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MAINTENANCE: TELECOMMUNICATIONS MANAGEMENT NETWORK

TMN MANAGEMENT CAPABILITIES PRESENTED AT THE F INTERFACE

Recommendation M.3300

FOREWORD

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CCITT NOTE

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

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Recommendation M.3300

TMN MANAGEMENT CAPABILITIES PRESENTED AT THE F INTERFACE[1)]

(1992)

Abstract

This Recommendation provides an overview of the TMN management capabilities presented for human information and/or intervention. This Recommendation describes the human-machine supporting functions in the five OSI management categories and the management capabilities from a TMN management services perspective.

Abbreviations

A list of abbreviations used in this Recommendation is given in Annex B.

Keywords

– human-machine interaction;
– interface;
– management capabilities;
– TMN.

1 Introduction

This Recommendation identifies the TMN management capabilities to be controlled by means of human readable displays and human data entry. The F interface is intended to provide the user access to telecommunications management systems via a telecommunication management network (TMN) (see Recommendation M.3010 [1]). The human-machine interface (HMI) enables the exchange of information between users and systems. Interaction between users and the controlled systems is based on a repertoire of inputs, outputs, special actions and human-machine interaction mechanisms including dialogue procedures. This Recommendation provides an overview of the management capabilities presented at the F interface. The details appropriate to particular management capabilities remain as described in the relevant M-Series Recommendations.

For each management capability, one or more human-machine functions may be required via the G interface. Each human-machine function is then described in the Z-Series Recommendations, which permits the information structure across the G interface to be defined in detail.

Section 4 and Annex A of this Recommendation describe the supporting functions in the five OSI management categories functional areas (see Recommendation M.3400 [2]), while § 5 lists the management capabilities from a TMN management services perspective (see Recommendation M.3200 [3]). The user support administration functions performed are generally data report administrative functions, e.g. create report/summary, create schedule for report/summary, request report/summary, change report/summary, delete report/summary, etc. These data report administrative functions are repeated in each functional area. Command/response functions are evident in some functional areas, e.g. request line test, receive test results, close service order, etc.

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1) This Recommendation replaces Recommendations M.250 and M.251 contained in the CCITT Blue Books.

2 Scope

The general concepts and philosophy of the TMN are fully described in Recommendation M.3010 [1]. The description of the management functions, on the basis of Recommendation M.3010 [1], has the advantage that general descriptions of the various management activities obtained, are valid for all network elements. No separate descriptions for maintenance of terminals, subscriber lines, exchanges, lines between exchanges, etc. are necessary. In addition, it is recognized that complex tasks involve several functional areas. This Recommendation is not intended to provide a comprehensive grasp of the orchestration of complex tasks, nor does it imply that all of the capabilities outlined in Annex A need to be provided in a specific implementation of a device containing WSF. Indeed, a subset of these capabilities may be provided in the device containing the Work Station Function (WSF). In this sense, Annex A provides examples of the TMN capabilities.

3 Functional architecture

A generalized functional architecture of the TMN is shown in Figure 1/M.3300. For the purpose of modelling the HMI support in the TMN, two functions (HMA, PF) have been identified.

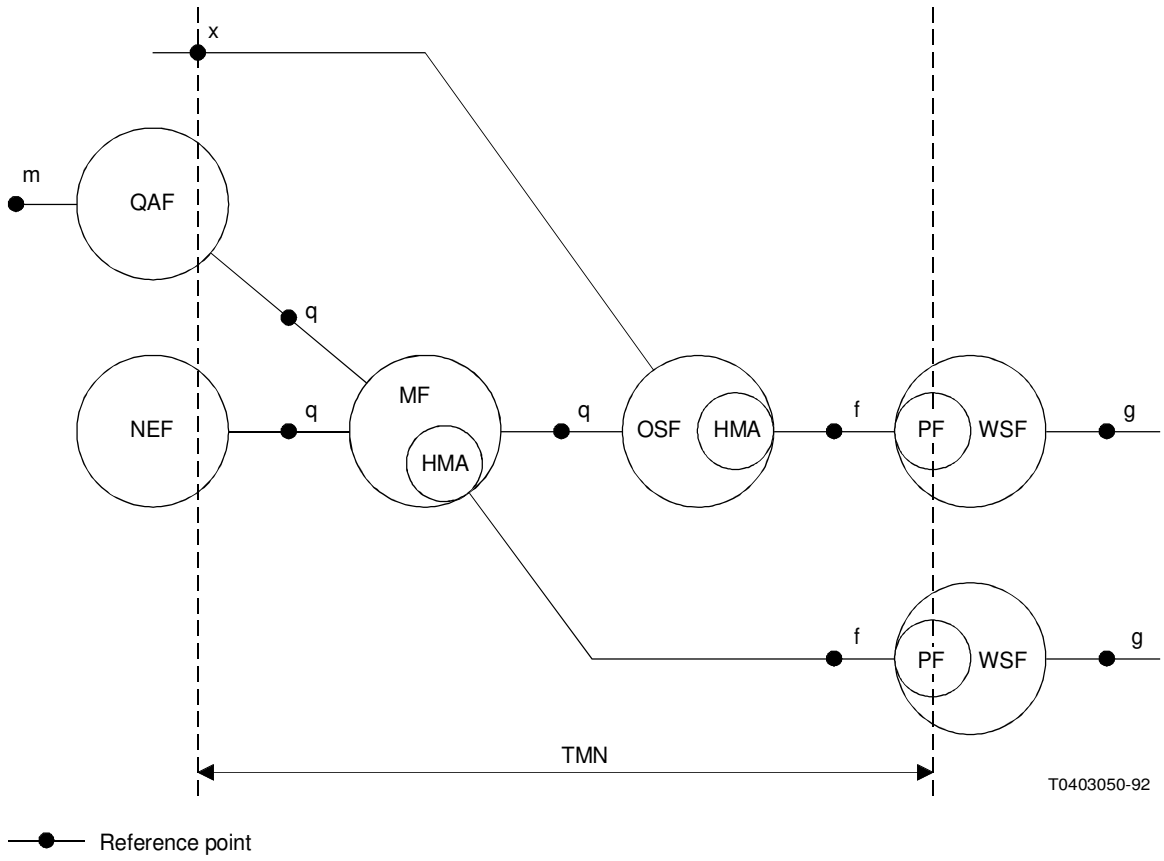

FIGURE 1/M.3300

Overview of the functional architecture of the TMN, highlighting the HMI aspects

3.1 *Reference points*

Reference points, as described in Recommendation M.3010 [1], delineate management function blocks. Reference points are considered as being service boundaries between the management function blocks such as OSF, MF, QAF, WSF, and NEFs. Five classes of reference points are defined:

- q class between OSF, QAF, MF, and NEF;
- f class for attachment of work stations;
- g class between WSF and users;
- m class between QAF and non-TMN managed entity;
- x class between TMN and other networks (e.g. TMNs).

3.2 *The human machine adaptation (HMA)*

The HMA performs the conversion from the Management Application Function (MAF) information model to the WSF information model and vice-versa (it masks and possibly reorganizes some data and it adds information). In addition, it supports the authentication and authorization of the human operators. In the TMN, the HMA is shown at the OSF/MF side of the f reference point (see Figure 1/M.3300).

3.3 *The presentation function (PF)*

The PF, as described in Recommendation M.3010 [1], is the basic component of the WSF. It performs general operations to translate the information held in the information model, and available at the f reference point, to a displayable format for the human operator at the g reference point, and vice-versa. The PF performs all the functions needed to provide a user with a comfortable and user friendly human-machine display. The PF also provides the user with physical input, output and edit facilities to enter, display, and modify details about objects.

For TMN purposes, refinement of the PF into further functional blocks is not required.

4 Management capabilities

The TMN management capabilities cover aspects of the management of telecommunication networks from the work station/human operator expectation, at the “f” reference point.

Annex A organizes the management capabilities into the OSI management categories:

- performance management;
- fault management;
- configuration management;
- accounting management;
- security management.

Details of the functions supported by the TMN are given in M.3400 [2]. Details of the HMI functions required to support these TMN functions are described in the appropriate Z-Series Recommendations.

5 Management services

Recognizing the necessity for cooperation between users in performing network management operations, basic functions are needed to support the work in each of, and spanning over, the previous functional areas, e.g. message handling, service order management.

Generally, orchestration of the elementary functions described in Annex A is needed since managing a network involves tasks spanning over several OSI management categories. For example, for users’ activities concerning fault management, there is a need for a set of functions of configuration management concerning resource

configuration and resource information, to limit the consequences of a fault. It is understood that the TMN management services provide a framework for defining the areas of management capabilities which provide the user aspects of planning, operating and maintaining telecommunication networks. As such, they describe user perception of the management capabilities.

The following are some examples of management services spanning several functional areas:

– management of transmission paths;

– management of customer access;

– switching network management;

– traffic and charging administration;

– traffic management.

Management services are defined in Recommendation M.3200 [3].

ANNEX A

(to Recommendation M.3300)

Management capabilities

This annex describes in a general manner the functions at the F interface.

A.1. *Performance management*

Performance management provides functions to evaluate and report upon the behaviour of telecommunications equipment and the effectiveness of the network or network element.

A.1.1 *Traffic measurement reporting*

The following functions enable the user to define and control the delivery of traffic measurement reports which are made from the performance measurement information.

A.1.1.1 *Create traffic report definition*

A user may define a traffic report by specifying the information which the report should provide (e.g. sample traffic over a half-hour period).

A.1.1.2 *Modify traffic report definition*

A user may change the parameters of a traffic measurement report.

A.1.1.3 *Create new schedule for traffic measurement reports*

A user may set the schedule of when traffic measurement reports are run (e.g. each day, at midnight; every 12 hours).

A.1.1.4 *Display schedule of traffic measurement reports*

A user may receive information about when traffic reports are scheduled.

A.1.1.5 *Modify schedule for traffic measurement reports*

A user may change the schedule of when traffic measurement reports are run and delivered.

A.1.1.6 *Request traffic measurement report*

A user may request a traffic report at any time on available traffic measurement data other than its normal scheduled time.

A.1.1.7 *List all requested reports*

A user may receive a listing of outstanding traffic reports, both scheduled and on demand.

A.1.1.8 *View traffic measurement report*

A user may access traffic measurement reports which have been previously scheduled or requested on demand.

A.1.1.9 *Cancel traffic measurement report*

A user may cancel a request for a traffic report, either on demand or scheduled, to be generated.

A.1.2 *Performance monitoring*

Performance monitoring refers to capabilities that allow users to obtain, evaluate, and report on network performance parameters regardless of the current health of the network. The performance monitoring information may be used to aid the user in fault diagnostics, network planning and Quality of Service.

A.1.2.1 *Real-time performance monitoring*

A user may receive performance data that have passed through a filter of criteria set by the user in real time.

A.1.2.2 *Specify real-time performance criteria*

A user may modify the criteria which are used to filter performance information; this includes setting thresholds.

A.1.2.3 *Request on demand performance information*

A user may request performance information on demand.

A.1.2.4 *Performance data logging*

Performance information may be placed into a log file for user access and may be used in generating reports. The specific data that are recorded into this log are determined by a second filter that contains criteria which may be different from those used in the filter for real-time performance monitoring.

A.1.2.5 *Modify performance data logging criteria*

A user may modify the criteria which are used to filter performance data for the log file.

A.1.2.6 *Retrieve performance log*

A user may request a performance log, in whole or part. For example, a user may request all logged performance data for a specific circuit in a specific time period.

A.2 *Fault management*

Fault management is a set of functions which enables the detection, isolation, correction of abnormal operation of the telecommunication network and its environment. It provides facilities for the maintenance phases of Recommendation M.20 [4].

Performance monitoring and fault management are conceptually similar. They can be distinguished by the fact that fault management is concerned with faults that affect a user's service, even though they may have been generated as a result of performance degradations.

A.2.1 *Alarm surveillance*

Alarm surveillance is concerned with managing information about service-affecting performance degradations.

A.2.1.1 *Alarm reporting*

A user may initiate, delete, suspend, resume an alarm reporting service and modify the criteria that are used to filter alarm information for real-time delivery. Alarm information passes through an event forwarding discriminator (EFD) (see Recommendation M.3100 [5]) to determine what alarms should be sent to the user.

A.2.1.2 *Retrieve alarm reporting criteria*

A user may retrieve the attributes of one or more EFDs to recognize their current alarm reporting criteria.

A.2.1.3 *Alarm logging*

A user may initiate, delete, suspend, resume an alarm logging service, and modify the criteria that are used to filter alarm information for the alarm log file. Alarm information may be placed into a log file, for user access. The specific alarms that are recorded into this log are determined by a second filter that contains criteria which may be different from those used in the filter for real-time alarms.

A.2.1.4 *Retrieve alarm logging criteria*

A user may retrieve the current alarm logging criteria for one or more alarm logs.

A.2.1.5 *Alarm retrieval*

A user may request an alarm log, in whole or part. For example, a user may request all logged alarms for a specific circuit in a specific time period or display the active alarms of a specific equipment.

A.2.1.6 *Alarm acknowledgement*

A user may acknowledge one of more status channel-based alarms and one or more terminal message-based alarms related to the managed system. The acknowledgement affects the managed systems in regard to the maintenance and status channel-based alarms.

A.2.1.7 *Fault localization*

For further study.

A.2.2 *Testing*

A user may request a specific test be done. The user may also be permitted to set parameters of the requested test. In some cases the test type and parameters may be automatically assigned, and the user may not be given the option of setting them.

A distinction may be made between tests which interrupt service ("intrusive") and tests which do not ("non-intrusive"). Whether a test is intrusive or non-intrusive affects how a user may want to have that test run, and the capabilities needed to support the testing procedure.

A.2.2.1 *Create routine test*

A user may define the routine tests by specifying the particular tests to be done.

A.2.2.2 *Delete routine test*

A user may delete the routine tests by specifying the particular tests to be deleted.

A.2.2.3 *Suspend routine test*

A user may suspend the routine tests by specifying the particular tests to be suspended.

A.2.2.4 *Resume routine test*

A user may resume the routine tests by specifying the particular tests to be resumed.

A.2.2.5 *Create test measurement criteria*

A user may define the measurement thresholds for tests.

A.2.2.6 *Modify test measurement criteria*

A user may modify the measurement thresholds for tests.

A.2.2.7 *Test scheduling*

A user may request that a test be done at some point in the future, or at regular intervals at a certain time. This capability allows users to execute intrusive tests of facilities which would interrupt their service.

A.2.2.8 *Modify test scheduling*

A user may access and modify or cancel a request for a scheduled test.

A.2.2.9 *Create object list*

A user may define the list of objects on which the test is to be applied.

A.2.2.10 *Delete object list*

A user may delete the list of objects on which the test is to be applied.

A.2.2.11 *Modify object list*

A user may modify the list of objects on which the test is to be applied.

A.2.2.12 *List all scheduled tests*

A user may request a list of all tests scheduled for a given facility or facilities.

A.2.2.13 *Request on demand test*

A user may request that a test be performed as soon as possible.

A.2.2.14 *Request report*

A user may request the results of a test, lists of objects, schedule, etc.

A.2.2.15 *Receive test results*

A user may be notified that a test is complete. This notification may be accompanied by test results, or the user may be required to take specific action to receive the results. This capability applies both to scheduled and on demand tests.

A.2.2.16 *Fault correction*

For further study.

A.2.2.17 *Fault verification*

For further study.

A.2.3 *Problem report administration*

A problem report is used to track and control the actions taken to clear alarms or other reported problems. The facilities here enable a user to create and monitor the progress of a problem report.

A problem report may contain the following information:

– problem report identification;

– date created;

– date last updated;

– associated alarm reports;

– associated test results;

– status;

– associated problem report identifications.

A.2.3.1 *Create problem report*

A user may request that a problem report be created with the appropriate information from alarm log and test results.

A.2.3.2 *Update problem report*

A user may provide additional descriptive text for an open problem report. This additional information will be appended to the description provided when the problem was originally entered.

A.2.3.3 *Fault restoration*

Under study.

A.2.3.4 *Close problem report*

A user may attempt to close out a problem report. Typically, the user has resolved the problem or wants to abort the problem report.

A.2.3.5 *Check problem report status*

A user may request status information on an open or closed problem report.

A.2.3.6 *Review problem history*

A user may request information about past troubles reported for a particular service or circuit.

A.2.3.7 *Cross reference problem reports*

This enables a user to identify and cross reference problem reports.

A.3 *Configuration management*

Configuration management enables the user to create and modify the management model for both the physical and logical resources within the telecommunications network.

A.3.1 *Service order management*

The service order management functions enable a user to identify and control the provisioning of new resources required for the telecommunications network. Service order may be used to request new resources (physical or logical) for addition to the network or the model.

A service order may contain the following information:

– service order number;

– creation date;

– planned completion date;

– completion date;

– price quoted;

– status;

– associated service order numbers.

A.3.1.1 *Receive SO detail*

A user may view all the information that is typically on a service order.

A.3.1.2 *Create service order*

A user may create and submit a service order for processing.

A.3.1.3 *Check SO status*

A user may request information about the status of a service order.

A.3.1.4 *Update service order*

The user may update the service order at the time that some information becomes available on the progress of the service order, or change the requested service data.

A.3.1.5 *Cancel SO*

A user may request that a pending service order request be cancelled.

A.3.1.6 *Close SO*

A user may request that a pending service order request be closed on successful completion.

A.3.1.7 *Cross-reference related SO numbers*

A user may specify relationships between service orders and view related service orders.

A.3.2 *Resource configuration*

This section is incomplete and needs to be developed.

The capabilities may include the following:

– create/allocate resources;

– review routing information;

– control routing;

– modify resource parameterization.

A.3.3 *Resource information*

A.3.3.1 *List allocated resources*

A user may request a list of facilities (e.g. circuits) and features describing its services. This capability may be used, for example, to find the name of a circuit to report a trouble against.

A.3.3.2 *Verify resource information*

A user may verify information about a resource before taking further actions (e.g. entering a problem report). This capability may be used to check the consistency of information between the model and the network.

A.3.3.3 *Resource information*

To facilitate network planning, a user may access information about all available network resources.

A.4 *Accounting management*

Accounting management provides a set of functions which enable the use of the network service to be determined and the costs for such use to be calculated.

A user may access two classes of accounting information:

1) As rendered (i.e. as appeared on the customer's bill);

2) Current (information based upon the current billing period).

A.4.1 *Create, modify, list billing criteria*

Enables a user to specify the calculation to be performed in order to generate the user's bill. This may include charge rates, billing periods, etc.

A.4.2 *Get billing information*

A user may request accounting information. This request may be defined for the current or a rendered billing period, for one or more billing details, or as a summary of billing information.

A.4.3 *Reconcile billing concerns*

A user may request that an accounting item be verified for accuracy.

A.4.4 *Manage billing information*

A user may request information about billing numbers, telephone numbers, cross-references, limits, etc.

A.4.5 *Notice of exceeded limits*

A user may be advised if a limit has been exceeded. These limits are specified as part of the billing criteria and may be changed for a single customer or group of customers.

A.4.6 *Bill payment*

A user may provide information in support of bill payment.

A.4.7 *Usage data*

A user may access information on service usage.

A.5 *Security management*

Security management provides a set of functions which enable users to manage the security aspects of the TMN. Security management capabilities include the following:

A.5.1 *Access security*

Only valid users will be allowed access to the management capabilities. A user should be restricted to manage only those resources and capabilities for which access is required.

A.5.2 *Managing access security*

A privileged user may be permitted to define the users and their access security codes and define and modify the capabilities of each user.

A.5.3 *Audit trails*

A user may have access to usage and security event information.

A.5.4 *Security alarms*

A user may have access to security alarms which indicate security violations.

A.5.5 *Management of audit trails and security alarms*

A user may establish and configure audit trails and security alarms reporting capabilities.

A.5.6 *Intrusion recovery*

A user may be permitted access backup files in order to restore service after a security violation.

ANNEX B

(to Recommendation M.3300)

Abbreviations

TMN Telecommunication Management Network

HMI Human Machine Interface

OSF Operation System Function (Recommendation M.3010)

MF Mediation Function (Recommendation M.3010)

QAF Q-Adaptor Function (Recommendation M.3010)

WSF Work Station Function (Recommendation M.3010)

NEF Network Element Function (Recommendation M.3010)

HMA Human Machine Adaptor (Recommendation M.3010)

PF Presentation Function (Recommendation M.3010)

SO Service Order