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SERIES M: TELECOMMUNICATION MANAGEMENT, INCLUDING TMN AND NETWORK MAINTENANCE

Designations and information exchange

Formalization of generic orders

ITU-T Recommendation M.1403

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ITU-T Recommendation M.1403

Formalization of generic orders

Summary

ITU-T Recommendation M.1403 defines orders and additional information intended primarily for human-to-human communication between various operators, i.e., network operators or service providers.

The orders contain data for designations of interconnections and other information about services and network resources that are required to be communicated between operators.

This Recommendation provides a skeleton that can be extended with any contents and allow for any use of the orders.

This Recommendation is developed in order to facilitate computerized interoperation between telecommunication operators.

As the data defined in this Recommendation are designed for human usage, they are independent of the functions in which they are used. Hence, the data may be applied in any functions, e.g., in customer requests, call centres, billing, service platforms, etc.

Source

ITU-T Recommendation M.1403 was approved on 6 August 2007 by ITU-T Study Group 4 (2005-2008) under the ITU-T Recommendation A.8 procedure.

Keywords

Data definitions, designations, domestic, interconnection, international, messages, operator, orders, terminology, X interface.

FOREWORD

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The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

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.

Compliance with this Recommendation is voluntary. However, the Recommendation may contain certain mandatory provisions (to ensure e.g. interoperability or applicability) and compliance with the Recommendation is achieved when all of these mandatory provisions are met. The words "shall" or some other obligatory language such as "must" and the negative equivalents are used to express requirements. The use of such words does not suggest that compliance with the Recommendation is required of any party.

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As of the date of approval of this Recommendation, ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementers are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database at http://www.itu.int/ITU-T/ipr/.

CONTENTS

Introduction

This Recommendation defines order designations and additional information intended primarily for human-to-human communication between various operators, i.e., network operators or service providers within the context of an external terminology schema in end user terminology.

This Recommendation on generic orders provides common terms for any order, e.g., network orders and service orders.

The area of interest is the communication of orders between operators about network interconnections and telecommunication services. The objects of communication are telecommunication services and network resources.

This Recommendation focuses on human needs for stable and recognizable data formats independently of the media they are communicated over. Therefore, in order to support the human-to-human communication, the formats defined in this Recommendation are required to be provided at the corresponding human-to-computer interfaces, as well. Hence, this Recommendation defines the formats of data at human-to-computer interfaces, but does not define the data communication formats for interfaces between computer systems, such as at the TMN X interface or non-TMN computer interfaces. However, it must be possible to automatically map the human-to-computer formats to the computer-to-computer formats and vice versa. The details of this mapping are for further study.

Use of this Recommendation inside national jurisdictions will be the result of bilateral negotiation between the operators and/or national regulatory activity. Although compliance with all ITU-T Recommendations is voluntary, special mention is made for ITU-T Rec. M.1403 due to the sensitivity of designations for interconnection from a regulatory and legal standpoint. This extension greatly increases the number of routes and nodes to be identified, and in this way extends the name spaces to be provided.

This Recommendation defines orders and additional information to be exchanged between two operators. While it defines order and message identification, it does not define data on the status or processing of these orders or messages. In that regard, this Recommendation can be considered as an adaptation or extension of ICT industry standards, e.g., OASIS UBL. ICT industry standards for such data may impose additional requirements on human-to-computer interfaces.

The definition of information is common for the functions it supports.

This Recommendation aims at supporting communication among service providers and network operators, but may also support communication between brokers, retailers, customers and installation providers.

This Recommendation aims at defining designations of orders and additional information for service personnel, technicians and file support personnel at their terminals supporting the services and network, and serves as design information for developers of operational support systems.

In addition to the definition of orders and messages in the main body of this Recommendation, Appendix I provides an explanation of the contents of messages.

Appendix II presents order information in context of Ogden's triangle and discusses simplified designs.

ITU-T Recommendation M.1403

Formalization of generic orders

1 Scope

The area of interest is the communication of orders between operators about telecommunication services and network interconnections. The contents of the orders are defined in other Recommendations.

The focus of this Recommendation is on end user terminology as defined in an external terminology schema and which puts requirements on other schemata and implementations.

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.

[ITU-T M.1400] ITU-T Recommendation M.1400 (2006), *Designations for interconnections among operators' networks*.

[ITU-T M.1401] ITU-T Recommendation M.1401 (2006), *Formalization of interconnection designations among operators' telecommunication networks*.

[ISO 3166-1] ISO 3166-1:2006, *Codes for the representation of names of countries and their subdivisions – Part 1: Country codes*.

3 Definitions

This Recommendation is comprised of structured definitions in the context of an external terminology schema graph.

This Recommendation uses all definitions in [ITU-T M.1401], provides an additional order structure to these definitions, and provides correspondences between the two structures.

4 Abbreviations

This Recommendation uses the following abbreviations:

ICC ITU Carrier Code

ICT Information and Communications Technology

OASIS Organization for the Advancement of Structured Information Standards

UBL Universal Business Language

5 Conventions

Figure 1 shows boxes containing object class labels to indicate object classes. Lines supported with a reversed arrowhead indicate subordinate object classes. Lines with two-way arrows indicate references between object classes. A dashed one-way arrow with an S at the arrowhead indicates a schema reference and is here used to state instance-class correspondences between Messages. " ‘& " states recursively superior node, while "(" states subordinate node. Hence, the used expression states a schema reference from any to any Message. Ellipses are used to indicate any data structure.

The text that follows Figure 1 includes a label and explanation for each class in the schema. A class can be an object class, an attribute class, or a reference class. The level of each class is depicted in the text by indentations (5 mm) of the class label, supported with dashes, where the number of indentations and dashes indicates the level of a given class within the schema. Therefore, each class label has a given indentation based on the Figure 1 schema graph.

Labels of data items that are subordinate to or referenced from a given object class are presented in the following sequence:

1) alphabetized object class attributes;
2) alphabetized object class references; and
3) alphabetized object classes that are contained within the given object class at the next lower level.

Textual definitions and explanations of object classes, attributes and references are provided in paragraphs that are adjusted 5 mm further to the right of their respective labels.

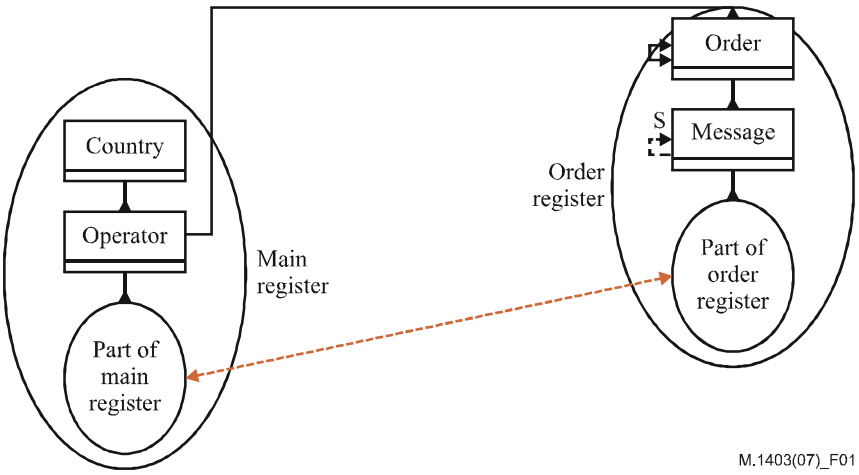
Object class labels are underlined; attribute group and attribute labels are not underlined. Object class references are written in blue, italics and underlined.

The formalism used in this Recommendation is introduced in Appendix III of [ITU-T M.1401].

Data attributes shall consist of sequences of characters, each character being either alphabetic (A-Z) or numeric (0-9). Additional requirements for symbols are explicitly stated in format requirements for specific attributes. It is recommended that alphabetic characters be represented with upper case letters unless stated otherwise.

Brown dotted lines indicate references between the main register part and the order register part. Brown textual references indicate references between the main register part and the order register part.

6 External terminology schema



NOTE – Except for Order and Message and their references, the right-hand part is a copy of the left-hand part. The brown arrow shows the correspondences. Country may be contained in Corporation; this is not elaborated in this Recommendation.

Figure 1 – External terminology schema graph, depicting object classes (boxes), containment (reversed arrowheads) and references (two-way arrows)

Country

See [ITU-T M.1401].

- *Country*

  See [ITU-T M.1401].

- Name

  See [ITU-T M.1401].

- Code

  See [ITU-T M.1401].

- Operator

  See [ITU-T M.1401].

  - *Operator*

    See [ITU-T M.1401].

  - ICC

    See [ITU-T M.1401].

  - Order

    An Order identifies a transaction relative to an organization, a part of an organization or a collaboration of organizations. This organization is typically an Operator, but may involve Customers, installation companies, etc.

    An Order comprises a set of Messages that are linked via the common Order.

    An Order can be of one or several types, like customer order, installation order, activation order, billing order or other. This is prescribed by the Type of each Message contained in the Order.

▪ ▪ ▪ Number

The Order Number uniquely identifies the Order within an Operator. The Order Number is used to retrieve and follow up information on events that are described in the Message instances. Assignment of Order Numbers and management of order series are outside the scope of this Recommendation.

The same Order Number may be used for a Request, Work order, etc., but different Numbers that are related by Derived orders may be used, as well. The Derived order may belong to another Operator.

▪ ▪ ▪ *Derived order*

An Order may have several subordinate Derived orders, which each is a role of another Order. Dependent on the current Order, Derived orders may be generated automatically. For example, the current Order may be a customer order/order request, while the Derived order may be an installation order.

▪ ▪ ▪ *Served order*

An Order may have several subordinate Served orders, which each is a role of another Order. The current Order may be a construction order, which must be executed before several installation orders can be executed.

▪ ▪ ▪ Message

A Message is a statement or a compound set of statements. A statement is the carrier of information between people and between systems.

Message type

A message instance is of a message type. A message type provides a template for a message instance.

Many message instances can refer to the same message class by the S(chema reference), and message classes can refer to other message classes recursively.

The message type contains all the data classes for the data instances in the corresponding message instance. There may be several data instances of one data class in one message.

Message instance

A message instance is treated as a unit of communication between persons or between systems. Due to the typing mechanism, provided by the S(chema) references between messages or by the Message Type attribute, a message instance will contain data according to a subset of the data classes provided subordinate to Message (class) in the data structure graph.

For each of the object classes (recursively) contained in Message, there is a reference to the corresponding object class in the main register. Instances of this reference provide a source for more information on the actual status of the object instance. Typically, the Message instances contain information on what is the planned status of an object instance some time into the future, what has happened in the outside world (UoD), or what has been the (planned) status in the past.

Seen from an object instance in the main register, the references to object instances in the order/transaction register (part) provide information on statements about the history and future of the entity.

▪ ▪ ▪ ▪ Type

Each message instance is of one named message Type only. However, message types may inherit from other message types without inheriting the Type value.

The typing mechanism constrains the data in the message instance to be of its message type (and recursively superior message classes) only.

▪ ▪ ▪ ▪ *S <>'& (((Order (Message*

A Message's subordinate S(chema) is a role of another Message, which provides the message class for the (first) message instance.

The S(chema) reference may be explicitly given for each Message, as will by the case between different message classes.

Normally, a message instance will contain the Type attribute only, which provides an indirect schema reference to the appropriate message class.

Appendix I

Theory of orders

(This appendix does not form an integral part of this Recommendation)

I.1 Introduction

The fundamentals about orders are found in the definitions of Order and Message in the main body of this Recommendation.

I.2 Statements in messages

In this Recommendation, a Message is treated as a set of statements in one sentence. The statements are elementary and correspond to predicates in predicate calculus. An example statement is "Customer abc has Role Owner to Account 123", or in predicate calculus "Role(abc, Owner, 123)". In the corresponding Message type, we find the template "Customer x has Role y to Account z", i.e., "Role(x, y, z)".

The main register consists of a set of elementary statements, and so does the order register. In the main register, the schema of the data classes is instantiated into a population of data instances. In the order register, the message types are instantiated into message instances. A message type may contain most of the data definitions that are contained in the schema of the main register, and a message instance may contain some of the data instances that are contained in the population of the main register.

In this Recommendation, data classes in the main register are considered to be first class citizens of the order register, as well. This means that this Recommendation does not address additional information, like process information, work flow, deals with installation companies, dates with customers, contacts, comments, etc.

The elementary statements of the External Terminology Layer of both registers may be considered combined by conjunctions, e.g., "Role(abc, Owner, 123) AND AddressType(123, bill, Kings road 16) AND Role(bcd, Owner, 234) etc.".

The Contents Layer for both registers uses reflexive pronouns rather than conjunctions, e.g., "Customer abc, (WHICH has) RoleOwner 123, (WHICH has) TypeAddress Kings road 16 etc.".

The effect of the above is that the terminology and grammar of the order register is identical to that of the main register. This is a fundamental issue, and provides harmonization and great simplifications for users who have to use both registers.

The references between the two registers provide a history of all statements about each entity in the main register. These history statements may be about past or future events. Here we give no recommendation on how much of this information should be recorded in one system or how the schema and population data should be partitioned into several systems, e.g., about past, current or future events.

If we want to assign actions to what should happen to the entities outside the register(s), this then will have to be provided in attributes of the entities. The form of these attributes should be coordinated across all entities. Also, the actions relate to the status of the entities in the main register. Hence, a generic Status attribute may replace the need for action attributes. This is for further study.

Note that we have provided no means to nest or group Messages within an Order. Such associations may relate to work flow and work sequences, and these issues are not addressed in this Recommendation. Also, there is no means to reference between objects within two Messages,

except that the same object may be mentioned within several Messages. This means that we may state that a relationship to an object has to be removed and another relationship to the same object has to be established within the same or different Messages, but cannot state which should be treated first. We may, however, assign timing to each event, but relative timing between events is for further study.

The reader should note the extensive use of local naming in orders as well as in the main register. Order (Number)s are defined locally to Operator. This means that the full identifier of the Order is Operator Identifier plus Order Number. However, within the scope of the Operator who issues this particular Order Number, i.e., the Operator who originates the Order, only the Order Number is needed. Only when communicating with other Operators, need the full identifier be used.

Within a Message of an Order we may also have Operators. The purpose of this mentioning is to be able to talk about any Operator inside the Message. One of these Operators may be the same as the one who originated the Order.

Since the contents of a Message class is identical to that of the Schema of the main register, the contents could have been defined by inheritance. To this must be added the two-way references between corresponding classes of the two registers.

Appendix II

Simplifications relative to Ogden's triangle

(This appendix does not form an integral part of this Recommendation)

II.1 Introduction

This appendix introduces Ogden's triangle and explains the role of Messages in context of this triangle.

The linguist Charles Kay Ogden (1889-1957) distinguished between terms, concepts and phenomena as shown in Figure II.1. Note that different labels of these notions may be used, like names, ideas and things. The discussion of different world views dependent on or indicated by the various choices of labels is outside the scope of this appendix.

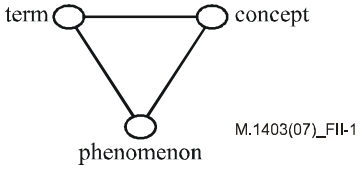


Figure II.1 – Ogden's triangle

The relation from terms to concepts may be labelled tcDenote, the relation from terms to phenomena may be labelled tpDenote, and from concepts to phenomena may be labelled cpDenote.

II.2 Denotations from messages

Terms may correspond to objects, attributes and values within the contents of Messages within Orders. Concepts may correspond to objects, attributes and values within the main register. Hence, the relation from data in the order register to data in the main register may correspond to tcDenote. And the concepts are data.

Note that there may be order data without corresponding data (yet) in the main register, and there may be main register data without corresponding data in the order register. However, when there is a mapping between the two registers, the mapping between the contents of each Message and the main register is isomorphic. The mapping between the contents of a set of Messages and the main register is homomorphic.

Both the order data and the main register data may be within the External terminology layer of the data architecture. Both sets of data may map to the Concept layer. This mapping is the tcDenote relation.

The Internal terminology layer may be considered to contain the phenomena of an IT system. The mapping from the Concept layer to the Internal terminology layer is the cpDenote relation.

The architecture may be considerably simplified if the Concept layer and the mappings to and from it can be discarded. In this case, only the tpDenote relation from the External terminology layer to the Internal terminology layer is used. In many cases, also the Internal terminology layer may be bypassed.

Further simplification may be achieved by discarding the Order notion. Orders are introduced for handling long transactions among organizations and systems. Hence, the orders may be discarded if everything is treated within one system, and/or with synchronous communication to other systems.

Appendix III

Harmonization issues

(This appendix does not form an integral part of this Recommendation)

The HCI data defined in this Recommendation are considered to provide requirements on information models in other Recommendations. Also, the information models may provide feed back on HCI data.

In particular, four issues in regard to harmonization of this Recommendation with TeleManagement Forum's Shared Data/Information (SID) Model have been identified for further study.

The current SID Model provides a UML-based information reference model and a common information vocabulary from a business entity perspective. This business view model categorizes the business entities in a layered structure, with each layer identifying in more detail the entities associated with the immediate parent layer.

Issues identified for further study follow.

1) Name binding of Order within Operator: The SID Model associates "party" with "party role" which is associated with "order". Introduce the concept of "business role" between "Organization (Operator) and "Order" in ITU-T Rec. M.1403.
2) Name binding of Message to Order: Align the association between Message and Order with "interaction/service order/resource order" as in the SID Model.
3) Different types of orders: ITU-T Rec. M.1403 makes no distinction between service order and derived order. Include roles of orders in ITU-T Rec. M.1403 with the SID Model, and align ITU-T Rec. M.1403 with pre-conditions and context as modelled in the SID, to determine the type of order.
4) Unique numbering of Order within Operator: The same Order number may be assigned by an Operator in different order management systems. The M.1403 name binding of Order within Operator does not allow for this.

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