INTERNATIONAL TELECOMMUNICATION UNION

CCITT

E.431

THE INTERNATIONAL
TELEGRAPH AND TELEPHONE
CONSULTATIVE COMMITTEE

TELEPHONE NETWORK AND ISDN

QUALITY SERVICE, NETWORK MANAGEMENT AND TRAFFIC ENGINEERING

SERVICE QUALITY ASSESSMENT FOR CONNECTION SET-UP AND RELEASE DELAYS

Recommendation E.431

Geneva, 1992

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.431 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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SERVICE QUALITY ASSESSMENT FOR CONNECTION SET-UP AND RELEASE DELAYS

1 Introduction

The communications function of "connection establishment" is influenced by how quickly end-to-end connections are implemented and how quickly the network components are returned to a ready to serve state.

It is to be noted that this Recommendation considers a network provider view of service quality according to the framework given in Recommendation E.430.

This Recommendation addresses service quality assessment with respect to connection set up and release delays in the public switched telephone network (PSTN), and the integrated services digital network (ISDN) as it evolves from the PSTN. Network performance design parameters from a grade of service and traffic engineering viewpoint for PSTN are given in the E.500-Series of Recommendations and for circuit switched services in the ISDN are given in Recommendation E.721.

2 Considerata

The user (customer) is the primary supervisor of service quality. The user's point of view can be properly expressed by general parameters which take into account that this user is mainly interested in the end-to-end aspect of these parameters.

From the network provider's point of view, the primary function of the network is to carry communications which produce revenue. To this end, the network should be properly designed and operated. Network providers do not control all aspects which influence the user perception of the general parameters and are primarily only able to influence the user perception via those network components which influence the general parameters.

It should be noted that factors outside the direct control of network providers affect customer-perceived connection set-up delays. These factors, which are related to customer equipment and behaviour, may produce significant variations in connection set-up delays. They include, but are not limited to:

– automatic dialling devices;

– telephones that use either pulse or tone dialling;

– PABXs.

From the technical point of view, the three cases below are considered:

i) voice service in the PSTN;

ii) non-voice services in the PSTN;

iii) voice and non-voice services in the ISDN as it evolves from the PSTN.

The concepts forming the basis for the traditional telephone service parameters given in this Recommendation, can be extended to include other network and service combinations.

3 Definitions[1)]

start dial signal delay (SDSD)

Time interval between off-hook and reception of start dial signal.

post dialling delay (PDD)

Time interval between the end of user or terminal equipment dialling and the reception of the appropriate network response.

call clearing delay (CCD)

Time interval between the clearance signal from the end users, and the networks return to ready to serve state.

4 Service and networks factors affecting delay measurements

It should be noted that customer's perception of start dial signal delay, post dialling delay and call clearing delay are affected more by variations rather than by absolute values.

These delays will also be influenced by the customer and/or customer provided equipment behaviour, or the types of networks that are interconnected, and in some cases by types of service that are being carried by the network. Examples of this, would be facsimile protocols or other voice band data calls using automatic clear down methods. When setting objectives for these services, consideration must be given to the types of signalling and/or switching equipment used for processing of the calls.

4.1 *Start dial signal delay (SDSD)*

Start dial signal delay (SDSD) is affected by:

i) the switching technology employed at the users originating call stage;

ii) the traffic level being experienced in the users originating switching equipment, at the time the call attempt commences;

iii) the users calling priority level.

Customer's perception of SDSD is very sensitive to the type of technology and therefore, no definitive quantity can be established since the amount of delay acceptable to the users must be in direct relationship to the type of equipment employed and to some extent to the traffic level being experienced on the calling stage at the time of measurement.

However, SDSD for new types of exchanges would, normally, be of the order of a few hundred milli-seconds.

4.2 *Post dialling delay (PDD)*

Post dialling delay can be influenced by customer dialling behaviour and/or the types of network, e.g. variable number lengths, that are interconnected, and in some cases, by the type of service that is being carried on the networks. Examples of the last item would be the freephone service and country direct service where a data base access and/or digit manipulation, must be accomplished. When setting objectives for these services, consideration must be given to the extra steps necessary for processing such calls.

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1) These definitions are not aligned with the Recommendation E.600 at this time.

Post dialling delay will vary according to the transmission media used, switching stages met and signalling system types encountered.

The PDD of any end-to-end connection will be governed by the collective delays of the originating, international and terminating networks. To compute the range of total PDD, the following computation should be made:

Total PDD =	Originating network contribution to PDD	+	International network contribution of PDD	+	Terminating network contribution to PDD

The international contribution may include transit routes with changes in signalling types and switching stage. The average contribution to PDD of signalling types are:

- CCITT No. 5: 5 seconds
- CCITT No. 6: 3 seconds
- CCITT No. 7: less than 3 seconds (for further study)
- CCITT R2: 5 seconds

4.3 *Call clearing delay (CCD)*

CCD is subject to the network technology, equipment configurations and the sequence of call release. Under normal circumstances it will follow the clear down of all parties (the end-to-end connection) and is approximately one second.

5 General guide to measurement techniques

In general, these parameters (SDSD, PDD, CCD) can be measured using test calls and/or by monitoring live traffic. For additional information on field data collection and evaluation, see Chapter II, Section 3, of CCITT Quality of Service Handbook (1984), and the 1992 Quality of Service and Network Performance Handbook.