "sequence". If only one or one group of the sub-elements contained in the complex type will appear in an instance document, the field shall be entered "choice". If the children may appear once or not at all, and may appear in any order, this field shall be entered "all".

### **6.17 The "Nillable" column**

The "Nillable" column is used to specify whether the value of an element or sub-element can be set to nil or not. For the "Element support table", or the "Type support table" when the row denotes a sub-element, the "Nillable" field shall be entered "true" if the element can be set to a nil value; otherwise this field shall always be entered "false".

### **6.18 The "Abstract" column**

The "Abstract" column in the "Type support table" indicates whether or not the corresponding complex type or sub-element is abstract. If the complex type or element is abstract, "true" is entered; if it is not, "false" is entered; for all the other cases, "-" is applied.

### **6.19 The "Selector" column**

The "Selector" column in the "Identity constraint support table" shall be entered the XPath expression for the scope of the elements for uniqueness identity. The XPath is composed of a sequence of elements, each of which is a direct sub-element of its parent, except the first sub-element in the tree which does not possess a parent. See Annex A for the usage example.

### **6.20 The "Field" column**

The "Field" column in "Identity constraint support table" shall be entered the XPath expression for the parts (attributes or elements) relative to each selected element. The attribute or element must be unique within the scope of the set of selected elements.

## Annex A

### An example of SICS proforma specification

#### A.1 tML schema definition

In this annex, the SICS proformas for "Element support", "Type support", "Attribute support", "Identity constraint support", "Complex type replacement support", and "Substitution group support" are illustrated. The following is a simple example of a tML schema definition:

```
<?xml version="1.0" encoding="UTF-16"?>
<xsd:schema targetNamespace="urn:int.itu/tML/SICSExample"
xmlns:tML="urn:int.itu/tML/SICSExample"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
version="1.0">
  <xsd:annotation>
    <xsd:documentation xml:lang="en-GB">
      <tML:SICSExample>
        <tML:OriginalAuthor>Dong Wenli - BUPT China</tML:OriginalAuthor>
        <tML:CreationDate>05-04-2004</tML:CreationDate>
        <tML:Description>This Schema contains some example Schema definitions.
          This example doesn't include the whole tML schema metadata provided
          in Annex A/M.3030, only because this is just an example showing some
          Schema features in order to display the corresponding SICS proformas
          in A.2. It is not necessary to include the whole tML schema metadata
          in M.3030 for this purpose. No more annotation is provided in
          this Schema example. </tML:Description>
        <tML:Source>M.tMLconf</tML:Source>
        <tML:SchemaHistory/>
      </tML:SICSExample>
    </xsd:documentation>
  </xsd:annotation>
  <xsd:element name="externalGsmCell">
    <xsd:complexType>
      <xsd:sequence>
        <xsd:element ref="tML:userLabel" maxOccurs="unbounded"/>
        <xsd:element ref="tML:absElement"/>
      </xsd:sequence>
    </xsd:complexType>
    <xsd:key name="empid">
      <xsd:selector xpath="tML:userLabel"/>
      <xsd:field xpath="@id"/>
    </xsd:key>
  </xsd:element>
  <xsd:element name="userLabel" type="tML:Usertype"/>
  <xsd:element name="absElement" type="xsd:string" abstract="true"/>
  <xsd:complexType name="Usertype">
    <xsd:sequence>
      <xsd:element ref="tML:name" minOccurs="0" maxOccurs="3"/>
      <xsd:group ref="tML:ddTop"/>
    </xsd:sequence>
    <xsd:attribute name="id" type="xsd:string" use="required" fixed="dwl88"/>
    <xsd:attribute name="contr" use="optional" default="66666">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string">
          <xsd:minLength value="5"/>
          <xsd:maxLength value="8"/>
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:attribute>
  </xsd:complexType>
  <xsd:element name="name" type="xsd:string" nillable="true"/>
```

```

<xsd:simpleType name="ListOfMyIntType">
  <xsd:list>
    <xsd:simpleType>
      <xsd:restriction base="xsd:string">
        <xsd:enumeration value="one"/>
        <xsd:enumeration value="two"/>
        <xsd:enumeration value="three"/>
      </xsd:restriction>
    </xsd:simpleType>
  </xsd:list>
</xsd:simpleType>
<xsd:group name="ddTop">
  <xsd:choice>
    <xsd:element name="ddc1">
      <xsd:simpleType>
        <xsd:restriction base="tML:ListOfMyIntType"/>
      </xsd:simpleType>
    </xsd:element>
    <xsd:element name="ddc2">
      <xsd:simpleType>
        <xsd:restriction base="xsd:date"/>
      </xsd:simpleType>
    </xsd:element>
  </xsd:choice>
</xsd:group>
<xsd:element name="absElementSub" type="xsd:integer" substitutionGroup=
"tML:absElement"/>
<xsd:element name="namesub" type="xsd:string" substitutionGroup="tML:name"/>
<xsd:complexType name="AuserType">
  <xsd:complexContent>
    <xsd:extension base="tML:UserType">
      <xsd:attribute name="postcode" use="optional">
        <xsd:simpleType>
          <xsd:restriction base="xsd:string">
            <xsd:length value="6"/>
          </xsd:restriction>
        </xsd:simpleType>
      </xsd:attribute>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
<xsd:complexType name="BuserType" block="restriction">
  <xsd:complexContent>
    <xsd:restriction base="tML:UserType">
      <xsd:sequence>
        <xsd:element ref="tML:name" minOccurs="0" maxOccurs="3"/>
      </xsd:sequence>
      <xsd:attribute name="id" type="xsd:string" use="required"
fixed="dwl88"/>
    </xsd:restriction>
  </xsd:complexContent>
</xsd:complexType>
</xsd:schema>

```

## A.2 SICS

Assuming that in the above schema definition, only the externalGsmCell is the root element, the SICS proformas for this simple schema-based information model can be illustrated as follows:

E 1 : tML:externalGsmCell

Table 1 : Element support

Index	Identifier	Content model	Values	Nilable	Status	Support	Additional information
1	tML:externalGsmCell	children		false	m		

Table 1.1 : Type support

Index	Identifier	Type/Content model	Order	Nilable	Abstract	Constraints	Values	Status	Support	Additional information
1.1		complexType	sequence	–	false		–	m		
1.1.1	tML:userLabel	children	–	false	false	maxOccurs= unbounded		m		
1.1.1.1	tML:Usertype	complexType	sequence	–	false		–	o		see Annex [A 1.1.1.1]
1.1.1.1.1	tML:name	children	–	true	false	minOccurs=0 maxOccurs=3		c:o		see Annex [A 1.1.1.1.1]
1.1.1.1.1.1		complexType	choice	–	false		–	c:m		
1.1.1.1.1.1.1	tML:metar	decimal	–	false	false			c:o		
1.1.1.1.1.1.2	tML:name	children	–	true	false			c:o		see Table 1.1.1.1.1
1.1.1.1.2	tML:ddTop	group	choice	–	–		–	c:m		
1.1.1.1.2.1	tML:ddc1	simple	–	false	false			c:o		
1.1.1.1.2.1.1		tML:ListOfMyIntType	–	–	–		–	c:m		
1.1.1.1.2.1.1.1	tML:ListOfMyIntType	list	–	–	–		–	c:m		
1.1.1.1.2.1.1.1.1		string	–	–	–	enum {one two three }	–	c:m		
1.1.1.1.2.2	tML:ddc2	date	–	false	false			c:o		
1.1.2	tML:absElement	string	–	false	true			x		see Annex [A 1.1.2]

Attribute support

Index	Subindex	Identifier	Type	Use	Constraints	Values	Status	Support	Additional information
1.1.1.1	1.1.1.1.3	id	string	required		fixed=bj88	c:m		
1.1.1.1	1.1.1.1.4	contr	simpleType	optional		default=66666	c:o		
	1.1.1.1.4.1		string		minLength=5 maxLength=8	–	c:m		

Table 1.2 : Identity constraint support

Index	Identifier	Category	Selector	Field	Status	Support	Additional information
1.2.1	empid	key	tML:userLabel	id	m		

Annex [A 1.1.1.1]

Table A.1.1.1.1 : Complex type replacement support for "tML:Usertype"

Index	Identifier	Derivation	Status	Support	Additional information
1	tML:Busertype	restriction	o		
2	tML:Ausertype	extension	o		

Index	Identifier	Type/Content model	Order	Nillable	Abstract	Constraints	Values	Status	Support	Additional information
1.1	tML:Usertype	complexType	sequence	–	false		–	c:m		
1.1.1	tML:name	children	–	true	false	MinOccurs=0 maxOccurs=3		c:o		
1.1.1.1		complexType	choice	–	false		–	c:m		
1.1.1.1.1	tML:metar	decimal	–	false	false			c:o		
1.1.1.1.2	tML:name	children	–	true	false			c:o		see Table 1.1.1

Attribute support

Index	Subindex	Identifier	Type	Use	Constraints	Values	Status	Support	Additional information
1.1	1.1.2	id	string	required		fixed=bj88	c:m		

Index	Identifier	Type/Content model	Order	Nullable	Abstract	Constraints	Values	Status	Support	Additional information
2.1	tML:Usertype	complexType	sequence	–	false		–	c:m		
2.1.1	tML:name	children	–	true	false	minOccurs=0 maxOccurs=3		c:o		
2.1.1.1		complexType	choice	–	false		–	c:m		
2.1.1.1.1	tML:metar	decimal	–	false	false			c:o		
2.1.1.1.2	tML:name	children	–	true	false			c:o		see Table 2.1.1
2.1.2	tML:ddTop	group	choice	–	false		–	c:m		
2.1.2.1	tML:ddc1	simple	–	false	false			c:o		
2.1.2.1.1		tML:ListOfMyIntType	–	–	–		–	c:m		
2.1.2.1.1.1	tML:ListOfMyIntType	list	–	–	–		–	c:m		
2.1.2.1.1.1.1		string	–	–	–	enum {one two three }	–	c:m		
2.1.2.2	tML:ddc2	date	–	false	false			c:o		

Attribute support

Index	Subindex	Identifier	Type	Use	Constraints	Values	Status	Support	Additional information
2	2.2	postcode	simpleType	optional			c:o		
	2.2.1		string		length=6		c:m		
2.1	2.1.3	id	string	required		fixed=bj88	c:m		
2.1	2.1.4	contr	simpleType	optional		default=66666	c:o		
	2.1.4.1		string		minLength=5 maxLength=8	–	c:m		

Annex [A 1.1.1.1.1]

Table A 1.1.1.1.1: Substitution group support for element "tML:name"

Index	Substitutable element	Status	Support	Additional information
1	tML:namesub	o		

Index	Identifier	Type/Content model	Order	Nillable	Abstract	Constraints	Values	Status	Support	Additional information
1	tML:namesub	string	–	false	false			o		

Annex [A 1.1.2]

Table A 1.1.2 : Substitution group support for element "tML:absElement"

Index	Substitutable element	Status	Support	Additional information
1	tML:absElementSub	m		

Index	Identifier	Type/Content model	Order	Nillable	Abstract	Constraints	Values	Status	Support	Additional information
1	tML:absElementSub	integer	–	false	false			m		



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