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Telecommunications management network

Telecommunications Markup Language (tML) framework

ITU-T Recommendation M.3030

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ITU-T Recommendation M.3030

Telecommunications Markup Language (tML) framework

Summary

This Recommendation is a framework containing rules, guidelines, and objectives for developing telecommunications industry standard telecommunications Markup Language (tML) schemas for operations, administration, maintenance and provisioning (OAM&P) applications. The tML language is based on the World Wide Web Consortium (W3C) XML 1.0 Recommendation. tML schemas are based on the W3C XML schema Recommendation. Also included in this framework are rules, objectives, and guidelines on procedures to develop new telecommunications vocabularies and to use/reuse existing vocabularies.

Source

ITU-T Recommendation M.3030 was prepared by ITU-T Study Group 4 (2001-2004) and approved under the WTSA Resolution 1 procedure on 22 August 2002.

Keywords

telecommunications Markup Language, eXtensible Markup Language, tML Schema.

FOREWORD

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In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

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

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Telecommunications Markup Language (tML) framework

1 Scope

This Recommendation, referred to as the telecommunications Markup Language (tML) framework document, establishes the tML.

tML is used in the context of the telecommunications Operations, Administration, Maintenance and Provisioning (OAM&P) domain¹. tML is an application of the World Wide Web Consortium (W3C) eXtensible Markup Language (XML).

tML is to be used as a message format between telecommunications OAM&P entities for functions such as ordering, billing, maintenance, and provisioning.

This Recommendation contains guidelines for developing tML message structures for use at the TMN x Reference Point (see ITU-T Recs M.3010 [1] and M.3013 [2]).

This version of the tML Framework focuses on the TMN X interface. Subsequent versions may extend the scope to include other TMN interfaces.

The scope of this version of the Recommendation (Figure 1) includes rules, objectives, and guidelines for:

- Specifying business document structure (i.e. tML Schemas) for X interface applications of tML;
- Use of common vocabulary structure;
- Use of namespaces;
- Mapping from existing standards to tML;
- Specification of metadata used.

The scope of this Recommendation does not specify the following items because trading partners specify these items through negotiation:

- Business Process Scenario;
- Implementation Infrastructure Profile-Specification of any particular communications protocol profile (including provisions for reliability, availability and survivability, or RAS), and provisions for security, privacy, and non-repudiation;
- Data and Vocabulary content.

¹ Other uses of the term t-m-l exist today, and shouldn't be confused with telecommunications Markup Language (tML). tML distinguishes itself from other uses of the term with a lower case "t". Two examples of other TMLs are:

- 1) Tutorial Markup Language (TML), an interchange format designed to separate the semantic content of a question from its screen layout or formatting (TML has been specified using SGML); and
- 2) Telephony Markup Language (TML), a proprietary framework for applying the Web for distributed Computer Telephony and messaging applications.

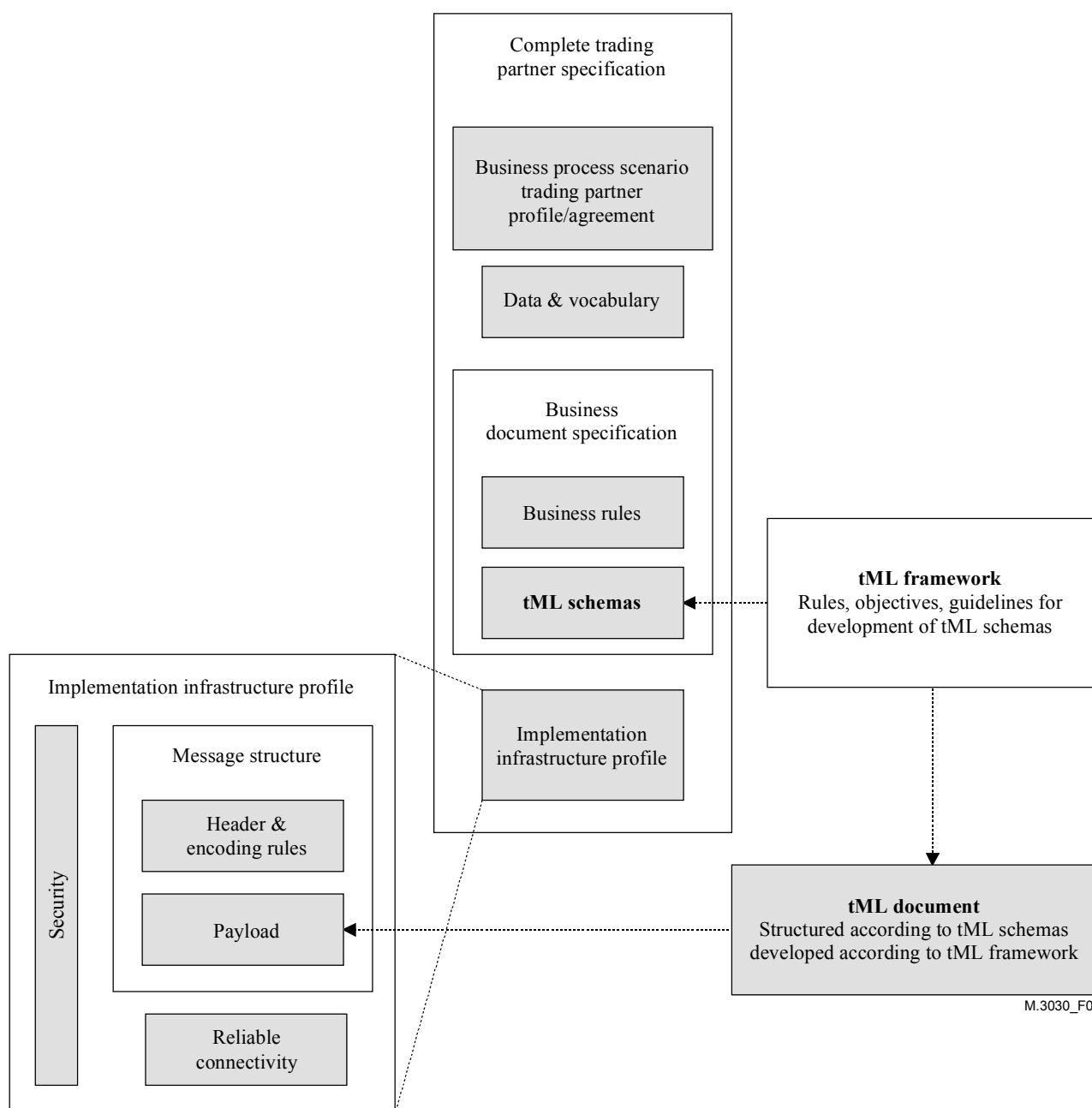


Figure 1/M.3030 – tML Framework Scope

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.

2.1 ITU-T Recommendations

- [1] ITU-T Recommendation M.3010 (2000), *Principles for a telecommunications management network*.

- [2] ITU-T Recommendation M.3013 (2000), *Considerations for a telecommunications management network*.

2.2 ISO Standards

- [3] ISO/IEC 10646-1:2000, *Information technology – Universal Multiple-Octet Coded Character Set (UCS) – Part 1: Architecture and Basic Multilingual Plane*.
- [4a] ISO/IEC 11179-3:1994, *Information technology – Specification and standardization of data elements – Part 3: Basic attributes of data elements*.
- [4b] ISO/IEC 11179-5:1995, *Information technology – Specification and standardization of data elements – Part 5: Naming and identification principles for data elements*.

2.3 World Wide Web Consortium (W3C) Recommendations

- [5] eXtensible Markup Language (XML) 1.0 (Second Edition), 6 October 2000.
- [6] XML Schema Part 1: Structures, 2 May 2001.
- [7] XML Schema Part 2: Datatypes, 2 May 2001.
- [8] Namespaces in XML, 14 January 1999.

2.4 IETF Specifications

- [9] IETF RFC 2141 (1997), *URN Syntax*.
- [10] IETF RFC 2396 (1998), *Uniform Resource Identifiers (URI): Generic Syntax*.

2.5 Object Management Group Specifications

- [11] Unified Modeling Language Specification, Version 1.4, September 2001.

2.6 Committee T1 Standards (Sponsored by ATIS, Alliance for Telecommunications Industry Solutions)

- [12] T1.227-2000 – *OAM&P – Extension to Generic Network Information Model for Interface Between Operations Systems Across jurisdictional Boundaries to Support Fault Management*.

3 Definitions

This Recommendation defines the following terms:

3.1 XML-based definitions

3.1.1 attribute: A characteristic of an object or entity (ISO/IEC 11179-3); a property of an element; attributes can be viewed as metadata for the element because they can pass information about an element. Composed structurally as *name=value* pair, where *name* is the name of the attribute and *value* is the value of the attribute.

3.1.2 character: An atomic unit of text as specified by ISO/IEC 10646; a single alpha, numeric, or punctuation mark, as defined by ISO/IEC 10646.

3.1.3 character data: All text characters that are not markup characters.

3.1.4 content model: All data between the start tag and end tag of an element that affects the structure of the element in the instance document. This could be attributes or other elements within an element. (This term is not used).

3.1.5 context: A designation or description of the application environment or discipline in which a name is applied or from which it originates (ISO/IEC 11179-3).

3.1.6 data dictionary: A collection of metadata about the data objects or items in a data model including such characteristics as name, semantic meaning, relationships, and type of data.

3.1.7 data element: A unit of data for which the definition, identification, representation, and permissible values are specified by means of a set of attributes (ISO/IEC 11179-3).

3.1.8 default namespace: A namespace with an empty prefix. A default namespace is considered to apply to the element where it is declared (if that element has no namespace prefix), and to all elements with no prefix within the content of that element. If the URI reference in a default namespace declaration is empty, then unprefixed elements in the scope of the declaration are not considered to be in any namespace.

3.1.9 delimiter: A special character that marks the beginning and end of a string or text field.

3.1.10 document: A class of data object; may be the text of a printed document, a set of database records.

3.1.11 document element: The root element of an instance document. There is exactly one element, called the root, or document element, no part of which appears in the content of any other element.

3.1.12 element: A logical data structure within an XML document; start tags and end tags define the beginning and end of an element. Each XML document contains one or more elements, the boundaries of which are either delimited by start-tags and end-tags, or, for empty elements, by an empty-element tag. Each element has a type, identified by a case-sensitive name, sometimes called its "generic identifier" (GI), and may have a set of attribute specifications. Each attribute specification has a name and a value.

3.1.13 element declaration: Associating a name with a type. (This term is only within the definition of local element declaration, which is not used).

3.1.14 element type: The name that appears in a start-, end- or empty-tag. In the following example there are three elements but only two element types:

```
<enduser>
  <firstname>Jo Anne</firstname>
  <firstname>Stephen</firstname>
</enduser>
```

An element type has element content when elements of that type must contain only child elements, optionally separated by white space.

3.1.15 empty element: Elements that do not have content. An empty-tag follows the syntax: <name></name> or <name/>.

3.1.16 end tag: The end of every element that begins with a start-tag must be marked by an end-tag containing a name that echoes the element's type as given in the start-tag. It is assumed that an XML processor is doing its work on behalf of another module, called the application.

3.1.17 entity: A virtual storage unit of no fixed value, identified by a name; often a separate file, but may be a string or even a database record.

3.1.18 eXtensible Markup Language (XML): By construction, XML documents are conforming SGML documents; a W3C Recommendation; an application profile or restricted form of the Standard Generalized Markup Language (SGML). By construction, XML documents are conforming SGML documents. The XML subset of SGML has been specifically designed to function on the Web. While HTML's tags are predefined, XML allows tags to be defined by the developer of the page. Thus, XML-defined Web pages can function like database records.

3.1.19 generic identifier (GI): The name of an element "type". Sometimes the term "tag name" is used to refer to a GI.

3.1.20 global element (and attribute) declarations: Global elements, and global attributes, are created by declarations that appear as the children of the schema element. Once declared, a global element or a global attribute can be referenced in one or more other declarations.

3.1.21 HyperText Markup Language (HTML): A system of coding information from a wide range of domains (e.g. text, graphics, database query results) for display by World Wide Web browsers. Certain special codes, called tags, are embedded in the document so that the browser can be told how to render the information.

3.1.22 import: Defines incorporation of type declarations from another schema. The import mechanism is used in an XML Schema to allow definitions and declarations contained in other schemas under different namespaces to be referenced in the document. If a developer references schema fragments or modules from another namespace, then the import mechanism must be used. If the developer references fragments or modules from the same namespace, then the include mechanism must be used.

3.1.23 include: Defines incorporation of another schema into the existing namespace. An entity is included when its replacement text is retrieved and processed, in place of the reference itself, as though it were part of the document at the location the reference was recognized. XML Schemas can be included in other XML Schemas. Such included schema documents must either

- a) have the same target namespace as the <include>ing schema document; or
- b) no target namespace at all, in which case the <include>d schema document is converted to the <include>ing schema document's target namespace.

3.1.24 local element declarations: Local element declarations are nested further inside a schema structure and are not direct children of the root schema element (This term is not used).

3.1.25 local name: A local name is the local part of a qualified name. This is called the local part in namespaces in XML.

3.1.26 lower camel case: Lower Camel Case is a capitalization pattern where the first letter is lowercase, but after that all words are capitalized and no separators are used. `thisIsAnExample`.

3.1.27 markup: Markup takes the form of start-tags, end-tags, empty-element tags, entity references, character references, comments, CDATA section delimiters, document type declarations, processing instructions, XML declarations, text declarations, and any white space that is at the top level of the document entity.

3.1.28 metadata: Data that describes other data.

3.1.29 meta-language: A language that describes other languages. SGML and XML are considered meta-languages because they define markup languages such as tML. (This term is not used).

3.1.30 name: A token beginning with a letter or one of a few punctuation characters, and continuing with letters, digits, hyphens, underscores, colons, or full stops, together known as name characters.

3.1.31 namespace: A conceptual collection of unique names identified by a URI or a URN reference [IETF RFC 2396]; used in XML documents as element types and attribute names. Namespaces are used in XML to qualify names in order to separate them from other names.

NOTE – A URI has a similar format to a URL. It is not always possible to resolve a URI to find an instance of an XML schema.

3.1.32 namespace prefix: A string that associates an element or attribute name with a namespace URI in XML.