



INTERNATIONAL TELECOMMUNICATION UNION

CCITT

E.862 (rev.1)

THE INTERNATIONAL
TELEGRAPH AND TELEPHONE
CONSULTATIVE COMMITTEE

TELEPHONE NETWORK AND ISDN

**QUALITY OF SERVICE,
NETWORK MANAGEMENT AND TRAFFIC
ENGINEERING**

**DEPENDABILITY PLANNING
OF TELECOMMUNICATION NETWORKS**

Recommendation E.862 (rev.1)



Geneva, 1992



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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 E.862 was prepared by Study Group II and was approved under the Resolution No. 2 procedure on the 16th of June 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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Recommendation E.862**DEPENDABILITY PLANNING OF TELECOMMUNICATION NETWORKS***(revised 1992)***Introduction**

This Recommendation is concerned with models and methods for dependability planning, operation and maintenance of telecommunication networks, and the application of these methods to the various services in the international network.

The CCITT,

considering

- (a) that economy is often an important aspect of dependability planning;
- (b) that the ability of achieving a certain level of dependability differs between network providers;
- (c) that network providers often operate in a competitive environment;
- (d) that Recommendations E.845, E.850 and E.855 establish objectives for serviceability performance;
- (e) that objectives for dependability performance are deducible from Recommendations Q.504, Q.514, and X.134 to X.140;
- (f) that these objectives have been established in an intuitive manner rather than based on analysis of user needs;
- (g) that there exists no unambiguous way of implementing these objectives in planning;
- (h) that there is a need of establishing a method for dimensioning and allocating dependability in the telecommunication network;
- (i) that terms and definitions relevant to concepts used for dependability may be found in Recommendation E.800,

recommends

that the procedures defined in this Recommendation shall be used by Administrations to plan, design, operate and maintain their networks.

1 General

Dependability planning may be accomplished by using essentially two different methods.

Intuitive method

The level of dependability is determined by making a synthesis of objectives and procedures presently used. It is a pragmatic method in absence of an analytical method or in the case when necessary data for a thorough analysis is not available.

This method reflects the present status, but is inconsistent in achieving what Administrations actually want to attain: the most economic level of dependability taking into account customer needs and inconvenience.

Analytical method

The analytical method is based on principles defining the object of dependability planning. The principles are realized through a quantitative model. The level of dependability is deduced by applying the model, taking into account all relevant factors in each planning case.

- *Basic principle* – The main object of dependability planning is to find a balance between the customers' needs for dependability and their demand for low costs.
- *Model* – Fault consequences are expressed in terms of money and are included as additional cost factors in planning and cost-optimization. The cost factor reflects the customers' experience of faults in the network, quantified in terms of money, as well as the Administration's costs for lost traffic revenue and corrective maintenance.
- *Application* – The Administration is provided with a method to integrate dependability as a natural part of planning, taking local information from the actual planning case into account. This method enables the preparation of simplified planning rules.

The application of the analytical method gives, economically, the best-balanced level of dependability, seen from the customer's point of view. This reduces the risk of customer's complaints and loss of business to competitors as well as the risk of unnecessary investments. It is, therefore, considered to be the best general way of planning dependability for the Administration, as well as for the customers.

Recommendations for operational dependability objectives are needed in order to discover impairments and to check and compare dependability performance in the national and international network. Experience from the application of the analytical method may give reason to revise existing Recommendations.

2 Generic measures for dependability planning

The dependability is described by measures defining the availability performance, the reliability performance and the maintainability performance of the network and its constituent parts as well as the maintenance support performance (for the maintenance of the network). The recommended measures are:

- a) *Availability performance*
 - Mean accumulated down time
- b) *Reliability performance*
 - Mean failure intensity
- c) *Maintainability performance*
 - Mean undetected fault time
 - Mean time to restoration
 - Mean active repair time
- d) *Maintenance support performance*
 - Mean administrative delay
 - Mean logistic delay

Note – The definitions of these measures are given in Recommendation E.800 and Supplement No. 6.