INTERNATIONAL TELECOMMUNICATION UNION

CCITT

THE INTERNATIONAL
TELEGRAPH AND TELEPHONE
CONSULTATIVE COMMITTEE

E.810

(11/1988)

SERIES E: OVERALL NETWORK OPERATION, TELEPHONE SERVICE, SERVICE OPERATION AND HUMAN FACTORS

Quality of services; concepts, models, objectives, dependability planning – Models for telecommunication services

---

MODEL FOR THE SERVEABILITY PERFORMANCE ON A BASIC CALL IN THE TELEPHONE NETWORK

Reedition of CCITT Recommendation E.810 published in the Blue Book, Fascicle II.3 (1988)

NOTES

1 CCITT Recommendation E.810 was published in Fascicle II.3 of the *Blue Book*. This file is an extract from the *Blue Book*. While the presentation and layout of the text might be slightly different from the *Blue Book* version, the contents of the file are identical to the *Blue Book* version and copyright conditions remain unchanged (see below).

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

Recommendation E.810

MODEL FOR THE SERVEABILITY PERFORMANCE ON A BASIC CALL IN THE TELEPHONE NETWORK[1)]

Introduction

This Recommendation[2)] is one of a set of closely related Recommendations concerned with the accessibility and retainability of telephone services, as listed below.

The CCITT,

considering

(a) that there is a desire to establish overall objectives for the quality of service as perceived by the users;

(b) that such objectives can then be used as a basis for the design, planning, operation and maintenance of telecommunication networks and their component parts;

(c) that Recommendation E.800 contains terms and definitions for the quality of service, the reliability and availability performances and related characteristics of services and networks,

recommends

that the telephone call model given in this Recommendation shall be used by Administrations to design, plan, operate and maintain their networks taking into account the objectives given in Recommendations:

E.830 Models for the allocation of international telephone connection retainability, accessibility and integrity;

E.845 Connection accessibility objective for the international telephone service;

E.850 Connection retainability objective for the international telephone service.

Note – Refer also to the draft Recommendation on interruption objectives which is being studied under Question 39/II.

1 Model of a basic telephone call and its serveability performance

The following simplified model illustrates the principal phases of a basic telephone call. It also interrelates these phases to the service-related performance concepts and their principal measures as well as to the main causes of failure in the establishment and retention of such a call and its subsequent billing.

The model also indicates where, in this series of phases, user actions or mistakes may influence the call.

2 Comments to the model and its applications

2.1 *Mathematical modelling*

In a simple case of statistical independence, the probabilities may be combined into the following mathematical models:

$$P = (P_{11} \cdot P_{12}) \cdot P_2 \cdot (P_{31} \cdot P_{32}) \cdot P_4$$

to express the probability of a correctly billed revenue-making call and,

---

1) Although this Recommendation deals with the telephone service, in principle the model and the decomposition of serveability performance can also be applied to other telecommunication services. The elaboration of this principle is left for further study.

2) Some of the terms in this Recommendation, for example the noun "measure", are used in the sense of their definition given in Recommendation E.800.

$$P = (P_{11} \cdot P_{12}) \cdot P_2 \cdot (P_{31} \cdot P_{32})$$

to express the probability of a successfully completed call.

2.2 *Contributions to causes of call failure*

It is generally recognized that the various parts of a national or international network may be of different importance to the successful completion of the various phases of a call. For example, the network accessibility is mainly determined by the telephone set, the subscriber line and the local exchange; the connection accessibility by the exchanges, transmission network and signalling network used; the billing integrity is dependent on the charging facilities used by the network parts that constitute the connection and the equipment for processing the billing information, etc. In some Administrations, the telephone set is not considered as a part of the network and in that case it is not included in the concept of network performance.

2.3 *Time aspects of measures*

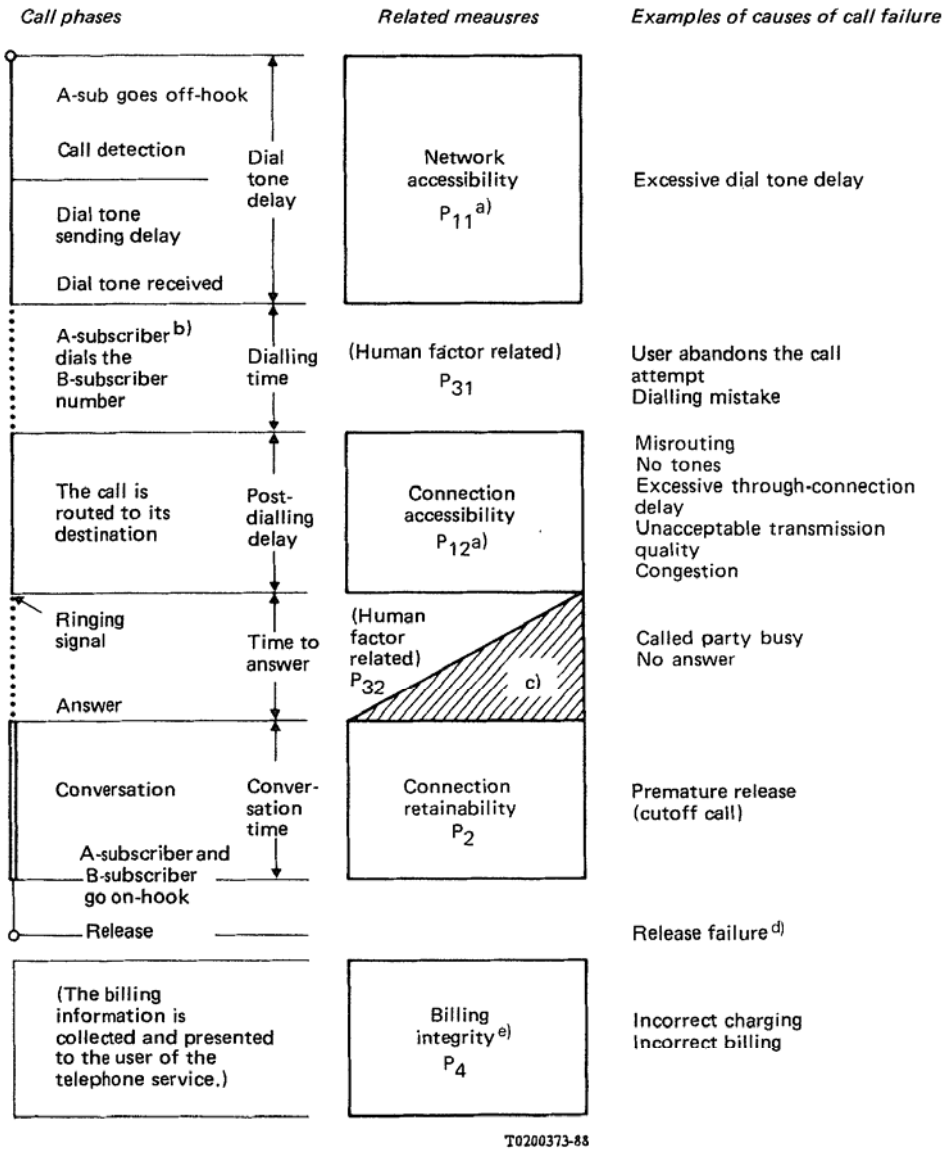
Depending on the intended application of the measures indicated in Figure 1/E.810, it may be appropriate to express these measures as instantaneous values related to a given instant of time or as a mean over a given time interval.

Advice on which variant to use should be given in each specific relevant Recommendation.

2.4 *Space aspects of averages*

The measures as indicated in Figure 1/E.810 could be applied to calls between particular destinations as traffic weighted averages over a number of destinations, etc.

Each relevant Recommendation should clearly specify which alternative(s) to use.



a) Network accessibility and connection accessibility combine into service accessibility.

b) The routing of the call may start before all digits have been received.

c) The shaded area shows that a premature release can occur durine the time to answer.

d) The release of a call is not a separate phase in this model. A release failure may result in network inaccessibility for a new call.

e) The billing integrity has been shown for completeness but is not a part of serveability performance.

FIGURE 1/E.810

Model of the serveability performance on a basic call in the telephone network

ITU-T RECOMMENDATIONS SERIES

Series A	Organization of the work of the ITU-T
Series B	Means of expression: definitions, symbols, classification
Series C	General telecommunication statistics
Series D	General tariff principles
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	Transmission of television, sound programme and other multimedia signals
Series K	Protection against interference
Series L	Construction, installation and protection of cables and other elements of outside plant
Series M	TMN and network maintenance: international transmission systems, telephone circuits, telegraphy, facsimile and leased circuits
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
Series R	Telegraph transmission
Series S	Telegraph services terminal equipment
Series T	Terminals for telematic services
Series U	Telegraph switching
Series V	Data communication over the telephone network
Series X	Data networks and open system communications
Series Y	Global information infrastructure and Internet protocol aspects
Series Z	Languages and general software aspects for telecommunication systems

Printed in Switzerland

Geneva, 2008