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SERIES M: TMN AND NETWORK MAINTENANCE: INTERNATIONAL TRANSMISSION SYSTEMS, TELEPHONE CIRCUITS, TELEGRAPHY, FACSIMILE AND LEASED CIRCUITS

Designations and information exchange

Network maintenance information

ITU-T Recommendation M.1530

(Previously CCITT Recommendation)

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TMN AND NETWORK MAINTENANCE: INTERNATIONAL TRANSMISSION SYSTEMS, TELEPHONE CIRCUITS, TELEGRAPHY, FACSIMILE AND LEASED CIRCUITS

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ITU-T RECOMMENDATION M.1530

NETWORK MAINTENANCE INFORMATION

Summary

A representative list of information[1], useful to network maintenance activities, is provided in a structured table. Five categories of information are identified, based on the different natures of the events and their priority in information exchange between maintenance elements within the same network operator or different network operators, network operators and service providers and service providers and their customers (i.e. Maintenance Information to be exchanged at Customer Contact point (MICC). References to the main relevant Recommendations are also given.

Source

ITU-T Recommendation M.1530 was revised by ITU-T Study Group 4 (1997-2000) and was approved under the WTSC Resolution No. 1 procedure on the 26th of March 1999.

Keywords

Customer, Failure, Fault, Maintenance information, Maintenance information to be exchanged at customer contact point, Network operator, Schedule, Service provider, Sudden and planned events.

[1] This list is not exhaustive and other types of information may be found depending on the continuous development and relevant update of other ITU-T Recommendations.

FOREWORD

ITU (International Telecommunication Union) is the United Nations Specialized Agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the ITU. The ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Conference (WTSC), which meets every four years, establishes the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

The approval of Recommendations by the Members of the ITU-T is covered by the procedure laid down in WTSC Resolution No. 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 term *recognized operating agency (ROA)* includes any individual, company, corporation or governmental organization that operates a public correspondence service. The terms *Administration, ROA* and *public correspondence* are defined in the *Constitution of the ITU (Geneva, 1992)*.

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As of the date of approval of this Recommendation, the ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementors are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database.

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Recommendation M.1530

NETWORK MAINTENANCE INFORMATION

(Published in 1980 as M.1220; revised 1984, 1988;
revised and renumbered 1992;
revised in 1999)

1 General

Maintenance of the international network is fundamentally concerned with ensuring that all its elements are operating in such a way that it may successfully provide a connection of specified or agreed quality whenever required. To achieve this objective it is important that network maintenance personnel of all involved network operators/service providers and any other people concerned in maintenance activities (e.g. service provider's customer care staff at customer contact point) have access to relevant information that may assist in identifying network/service impairments and to direct corrective action for fault localization and removal in case of a failure, exchanging also any relevant information with the customer when required.

2 Scope

This Recommendation provides general guidelines to transfer and use information from a maintenance standpoint. The purpose of transferring information is to assist maintenance elements in determining network elements (e.g. circuits and any other associated equipment) which are not performing to specified or agreed standards and also to provide any related information to the customer as agreed.

3 Categories of information

The analysis and investigation of network problems requires the information to be subdivided into categories, based on the different nature of the events and on consequent differences in the urgency and/or priority of exchange between maintenance elements. This categorization is generally valid independently of the specific service carried on the network involved. Five main categories of information can be defined:

1) information on sudden events (to be dealt with in real time);
2) information on planned events (to be dealt with in time for the necessary action);
3) information on persistent problems (to be dealt with when the observed problem persists longer than a certain time);
4) periodic information (to be dealt with periodically);
5) information on particular aspects subject of inter-network operators and/or service providers and customers agreements (to be exchanged when necessary).

Typical information of each category is listed in Table 1 with the indication of the references and some explanations in the notes.

Table 1/M.1530

Item	Typical information needed for network maintenance purposes	References	Urgency and/or priority of exchange
1	**Information on sudden events**		**In real time**
1.1	Failures on international transmission systems included in Mutual Aid plans	Mutual Aid plans	
1.2	Failures on international transmission systems not included in Mutual Aid plans (Note 1)	M.495 M.725	
1.3	Failures on national transmission systems (especially those affecting international leased and special circuits) (Note 2)	M.716	
1.4	Relevant faults in international switching exchanges (Note 3)	M.716 M.720 E.410	
1.5	Temporary decrease in the ASR (Answer Seizure Ratio) parameter (Note 4) for the telephone traffic	M.720 E.411 E.420	
1.6	Normal fault reports for circuits, switching inter-register and line signalling, etc. (Note 5)	M.700-series	
1.7	Information to localize and clear the faults, permit protection/reversibility and facilitate restoration/normalization for the transport network	M.2130	
1.8	Fault report and network fault report	M.1537	
2	**Information on planned events**		**In time for the necessary actions**
2.1	Planned outages of international links	M.1540 M.721	
2.2	Planned outages of national transmission systems, which affect international leased and special circuits	M.1540 M.1014	
2.3	Planned outages of international switching exchanges	M.716 M.720 E.411	
2.4	Routing data changes (Note 6)	M.720 E.149	
2.5	Circuit order of selection changes (Note 7)		
2.6	Changes in numbering plan of the country	M.716	
2.7	Changes in the order of selection of international telephone traffic (Note 8)		
2.8	Changes in the routing of special services (e.g. for telephone service codes 11 and 12, direct, international toll-free services, etc.)		
2.9	Changes in information regarding leased and special circuits (route, bit rate, etc.)	M.1000-series	
2.10	Planned outages impacting the service to the customer	M.1537	

Table 1/M.1530 *(continued)*

Item	Typical information needed for network maintenance purposes	References	Urgency and/or priority of exchange
3	**Information on persistent problems**		**When the observed problem persists longer than a certain time**
3.1	Recurrent faults	M.1550	
3.2	Recurrent faults in international leased circuits	M.1560	
3.3	Hard-to-reach destinations (Note 9)	M.720 Q.542 E.412	
3.4	Fault report patterns (Note 10)	M.720	
3.5	Fault follow-up between service provider and the customer	M.1537	
4	**Periodic information**		**Periodically**
4.1	Contact point information	M.1510	
4.2	General and reference information to be exchanged between the service provider and the customer	M.1537	
4.3	Fault report trend data (Note 11)	M.715 M.716 M.720	
4.4	National network call completion information for the telephone traffic (Notes 12 and 13)	M.720 E.600	
4.5	International network call completion information for the telephone traffic (Note 14)	M.720 E.420 E.422 E.426 E.600	
4.6	Traffic service observations undertaken either for specific purposes or for preparation of Tables 1/E.422 and 1/E.423	M.720 E.422 E.423	
4.7	Data from traffic measuring equipment, e.g. loading in erlangs, percentage occupancy and overflow intensities	M.720	
4.8	Results of automatically generated test calls	M.1235	
4.9	Service availability information of telecommunication systems	M.721	
4.10	Service availability information of international leased circuits	M.1016	
4.11	Transmission restoration time	M.495	

Table 1/M.1530 *(concluded)*

Item	Typical information needed for network maintenance purposes	References	Urgency and/or priority of exchange
5	**Information on inter-network operators and/or service providers and customers agreements related to maintenance activities**		**When necessary**
5.1	Maintenance schedule for routine maintenance of international carrier system	M.500 M.520	
5.2	Maintenance schedule for signalling and switching routine tests and measurements	M.719 M.732	
5.3	Maintenance schedule for routine maintenance of international public telephone circuits	M.600-series M.733	
5.4	Preliminary exchange of information for the provision of international leased circuits and international data transmission systems	M.1045	
5.5	Maintenance schedule for preventive maintenance on international leased circuits	M.1060	
5.6	Maintenance schedule for automatically generated test calls for assessment of network performance	M.1235	
5.7	Routing data	M.716 M.720 E.149	
5.8	Order of selection of circuit (Note 7)		
5.9	Incoming test facilities at international switching centres	M.734	
5.10	Order of the selection of international traffic trunks (Note 8)		
5.11	Information concerning signalling, switching and transmission systems	M.720	
5.12	Results of specific investigations on transmission systems or on switching and line and inter-register signalling	M.717 M.718 M.719	
5.13	Fault localization, service restoration and network repair information between service provider and customer	M.1537	

Notes to Table 1

The terms appearing in the following Notes are found in the relevant M-, Q- and E-series Recommendations.

NOTE 1 – The Mutual Aid plans are arranged only for the most important international transmission systems. Therefore, in these cases it is essential to inform the interested maintenance elements in involved network operators and/or interested service providers in order to adopt all the necessary activities to ensure the Mean Time To Repair (MTTR) or the Mean Time to Restore Service (MTRS) to be maintained within specified or agreed limits.

NOTE 2 – In the international centres, international leased and special circuits are routed to the destination via national group links or digital blocks. A failure of these group links or digital blocks leads to a break in the international circuits. In these cases, it is of particular importance to advise the other maintenance elements (e.g. the fault report points) in involved network operators and/or any involved service provider in order to avoid unnecessary faults location in the other countries and consequently to reduce the MTTR and/or MTRS to specified/agreed levels/limits. In some cases, according to a specific agreement the aforesaid failure information may be also forwarded to other people involved in maintenance activities of the interested circuits (e.g. service provider's customer care staff at customer contact point) for any subsequent exchange of information with the customer.

NOTE 3 – This exchange of information is required when the fault involves a relevant decrease in the level of service offered to another country. In this case, the networks' management centres must also be informed.

NOTE 4 – Whenever the ASR temporarily decreases with respect to the reference historical value, the appropriate maintenance point in the terminating country must be informed, after the necessary local investigations have been carried out, in order to co-operate and to remove the distant network loss. The network management centres must also be informed in order to initiate expansive and protective actions.

NOTE 5 – For the normal faults reports, the procedures specified in Recommendation M.710 and others of the M.700-series are adopted.

NOTE 6 – Routing data and changes thereto (see Recommendation E.149 for telephone traffic) can reduce the consequences of misrouting of traffic due to invalid dialling. An improvement can be expected in:

– the number of calls which fail;

– the number of calls switched more than necessary;

– the number of calls which contribute to congestion on routes accessed improperly;

– circuit utilization.

NOTE 7 – Selection of circuits not in the sequence agreed upon can cause:

– uneven distribution of traffic among the circuits involved;

– increased probability of simultaneous seizures which lead to initial call failure and subsequent re-attempts. These may lead to different levels of network congestion with the possibility of blockage (see also Note 9).

NOTE 8 – When many trunk groups join different exchanges between two cities, it is important to agree on the order of selection of these trunk groups to reach a right distribution of traffic.

NOTE 9 – For the telephone traffic information about destinations that are hard to reach [e.g. destinations with a low Answer Bid Ratio (ABR)] should be used by the network management centres in order to enable as many calls as possible to be successfully completed in a given network situation. This can be achieved by appropriate actions of the maintenance forces to reduce the possibility of traffic blockage.

NOTE 10 – When individual subscriber and/or operator reports are compiled by common fault types, randomness often gives way to an obvious configuration (sometimes called a "pattern") to indicate the existence and nature of the network fault. The analysis for patterns may well be subdivided into originating, international and terminating network categories wherein the international domain includes both international switching centres. A network analysis point could use such information to identify suspected network components and make referrals or notifications to the appropriate maintenance forces for corrective actions.

NOTE 11 – Fault report data can:

– identify faults which contribute to both transmission impairments and poor network utilization;

– identify deficient network components and direct corrective action;

– identify trends.

The fault report points (circuit and network) are responsible for (see 2.15/M.715 and 2.15/M.716) forwarding details of faults found or other faults (the cause of which could not be detected) to the network analysis point for analysis to detect long-term trends.

NOTE 12 – For the telephone traffic, information to reflect the national network call completion ratio, if available, would act as a reference with which to compare completion rates experienced from distant countries.

NOTE 13 – For the telephone traffic, abnormal trends or conditions identified should be promptly brought to the attention of those who can take corrective actions.

It should be stated whether the call completion information was obtained by sampling over a period or whether all calls over a period were taken into account. If sampling is used, the size of the sample and the total population of calls should be stated so that the statistical tolerances which are assigned to the results may be determined. If all calls are taken into account, the total number of calls should be stated.

The data collection period should be stated, e.g. weekday, busy period, 24 hours of a weekday or during a weekend, etc. This is useful in the assessment of the performance differences between business and social telephone traffic.

It should be stated whether the telephone data has been subjected to any filtering process and, if so, what the process is, e.g. code screening and/or number length validation.

It should be stated whether the telephone information was supplied from processors in a stored programme control (SPC) switching unit and, if so, the periods for which processors were not supplying this data due to overload, etc.

NOTE 14 – It is desirable that information be taken from the outgoing side of the originating international switching centre. If it was not collected from this point, the location in the network where the telephone data was collected from, and what losses are included in the data, should be stated.

Depending on where the telephone data was collected, it should be stated either in terms of Answer Seizure Ratio (if a data is collected from the outgoing side of the originating exchange) or Answer Bid Ratio if it is collected at any other point.

The proportion of telephone calls failed due to distant network congestion should be stated. This is particularly useful if it can be related to individual area codes and/or particular services (e.g. toll-free, mobile, TV special programmes). The ability to classify call failures is strictly dependent on the signalling system used.

4 Further information

More detailed information can be obtained from real time tests, or from near real time reports from traffic/service monitoring equipment, and (if required) from off-line reports using historical data. Any distribution of maintenance information should clearly indicate how and where the information was obtained, a full description of the data presented, and the period of time during which it was gathered.

Experience has shown that the detailed investigation of a particular problem is more efficiently handled by discussion and cooperation between the appropriate maintenance staff of network operators, service providers and their customers.

Results of network/traffic management analysis may help the maintenance personnel to prioritize the actions to be taken to remove network/service impairments, in order to minimize network/service degradation or outage time to a specified or agreed level/target.

Account will need to be taken of unique national or international events, e.g. earthquakes, which could influence all international services.

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