International Telecommunication Union

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

M.3363

(02/2020)

SERIES M: TELECOMMUNICATION MANAGEMENT, INCLUDING TMN AND NETWORK MAINTENANCE

Telecommunications management network

Requirements for data management in the telecommunication management network

Recommendation ITU-T M.3363

ITU-T M-SERIES RECOMMENDATIONS

TELECOMMUNICATION MANAGEMENT, INCLUDING TMN AND NETWORK MAINTENANCE

Introduction and general principles of maintenance and maintenance organization	M.10–M.299
International transmission systems	M.300–M.559
International telephone circuits	M.560–M.759
Common channel signalling systems	M.760–M.799
International telegraph systems and phototelegraph transmission	M.800–M.899
International leased group and supergroup links	M.900–M.999
International leased circuits	M.1000–M.1099
Mobile telecommunication systems and services	M.1100–M.1199
International public telephone network	M.1200–M.1299
International data transmission systems	M.1300–M.1399
Designations and information exchange	M.1400–M.1999
International transport network	M.2000–M.2999
Telecommunications management network	**M.3000–M.3599**
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.

Recommendation ITU-T M.3363

Requirements for data management in the telecommunication management network

Summary

Recommendation ITU-T M.3363 describes the requirements for data management in the telecommunication management network (TMN), the functional framework for data management and the functional description. The data refers to the different categories of telecommunication data in business support system (BSS) and operation support system (OSS). The requirements for data management include metadata management, data lifecycle management, data quality management, data security management, data configuration management and data service management.

History

Edition	Recommendation	Approval	Study Group	Unique ID*
1.0	ITU-T M.3363	2020-02-13	2	11.1002/1000/14182

Keywords

Data management, DFCAPS, TMN.

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* To access the Recommendation, type the URL http://handle.itu.int/ in the address field of your web browser, followed by the Recommendation's unique ID. For example, http://handle.itu.int/11.1002/1000/11830-en.

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Table of Contents

Recommendation ITU-T M.3363

Requirements for data management in the telecommunication management network

1 Scope

This Recommendation describes the requirements for data management in the telecommunication management network (TMN), the functional framework for data management and the functional description. The data refers to the telecommunication data in business support system (BSS) and operation support system (OSS).

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.3000] Recommendation ITU-T M.3000 (2000), *Overview of TMN Recommendations.*

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

[ITU-T M.3190] Recommendation ITU-T M.3190 (2008), *Shared information and data model (SID).*

[ITU-T M.3400] Recommendation ITU-T M.3400 (2000), *TMN management functions.*

[ITU-T X.1051] Recommendation ITU T X.1051 (2016), *Information technology - Security techniques – Code of practice for Information security controls based on ISO/IEC 27002 for telecommunications organizations.*

[ITU-T X.1052] Recommendation ITU T X.1052 (2011), *Information security management framework.*

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 data quality [b-ISO 8000-2]: Degree to which a set of inherent characteristics of data fulfils requirements.

3.1.2 metadata [b-ISO 8000-2]: Data defining and describing other data.

3.2 Terms defined in this Recommendation

This Recommendation defines the following terms:

3.2.1 data lifecycle: A whole range of data processing phases including data planning, data acquisition, data storage, data sharing, data usage, data transmission and data disposal.

3.2.2 data management: A set of functions that control, protect, and enhance the value of data throughout their lifecycles.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

BSS Business Support System

DFCAPS Data, Fault, Configuration, Accounting, Performance and Security

MFA Management Functional Area

OSS Operation Support System

SDN Software Defined Network

SID Shared Information Data

TMN Telecommunication Management Network

5 Conventions

None.

6 Background of data management

There are large amounts of data generated in telecommunication networks every day. Referring to the domains contained within the shared information data (SID) framework described in [ITU-T M.3190], the telecommunication data could be classified as the following different data categories:

– Produce data: produce specification, etc.

– Customer data: customer order, customer bill, etc.

– Service data: service usage, service configuration, service performance, etc.

– Resource data: resource topology, resource inventory, resource performance, resource configuration, resource usage, etc.

– Supplier/partner data: S/P order, S/P performance, S/P bill, S/P payment, etc.

– Common business data: business party, location, policy, agreement, etc.

– Analysis data: analysis report, customer tag, etc.

As telecommunication networks evolve, including the emergence of software defined network (SDN), data types and the amount of data increase sharply. These data processing, management and mining could impact telecommunication operation management. Therefore, data management play an important role in telecommunication intelligent operation management. It is necessary to specify the functional requirements of data management in current telecommunication management network (TMN) framework.

7 Overview of data management in the TMN

The objectives of data management are to provide the capabilities of controlling, protecting, and enhancing the value of telecommunication data throughout their lifecycles.

As an important part of the telecommunication management network [ITU-T M.3000], data management could ensure data security and improve data quality.

Data management as a new management functional area (MFA) [ITU-T M.3010] should be added into TMN management functions [ITU-T M.3400]. Figure 7-1 shows the TMN management service logical architecture.

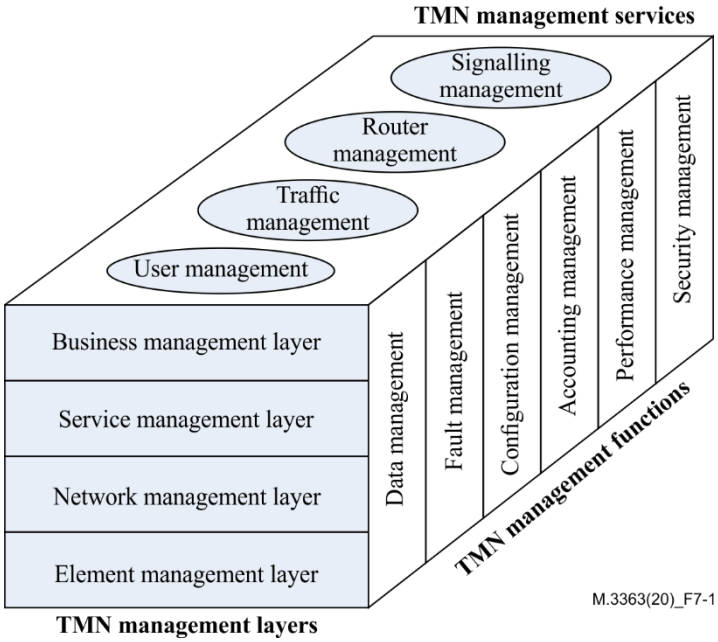

Figure 7-1 – Enhanced TMN management service logical architecture

This Recommendation focuses on the functional requirements of data management in telecommunication networks, which includes metadata management, data lifecycle management, data quality management, data security management, data configuration management, and data service management which are described in clauses 8 to 13. These management function entities work together to ensure the consistency, security and effectiveness of telecommunication data.

8 Metadata management

In this Recommendation, metadata refers to the descriptive data associated with telecommunication data. It provides information about the data. It can facilitate tracking and working with specific data to make it easier. It includes means of creation of the data, purpose of the data, time and date of the data creation, creator or author of the data, location in telecommunication networks where the data was created, file size, data quality, source of the data, process and standards used to create the data and so on.

Metadata management provides functional requirements of planning, implementation and control activities to enable easy access to high quality, integrated metadata.

The goals of metadata management include:

– Provide organizational understanding of business terms and usage.

– Collect and integrate metadata from diverse sources.

– Provide a standard way to access metadata.

– Ensure metadata quality and security.

Metadata management includes the following function set groups:

– Metadata creation management function set.

– Metadata maintenance management function set.

– Metadata stores management function set.

– Support metadata reporting and analysis function set.

8.1 Metadata creation management function set

Metadata creation management provides functions to manage the created metadata as follows:

– This set supports measures to categorize metadata into three types: business metadata, technical metadata, and operational metadata.

– This set supports the synchronization about the timing of updates in relation to source changes.

– This set supports the degree of integration of metadata from different sources, and rules for integration.

8.2 Metadata maintenance management function set

Metadata maintenance management provides functions to maintain the metadata as follows:

– This set supports the processes and rules for updating metadata, the patches and version maintenance plan and execution in order to keep the current patching level and version.

– This set supports quality assurance and quality control to ensure metadata quality and consistency, missing metadata reports, frequency of data update with matching sets to timeframes.

– This set supports the access rights about who can access and how they access, along with specific user interface functionality for access.

– This set supports measures to manage the roles and responsibilities for maintaining metadata.

8.3 Metadata storage management function set

Metadata storage management provides functions to manage the metadata stores as follows:

– This set supports measures to administrate metadata storage by monitoring and resolving various issues in the implemented repository environment.

– This set supports measures to load, scan, import and tag the metadata.

– This set supports measures to backup, recover, archive, purge the data.

8.4 Metadata report and analysis management function set

Metadata report and analysis management provides functions to manage the metadata reports and analysis as follows:

– This set supports measures to monitor metadata stores, generate reports, warnings, job logs and provide query statistics analysis.

9 Data lifecycle management

Data lifecycle management provides functional requirements for the development, execution, and supervision of plans, policies, programs, and practices that deliver, control, protect, and enhance the value of data throughout their lifecycles.

The goals of data lifecycle management include:

– Managing the availability of data throughout the data lifecycle from planning to disposal of data.

– Monitoring the data availability related information such as expiration date, sensitivity level and data sharing right.

– Ensuring that data can be used effectively to add value to the enterprise.

– Ensuring the integrity of data.

– Managing the performance of data transactions.

Data lifecycle management includes the following function set groups:

– Data registration management function set.
– Data storage management function set.
– Data directory management function set.
– Data access management function set.
– Data dispose management function set.
– Master data management function set.

9.1 Data registration management function set

Data registration management provides functions to manage the registration of the descriptions of data during data planning, data acquisition, and data storage phases as follows:

– This set supports measures to extract the useful depiction of data from data sources including data definition, data type, data acquisition cycle, data storage location, data structure and so on.
– This set supports measures to add the depiction into data directory for user access.
– This set supports measures to the audit and version maintenance of data.
– This set supports data node registration management mechanism to dynamically increase data nodes without affecting the service operation.
– This set supports the application for data registration.

9.2 Data storage management function set

Data storage management provides functions to enable the design, implementation and support of stored data to maximize its value during data storage phase as follows:

– This set supports measures to ensure the performance and reliability of the data storage, through performance tuning, monitoring, error reporting, and other activities.
– This set supports measures to implement backup and recovery mechanisms to ensure that data can be recovered if lost in any circumstance.
– This set supports measures to implement mechanisms for clustering and failover of the data storage.
– This set supports measures to implement mechanisms for archiving data.

9.3 Data directory management function set

Data directory management provides functions to show the information about data during data sharing, data usage, and data storage phases as follows:

– This set supports measures to contain detailed information about data, such as terminology, tables, fields, etc.
– This set supports the data directory updates in relation to data source changes.

9.4 Data access management function set

Data access management provides functions to access the data during data usage phase as follows:

– This set supports measures to provide access authority to data developers and data super users, such as data stewardship teams and data analysis.
– This set supports users to apply for the rights of accessing and using the data.
– This set supports measures to allow the authorized users to access and use the data sources that are registered in the data directory.

9.5 Data dispose management function set

Data dispose management provides functions to dispose of data during the data disposal phase, as follows:

– This set supports measures to dispose of the expired or obsolete data.

– This set supports measures to recover and reinitialize the storage space.

9.6 Master data management function set

Master data management provides functions to manage master data during data transmission phase as follows:

– This set supports measures to share the master data across the organization.

– This set supports measures to determine and establish the unique, stable data source and data standards within the scope of telecom operation and maintenance management.

– This set supports measures to ensure the consistency and integrity of cross-domain business data.

– This set supports master data modification and version management supporting the operation of adding, deleting or modifying master data.

– This set supports measures to issue master data versions to users, and to share different versions of master data to different users.

10 Data quality management

Data quality characteristics include completeness, validity, accuracy, consistency, availability, timeliness, logicality, etc.

Data quality management provides functional requirements of planning, implementation and the control of activities that apply quality management techniques to data, in order to ensure that it is fit for consumption and meets the needs of data consumers.

The goals of data quality management include:

– Developing a governed approach to make data fit for purpose based on data consumers' requirements.

– Defining standards and specifications for data quality controls as part of the data lifecycle.

– Defining and implementing processes to measure, monitor, and report on data quality levels.

– Identifying and advocating for opportunities to improve the quality of data, through changes to processes and systems.

Data quality management includes the following function set groups:

– Data audit management function set.

– Data quality problem solving function set.

– Data quality alarm management function set.

– Data quality assessment function set.

10.1 Data audit management function set

Data audit management provides functions to check or audit the data correctness and data integrity in each step of the data processing as follows:

– This set supports the audit point management including audit indicators setting (e.g., addition, deletion and alteration of audit indicators, establishment of description parameters of audit indicators, the collection source of indicators, etc.), audit rules configuration (e.g., addition, deletion and alteration of audit rules, establishment of

description parameters of audit rules, configuration of rules expression, etc.), audit points configuration (e.g., conducting classified management of audit points including data sources, data acquisition nodes, data aggregation nodes, etc., checking the correctness of audit point parameters).

– This set supports the audit task management including definition of audit tasks, automated scheduling of audit tasks, monitoring the operation status of audit tasks and providing the query of operation results, etc.

10.2 Data quality problem solving function set

Data quality problem solving provides functions to solve the data quality problems as follows:

– This set supports measures to provide the unified entry of data quality problem management.

– This set supports measures to monitor and query the problems and accumulate the knowledge.

– This set supports measures to solve the data quality problems including data sources issues (e.g., data loss, duplication, input irregularities, data anomalies, etc.), data acquisition and aggregation nodes issues (e.g., data loss, incomplete data, untimely data, etc.), inconsistent data naming and coding specifications which are cross-system associated, data loss leading to the problem that data cannot be correlated across domains, data quality problems caused by system failures or anomalies.

10.3 Data quality alarm management function set

Data quality alarm management provides functions to deal with the data quality alarms as follows:

– This set supports alarm rule configuration including addition, deletion and alteration of alarm rules.

– This set supports measures to query alarm information according to certain conditions.

– This set supports measures to notice and assign the task to solve data quality issues based on the different levels of alarm information.

10.4 Data quality assessment function set

Data quality assessment provides functions to assess data quality as follows:

– This set supports data quality assessment, which is a quantitative assessment by comparing the data quality assessment specifications with the actual measured values of the data quality audit indicators.

– This set supports measures to generate data quality statistical report on a daily or monthly period.

– This set supports measures to provide audit problem handling report and implement audit problem handling assessment.

– This set supports measures to create, maintain, and query data quality evaluation report.

11 Data security management

Data security management provides functional requirements of planning, development and execution of security policies and procedures to provide proper authentication, authorization, access, and auditing of data.

The goals of data security management include:

– Enabling appropriate access and preventing inappropriate access to data.

– Enabling compliance with regulations and policies for privacy, protection, and confidentiality.

– Ensuring user requirements for privacy and confidentiality.

Data security management includes the following function set groups:

– Risk data security management function set.

– Data lifecycle security management function set.

11.1 Risk data security management function set

Referring to information classification guidelines described in [ITU-T X.1051], telecommunication data could be classified as different risk categories in terms of legal requirements, value, criticality and sensitivity to unauthorized disclosure or modification. It should ensure that telecommunication data receives an appropriate level of protection in accordance with its importance to the organization.

Referring to risk management described in [ITU-T X.1052], risk data security management is a series of coordinated activities to assess and control the risks which telecommunication data faces.

Risk data security management provides functions to manage the different risk data as follows:

– This set supports data risk classifications which describe the degree of sensitivity of the data, and the harmful extent of data leakage, such as critical risk data, high risk data or moderate risk data.

– This set supports monitoring risk data throughout data lifecycle.

– This set supports data access control and data masking for risk data.

– This set supports data encrypted transmission for risk data.

– This set supports log retention of data queries, modifications or deletions for risk data.

– This set supports measures to prevent external attacks and data loss.

11.2 Data lifecycle security management function set

Data lifecycle security management provides functions to ensure data security throughout data lifecycle as follows:

– This set supports measures to prevent malicious modification of data generation rules resulting in distorted data or falsified data in data creation phrase.

– This set supports measures to prevent parsing, modifying or deleting data content in data acquisition and transmission phrase.

– This set supports data storage encryption, data recovery and backup, and multi-tenant isolation in data storage phase.

– This set supports data encryption, data masking, or password authentication in data usage phase.

– This set supports measures to completely clear or reallocate the storage space which is released in disposal phase.

12 Data configuration management

Data configuration management provides functional requirements of maintaining the data configuration operations.

The goals of data configuration management include:

– Ensuring standardization of data configuration operations.

Data configuration management includes the following function set groups:

– Configuration activities management function set.

– Configuration verification management function set.

– Configuration impact assessment function set.

– Dataflow topology configuration management function set.

12.1 Configuration activities management function set

Configuration activities management provides functions to maintain equipment operation configuration in TMN as follows:

– This set supports measures to activate or deactivate the equipment to generate or export data.

– This set supports measures to identify and confirm the data related equipment configuration including the types of data files, data storage paths, data naming rules, data generated period, data format, data parsing method, interface definition and so on.

– This set supports measures to record the detailed description about the difference between the device output data and the data definition criteria after the configuration is created or modified.

– This set supports measures to record the detailed description about the impact on the network performance after the various data output function is activated.

– This set supports measures to check the data configuration of each network element according to the equipment configuration verification manual and check the correctness and integrity of configuration items.

12.2 Configuration impact assessment function set

Configuration impact assessment provides functions to assess the impact after executing data configuration instructions as follows:

– This set supports measures to compare the network operation quality with the network operation indicators after executing the instructions.

12.3 Dataflow topology configuration management function set

Dataflow topology configuration management provides functions to generate and update the dataflow topology configuration as follows:

– This set supports measures to generate the dataflow topology to summarize the configuration information throughout data lifecycle including the network element configuration, data format, data storage time, the data transmission network topology configuration and so on.

– This set supports measures to update the dataflow topology in time while the dataflow topology changes.

13 Data service management

Data service management provides functional requirements of encapsulating all kinds of telecommunication data, providing standardized data services.

The goals of data service management include:

– Ensuring that telecommunication data can be used effectively throughout standardized data services.

– Ensuring data service delivery for retrieval, analysis or visualization.

Data service management includes the following function set groups:

– Data service catalogue management function set.

– Data service subscription management function set.

– Data service usage management function set.

13.1 Data service catalogue management function set

Data service catalogue management provides functions to show the information about data services as follows:

– This set supports measures to present the aggregate processed data including the application wide table with user instance, tag market with application tag, etc.

– This set supports measures to add, modify, delete or query the content of data service catalogue.

13.2 Data service subscription management function set

Data service subscription management provides functions to subscribe data service as follows:

– This set supports measures to provide service application information for data service subscription. The information includes data description, data storage location, data subscription interface and so on.

– This set supports measures to approve the data service subscription including auditing the data user's qualification, security measures, the impact on equipment performance and so on.

– This set supports measures to release the authorized and approved data services. The subscribed data can be published to the data service user in accordance with the agreed data access mode. The subscribed data can be extracted by the data service user from the security data file server.

13.3 Data service usage management function set

Data service usage management provides functions to manage the data access resources and data access capabilities as follows:

– This set supports measures to provide data access capabilities such as data sandboxes, and data modelling tools or algorithms.

– This set supports measures to provide the online data modelling, and the updating or releasing of data models.

Bibliography

[b-ISO 8000-2] ISO 8000-2:2018, *Data quality – Part 2: Vocabulary.*

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Series A	Organization of the work of ITU-T
Series D	Tariff and accounting principles and international telecommunication/ICT economic and policy issues
Series E	Overall network operation, telephone service, service operation and human factors
Series F	Non-telephone telecommunication services
Series G	Transmission systems and media, digital systems and networks
Series H	Audiovisual and multimedia systems
Series I	Integrated services digital network
Series J	Cable networks and transmission of television, sound programme and other multimedia signals
Series K	Protection against interference
Series L	Environment and ICTs, climate change, e-waste, energy efficiency; construction, installation and protection of cables and other elements of outside plant
Series M	**Telecommunication management, including TMN and network maintenance**
Series N	Maintenance: international sound programme and television transmission circuits
Series O	Specifications of measuring equipment
Series P	Telephone transmission quality, telephone installations, local line networks
Series Q	Switching and signalling, and associated measurements and tests
Series R	Telegraph transmission
Series S	Telegraph services terminal equipment
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Printed in Switzerland
Geneva, 2020