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STANDARDIZATION SECTOR  
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SERIES M: TELECOMMUNICATION MANAGEMENT,  
INCLUDING TMN AND NETWORK MAINTENANCE

Telecommunications management network

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**Multi-technology network management:  
Business agreement (TMF513)**

ITU-T Recommendation M.3170.1



ITU-T M-SERIES RECOMMENDATIONS  
**TELECOMMUNICATION MANAGEMENT, INCLUDING TMN AND NETWORK MAINTENANCE**

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International telegraph systems and phototelegraph transmission	M.800–M.899
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International public telephone network	M.1200–M.1299
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<b>Telecommunications management network</b>	<b>M.3000–M.3599</b>
Integrated services digital networks	M.3600–M.3999
Common channel signalling systems	M.4000–M.4999

*For further details, please refer to the list of ITU-T Recommendations.*

## **ITU-T Recommendation M.3170.1**

### **Multi-technology network management: Business agreement (TMF513)**

#### **Summary**

The multi-technology network management (MTNM) solution suite realizes a TMN interface between the NML and EML according to ITU-T Recommendation M.3010 for the FCAPS management of multi-technology fixed transport, access and aggregation networks.

This Recommendation explains the structure of the MTNM business agreement (TMF513) and relates its components to key Recommendations on TMN functionality for q reference points between the NML and EML. It wraps TMF513 and associated supporting documents by referencing them normatively and relating them to identified Recommendations on TMN (NGNM) and principles of functional (NG) network architectures (such as transmission layering without adaptation details). This Recommendation can also be used as a lead-in to the MTNM business agreement.

#### **Source**

ITU-T Recommendation M.3170.1 was approved on 16 March 2007 by ITU-T Study Group 4 (2005-2008) under the ITU-T Recommendation A.8 procedure.

## 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.

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/>.

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# ITU-T Recommendation M.3170.1

## Multi-technology network management: Business agreement (TMF513)

### 1 Scope

The multi-technology network management (MTNM) solution suite is an implementation standard of a TMN interface between the NML and EML according to [ITU-T M.3010] for the FCAPS management of multi-technology fixed transport, access and aggregation networks. The MTNM implementation view specifies a CORBA-based TMN Q interface between an NMS (CORBA client or TMN manager) and an EMS (CORBA server or TMN agent which is in contact to the NEL).

The MTNM solution suite consists of the following deliverables:

- The MTNM business view is specified in the business agreement (BA) TMF513.
- The MTNM system view is specified in UML in the information agreement (IA) TMF608.
- The MTNM CORBA-based implementation and deployment views are specified in the CORBA IDL solution set (SS) TMF814 (with HTML documentation) and associated implementation statement (IS) templates and guidelines TMF814A.
- The MTNM supporting documentation (SD) guides and lightens the work with the MTNM views and also includes normative parts of the interface such as name/value pairs.

This Recommendation outlines the structure of TMF513 and describes its relationship to the other M.3170-series Recommendations, other TMN Recommendations and other TM Forum specifications.

### 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 G.805] ITU-T Recommendation G.805 (2000), *Generic functional architecture of transport networks*.
- [ITU-T G.852.2] ITU-T Recommendation G.852.2 (1999), *Enterprise viewpoint description of transport network resource model*.
- [ITU-T M.3010] ITU-T Recommendation M.3010 (2000), *Principles for a telecommunications management network*.
- [ITU-T M.3013] ITU-T Recommendation M.3013 (2000), *Considerations for a telecommunications management network*.
- [ITU-T M.3020] ITU-T Recommendation M.3020 (2007), *Management interface specification methodology*.
- [ITU-T M.3050.x] ITU-T Recommendations M.3050.x (2004), *Enhanced Telecom Operations Map (eTOM)*.
- NOTE – This series of Recommendations has the following structure:  
M.3050.0 – eTOM – Introduction.  
M.3050.1 – eTOM – The business process framework.

M.3050.2 – eTOM – Process decompositions and descriptions.  
 M.3050.3 – eTOM – Representative process flows.  
 M.3050.4 – eTOM – B2B integration: Using B2B inter-enterprise integration with the eTOM.  
 M.3050/Supplement 1 – eTOM – ITIL application note.  
 M.3050/Supplement 2 – eTOM – Public B2B Business Operations Map (BOM).  
 M.3050/Supplement 3 – eTOM to M.3400 mapping.

- [ITU-T M.3170.0] ITU-T Recommendation M.3170.0 (2007), *Multi-technology network management: Introduction and supporting documentation*.
- [ITU-T M.3170.2] ITU-T Recommendation M.3170.2 (2007), *Multi-technology network management: Information agreement (TMF608)*.
- [ITU-T M.3170.3] ITU-T Recommendation M.3170.3 (2007), *Multi-technology network management: CORBA IDL solution set (TMF814) with implementation statement templates and guidelines (TMF814A)*.
- [ITU-T M.3200] ITU-T Recommendation M.3200 (1997), *TMN management services and telecommunications managed areas: overview*.
- [ITU-T M.3400] ITU-T Recommendation M.3400 (2000), *TMN management functions*.
- [ITU-T X.735] ITU-T Recommendation X.735 (1992) | ISO/IEC 10164-6:1993, *Information technology – Open Systems Interconnection – Systems Management: Log control function*.
- [TMF513 v3.0] TM Forum TMF513 Version 3.0 (2004), *Multi-Technology Network Management (MTNM) NML-EML Interface: Business Agreement*, except for the table of references contained in Appendix B.

NOTE – This table of references consists of the columns "reference", "description" and "brief use summary". Whilst the last column is meant to clearly indicate for each reference (i.e., row) whether the reference is needed for the implementation of the specification (a normative reference) or was used for the development of the specification (a non-normative reference), it turned out that this goal was not reached unambiguously in all cases. Therefore this Recommendation does not reference this table. Instead the truly normative references of [TMF513 v3.0], namely [TMF608], [ITU-T G.805] and [ITU-T X.735], are added to the references clause of this Recommendation while the useful and available non-normative references are added to the bibliography of this Recommendation (see [b-TMF044 v2.0] and [b-TMF402 v5.10]).

- [TMF608 v3.0] TM Forum TMF608 Version 3.0 (2004), *Multi-Technology Network Management (MTNM) NML-EML Interface: Information Agreement*, Rational Rose™ (UML) version and generated HTML version, except for the table of references contained in Appendix B.

NOTE – This Recommendation does not reference this table for the same reasons explained in the Note for [TMF513 v3.0]. Instead the truly normative references of [TMF608 v3.0], namely [TMF513 v3.0], [ITU-T G.805] and [ITU-T X.735], are added to the references clause of this Recommendation while the useful and available non-normative references are added to the Bibliography of this Recommendation (see [b-TMF044 v2.0] and [b-TMF404 v2.8]).

### 3 Definitions

Refer to clause 3 of [ITU-T M.3170.0].

## 4 Abbreviations

Refer to clause 4 of [ITU-T M.3170.0].

## 5 Conventions

This Recommendation does not use any particular notational or other conventions.

## 6 TMF513 overview – A lead-in to the MTNM business agreement

This business agreement defines the business problem statement and business requirement model for the information exchange or interface between network management systems (NMSs) and element management systems (EMSs) enabling unified management of SONET/SDH, OTN, DSL, ATM and point-to-point Ethernet transport and access networks.

The business problem statement is described in two parts:

- **Business problem description, project scope and objectives** which identify the business problem regarding the management of a variety of transport network equipment, including the scope, objectives, business scenarios and the benefits to be gained through the solution.
- **Business processes** which describe the related business processes and proposed improvements in terms of the enhanced telecom operations map [ITU-T M.3050.x] [b-GB921 v7.0] [b-GB921D v6.1] [b-TMF517 v1.1]. For MTNM the focus is on the resource management and operations business processes (RM&O grouping) in support of the management of multi-technology transport network equipment.

The business requirement model is described in four parts:

- **Requirements** which list the functional and non-functional requirements to be fulfilled by the EML-NML interface for each business scenario as described in the problem statement. The main requirements for the NML-EML interface have been specified in terms of the entities (managed objects) that are visible across the interface (see Table 4.1 of [TMF513 v3.0] and Figure 6-1 of [ITU-T M.3170.3] for an overview) and the operations that may be performed on these objects. These entities are defined in two categories according to the TM Forum business agreement template [b-TMF402 v5.10]: static and structural requirements; normal sequences, dynamic requirements. Additional requirements are defined for the remaining categories of [b-TMF402 v5.10]: abnormal or exception conditions, dynamic requirements; expectations and non-functional requirements; system administration requirements.
- **Use cases** which present use case descriptions and diagrams to define the interactions across each of the process interfaces covered in the business agreement. Use cases are defined in several categories (or management function sets): NMS-EMS session management, EMS-NE session management, discovery and inventory, provisioning, connection management, protection management, fault management, equipment, craft-related, performance management, GUI cut-through, ATM provisioning, and ATM connection management. Use case details include the following components: use case ID: use case name, summary, actor(s), preconditions, begins when, description, ends when, exceptions, post conditions and traceability. The use case template is similar to the use case template of [ITU-T M.3020].
- **Business requirement model UML diagrams** which contain a summary of the business requirement UML model along with the traceability to the requirements. This serves as the starting point for developing an information agreement and solution set(s).

The model is divided into a static model (complete class dictionary with mapping to static and dynamic requirements but no UML diagram fragments – these are part of TMF608) and a dynamic model (i.e., the collaboration and state diagrams of TMF608).

- **Traceability matrices** which provide matrices that show traceability for:
  - use cases to requirements;
  - UML classes to requirements;
  - UML classes to use cases;
  - static requirements to UML classes;
  - dynamic requirements to use cases and UML class operations; and
  - the remaining additional requirements (exceptional, non-functional, administrative).

The detailed static requirements, normal and exceptional dynamic requirements, use cases, business requirement UML model and traceability matrices for the MTNM NML-EML interface shall be in accordance with [TMF513 v3.0], which extends [b-TMF513 v.2.1].

NOTE – [TMF513 v3.0] incorporates [b-TMF513 v2.1] (though with certain well-documented changes), and so [b-TMF513 v2.1] is not a formal prerequisite for [TMF513 v3.0]. However, knowledge of the more readily accessible v2.1 may greatly simplify the approach to and understanding of v3.0.

## 6.1 Relationship to other M.3170-series Recommendations

M.3170.1/TMF513 defines the requirements for the interface both in terms of the objects and operations that the interface is required to support and the overall behaviour of the interface. It contains a mapping to M.3170.2/TMF608 which links the requirements to the classes, attributes and operations specified in the UML information model. [ITU-T M.3170.2] specifies the details of the classes, their relationships and their operations' behaviour that are required to support the requirements of the MTNM NML-EML Interface. It also provides UML diagram fragments and state diagrams. Hence M.3170.1 and [ITU-T M.3170.2] are mutually traceable and fully define the interface.

M.3170.3/TMF814 presents the CORBA IDL specification of the MTNM NML-EML interface. In defining a protocol-specific implementation that meets the specification defined in M.3170.1 and [ITU-T M.3170.2], it is necessary to consider protocol-specific issues such as efficiency and interoperability. This results in a service-oriented UML model (as opposed to a fine-grained model) and a corresponding service-oriented CORBA IDL model as outlined in [ITU-T M.3170.2] and detailed in [ITU-T M.3170.3].

## 6.2 Relationship to other TMN Recommendations

The following relationships to other TMN Recommendations exist:

- The MTNM NML-EML interface is based on M.3010 functional architecture, including logical layered architecture (LLA) and physical architecture defined in [ITU-T M.3010] and [ITU-T M.3013].
- The M.3170-series Recommendations address the problems arising in the resource management and operations (RM&O) business processes defined in [ITU-T M.3050.x] which in turn are mapped to the TMN management functions in [ITU-T M.3400] that categorizes the management function sets and their members (according to FCAPS application) and specifies them together with generic end-to-end flow scenarios, thereby relating them to TMN management services and TMN managed areas according to [ITU-T M.3200].
- The M.3170.1 business agreement, the M.3170.2 information agreement and the M.3170.3 CORBA IDL solution set are defined using the TM Forum's methodological analogues (in particular the BA and IA templates [b-TMF402 v5.10] [b-TMF404 v2.8] and the MTNM use case template) to the requirements, analysis and design (RAD) phases and templates defined in [ITU-T M.3020].

Refer to clause 7 for a few more details.

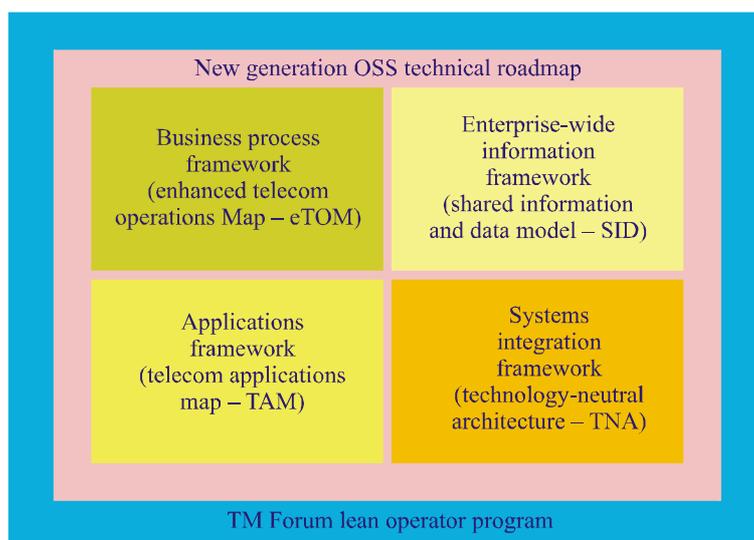
### 6.3 Relationship to other TM Forum specifications

The following relationships to other TM Forum specifications exist:

- The relationship of the M.3170-series to the M.3050-series Recommendations implies a relationship to the equivalent eTOM suite specifications, in particular [b-TMF921 v7.0] [b-TMF921D v6.1], and to the eTOM precursors TOM and NM DOM (network management detailed operations map).

NOTE – Historically, the eTOM was developed from the TOM which was developed, together with the NM DOM, based on [ITU-T M.3010], [ITU-T M.3400] and [ITU-T M.3200]. The LLA of [ITU-T M.3010] is a horizontal grouping of TMN management services/functions and a vertical grouping into functional customer-to-network flow-through areas. The LLA layers map intuitively to the TOM process groupings. Whilst the TOM mediates via flow-through processes according to the FAB breakdown between the customer and the telecom network ("NE management processes" and "physical network and IT" process groupings with details in NM DOM), the eTOM mediates between the customer and the suppliers/partners. When viewing (in the context of detailed NM process specification) the TOM as a part of the eTOM, the telecom network is really in a third eTOM dimension, hidden behind the RM&O process grouping. These currently invisible TOM and NM DOM processes are known as technology resources integration processes (TRIP). Some of these processes reappeared in the context of the eTOM/M.3400 and M.3400/eTOM mappings specified in Supplement 3 to [ITU-T M.3050] and its counterpart GB921T.

- The TM Forum has developed the new generation operations systems and software (NGOSS) lifecycle and methodology (GB927) as the guideline for service providers, equipment and software vendors as well as system integrators to analyse, design, develop, procure and deploy modular and interoperable NGOSS solutions that support dynamic requirements being imposed by a more business-driven service portfolio. The NGOSS lifecycle and methodology is based on the four key NGOSS frameworks eTOM (GB921 suite), SID (GB922 suite), TNA (TMF053 suite) and TAM [b-GB929 v.2.0] shown in Figure 6-1. In this context the M.3170-series Recommendations on MTNM are seen as a pre-built NGOSS-compliant interface ready to be used in OSS development projects. MTNM progression in the context of the evolution of the NGOSS frameworks (for example, towards service delivery framework (SDF) management) is for further study.



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**Figure 6-1 – The four key NGOSS frameworks**

- Historically, MTNM is related to the TM Forum projects SSIM, ATMIM, CaSMIM, IPNM, MTOSI [b-TMF517 v1.1], and the mTOP (multi-technology OSS program) community [b-TMFC5800].

Refer to clause 7 for a few more details.

Further information on the development of MTNM specifications within the TM Forum can be found in an accompanying MTNM users' guide, for further study.

## 7 Referencing TMF513

This Recommendation normatively references the TM Forum approved MTNM business agreement (BA) v3.0 [TMF513 v3.0] which extends the MTNM BA V2.1 [b-TMF513 v2.1], as well as the associated MTNM supporting documents and points to a number of MTNM-related in-force ITU-T Recommendations specifying TMN principles and considerations, TMN interface specification methodology, TMN features and principles of functional network architectures.

Figure 7-1 shows how M.3170.1 points to TM Forum-approved documents and to related ITU-T Recommendations on TMN and functional network architecture principles:

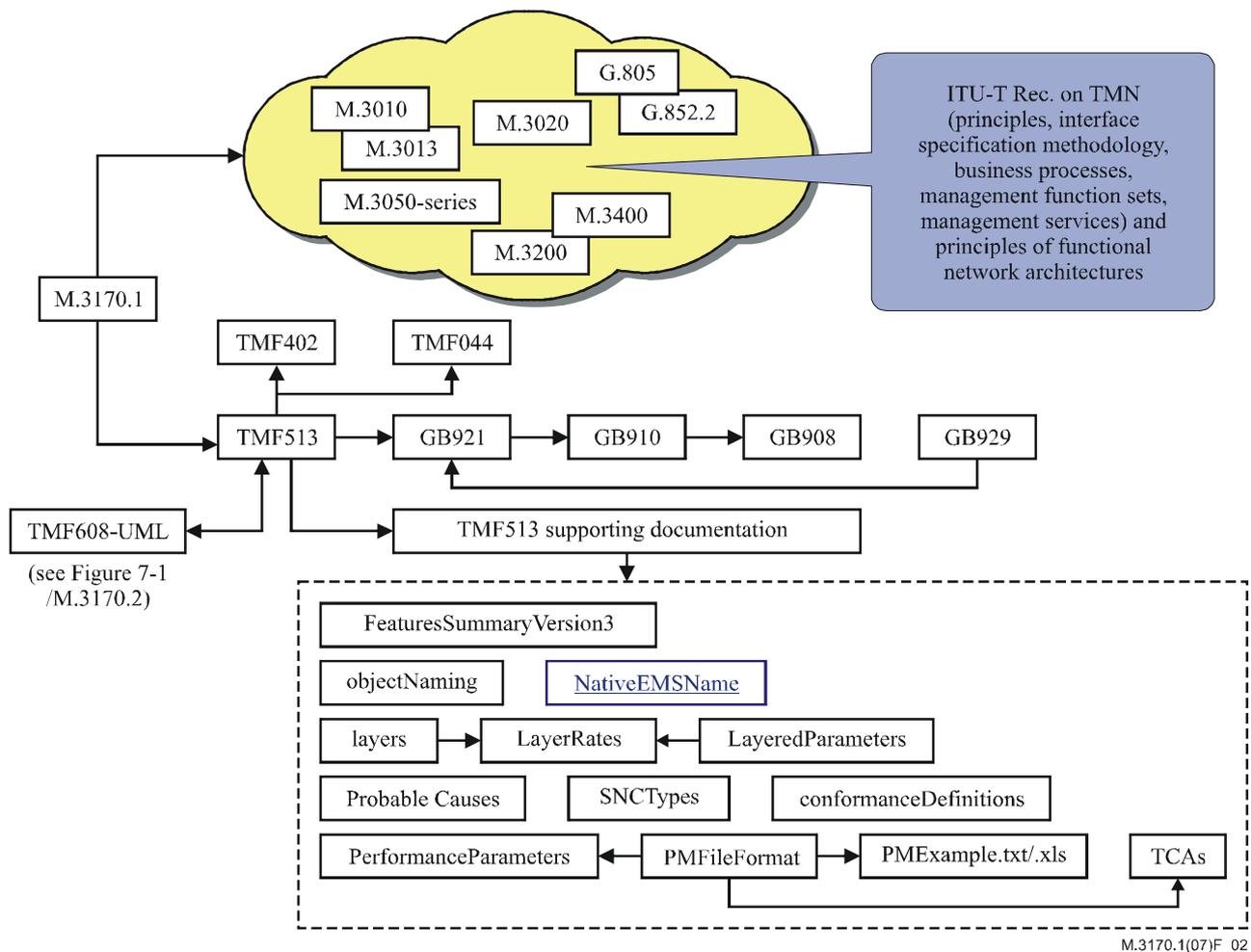


Figure 7-1 – ITU-T and TM Forum documents linked by M.3170.1

At the TM Forum side, Figure 7-1 shows the business agreement reference structure with regard to other key TM Forum documents [b-GB921 v7.0] [b-GB92D v6.1] [b-GB929 v2.0] [b-TMF402 v5.10] [b-TMF044 v2.0] (non-exhaustive – see clause 6.3), and looks inside the SD box (BA-relevant supporting documents according to Table 6-1 of [ITU-T M.3170.0]). Refer to clause 6.3 of [ITU-T M.3170.0] for an overview of the supporting documentation. Supporting documents that are only packaged with TMF513 are underlined in blue.

A more comprehensive description of the relationship of M.3170.1/TMF513 to other TM Forum specifications is for further study (see also clause 6.3).

At the ITU-T side, Figure 7-1 depicts an "ITU-T Recommendation cloud" with the BA-relevant ITU-T Recommendations. The cloud encompasses TMN-related Recommendations. (TMN principles and considerations [ITU-T M.3010] [ITU-T M.3013], interface specification methodology [ITU-T M.3020], business processes [ITU-T M.3050.x], management function sets [ITU-T M.3400], management services [ITU-T M.3200]) and Recommendations on functional network architecture principles (such as transmission layering without adaptation details) [ITU-T G.805] [ITU-T G.852.2]. Since TMF513 is concerned with requirements and use cases for the MTNM NML-EML interface, it is mainly related to TMN Recommendations and refers only in a minimalistic way to Recommendations on functional network architectures. The details of functional network and management architecture modelling are of interest for the MTNM service-oriented CORBA IDL solution set (see [ITU-T M.3170.3]). However, by referencing the supported transmission layer rates with their associated layered parameters, TMF513 already brings the MTNM multi-technology capability to the requirements phase of the specification process.

Relationships of TM Forum's TMF513 to further in-force and in-progress ITU-T Recommendations are for further study. Candidates may be found in the M.3020-series revision and amendment work on management interface specification methodology (MISM) and in the X.730-series and X.740-series of ITU-T Recommendations on common management services (such as Object, State, Alarm, Notification, Log, Test and Performance Management) and their progression. For example, TMF513 specifies fairly lightweight but nevertheless complete approaches to fault management and performance management.

## Bibliography

The following references contain information that was used in the development of the M.3170-series Recommendations.

- [b-GB921 v7.0] TM Forum GB921 v7.0 (2007), *Enhanced Telecom Operations Map (eTOM) – The Business Process Framework for the ICS Industry*.  
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