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CCITT

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THE INTERNATIONAL
TELEGRAPH AND TELEPHONE
CONSULTATIVE COMMITTEE

MAINTENANCE: DESIGNATIONS AND INFORMATION EXCHANGE

NETWORK MAINTENANCE INFORMATION

Recommendation M.1530

FOREWORD

The CCITT (the International Telegraph and Telephone Consultative Committee) is a permanent organ of the International Telecommunication Union (ITU). CCITT 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 Plenary Assembly of CCITT which meets every four years, establishes the topics for study and approves Recommendations prepared by its Study Groups. The approval of Recommendations by the members of CCITT between Plenary Assemblies is covered by the procedure laid down in CCITT Resolution No. 2 (Melbourne, 1988).

Recommendation M.1530 was revised by Study Group IV and was approved under the Resolution No. 2 procedure on the 5th of October 1992.

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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NETWORK MAINTENANCE INFORMATION

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

Abstract

A list of information, useful to network maintenance activities, is presented in a table. Five categories of information are identified, based on the different natures of the events and their priority in information exchange between maintenance elements. References to other relevant Recommendations are given.

Keywords

– failure;

– fault;

– maintenance information;

– schedule;

– sudden and planned events.

1 General

Maintenance of the international network is fundamentally concerned with ensuring that the automatic and semi-automatic telephone network (transmission and switching equipment) is functioning in such a way that it may successfully provide a switched connection of good transmission quality whenever required. To achieve this objective it is important that network maintenance forces have access to relevant information that may assist in identifying network impairments and to direct corrective action.

2 Scope

This Recommendation considers the transfer and use of information from a maintenance standpoint. The purpose of transferring information is to assist maintenance elements in determining circuits and equipment that are not performing to specified standards.

3 Categories of information

The analysis and investigation of network problems require to subdivide the information in categories, based on the different nature of the events and on consequent differences in the urgency and/or priority of exchange between maintenance elements. We can distinguish five categories of information:

– information on sudden events (to be dealt with in real time);

– information on planned events (to be dealt with in time for the necessary action);

– information on persistent problems (to be dealt with when the observed problem persists longer than a certain time);

– periodic information (to be dealt with periodically);

– information on particular aspects subject of inter-administration agreements (to be exchanged when necessary).

Typical information of each category is listed in Table 1/M.1530 with the indication of the references and some explanations in the notes.

4 Further information

More detailed information can be obtained from real time tests, or from near real time reports from traffic 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 elements.

Results of network management analysis may help the maintenance personnel to prioritize the actions to be taken to remove network impairments, in order to minimize service degradation.

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

TABLE 1/M.1530

Item	Typical information needed for network maintenance	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	Sudden decrease in the ASR (Answer Seizure Ratio) parameter (Note 4)	M.720 E.411 E.420	
1.6	Normal fault reports for circuits, switching interregister and line signalling, etc. (Note 5)	M.700-Series	
2	Information on planned events		In time for the necessary actions
2.1	Planned outages of international links	M.490 M.721	
2.2	Planned outages of national transmission systems, which affect international leased and special circuits	M.490 M.1014	

TABLE 1/M.1530 (*cont.*)

Item	Typical information needed for network maintenance	References	Urgency and/or priority of exchange
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 traffic (Note 8)		
2.8	Changes in the routing of special services (code 11 and 12, direct, international freephone service, etc.)		
2.9	Changes in information regarding leased and special circuits (route, bit rate, etc.)	M.1000-Series	
3	Information on persistent problems		When the observed problem persists longer than a certain time
3.1	Recurrent faults	M.1550	
3.2	Hard-to-reach destinations (Note 9)	M.720 Q.542 E.412	
3.3	Fault report patterns (Note 10)	M.720	
4	Periodic information		Periodically
4.1	Contact point information	M.1510	
4.2	Fault report trend data (Note 11)	M.715 M.716	
4.3	National network call completion information (Notes 12 and 13)	M.720 E.600	
4.4	International network call completion information (Notes 14 and 15)	M.720 E.420 E.422 E.426 E.600	
4.5	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	

TABLE 1/M.1530 (*end*)

Item	Typical information needed for network maintenance	References	Urgency and/or priority of exchange
4.6	Data from traffic measuring equipment, e.g. loading in erlangs, percentage occupancy and overflow intensities	M.720	
4.7	Results of automatically generated test calls	M.1235	
4.8	Service availability information of telecommunication systems	M.721	
4.9	Service availability information of international leased circuits	M.1016	
4.10	Restoration time	M.495	
5	Information on interadministration 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	Maintenance schedule for peventive maintenance on international leased circuits	M.1060	
5.5	Maintenance schedule for automatically generated test calls for assessment of network performance	M.1235	
5.6	Routing data	M.716 M.720 E.149	
5.7	Order of selection of circuit (Note 7)		
5.8	Incoming data facilities at international switching centres	M.734	
5.9	Order of the selection of international traffic trunks (Note 8)		
5.10	Information concerning signalling, switching and transmission systems	M.720	
5.11	Results of specific investigations on transmission systems or on switching and line and interregister signalling	M.717 M.718 M.719	

Notes to Table 1/M.1530

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 Administrations in order to adopt all the necessary activities.

Note 2 – In the international centres, international leased and special circuits are routed to the destination via national group links. A failure of these group links 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 Administrations in order to avoid unnecessary faults location in the other countries.

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 – When the ASR suddenly decreases compared to historical data, the appropriate maintenance point in the terminating country must be informed, after the necessary local investigations have been carried out, in order to cooperate and to remove the distant network loss. The network management personnel must also be informed in order to initiate expansive and protective actions.

Note 5 – For the normal faults reports we adopt the procedures specified in Recommendation M.710 and others of the M.700-Series.

Note 6 – Routing data and changes thereto (see Recommendation E.149) 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.

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 – Information about destinations that are hard to reach (e.g. destinations with a low answer-bid ratio) should be used by the network management personnel 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 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 of Recommendations M.715 and 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 – 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 – 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 traffic.

Notes to Table 1/M.1530 (cont.)

It should be stated whether the 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 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 data was collected from, and what losses are included in the data, should be stated.

Depending on where the 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 calls failed due to distant network congestion should be stated. This is particularly useful if it can be related to individual area codes. The ability to classify call failures is dependent on the signalling system used.