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INTEGRATED SERVICES DIGITAL NETWORK (ISDN) OVERALL NETWORK ASPECTS AND FUNCTIONS

GENERAL ASPECTS OF QUALITY OF SERVICE AND NETWORK PERFORMANCE IN DIGITAL NETWORKS, INCLUDING ISDNs

ITU-T Recommendation I.350

(Previously "CCITT Recommendation")

FOREWORD

The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the International Telecommunication Union. 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, established the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

ITU-T Recommendation I.350 was revised by the ITU-T Study Group XVIII (1988-1993) and was approved by the WTSC (Helsinki, March 1-12, 1993).

NOTES

1 As a consequence of a reform process within the International Telecommunication Union (ITU), the CCITT ceased to exist as of 28 February 1993. In its place, the ITU Telecommunication Standardization Sector (ITU-T) was created as of 1 March 1993. Similarly, in this reform process, the CCIR and the IFRB have been replaced by the Radiocommunication Sector.

In order not to delay publication of this Recommendation, no change has been made in the text to references containing the acronyms "CCITT, CCIR or IFRB" or their associated entities such as Plenary Assembly, Secretariat, etc. Future editions of this Recommendation will contain the proper terminology related to the new ITU structure.

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

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Recommendation I.350**GENERAL ASPECTS OF QUALITY OF SERVICE AND NETWORK PERFORMANCE IN DIGITAL NETWORKS, INCLUDING ISDNs***(Melbourne, 1988; revised Helsinki, 1993)***1 General****1.1 Purpose of Recommendation**

This Recommendation has been developed to:

- provide descriptions of Quality of Service and network performance;
- illustrate how the Quality of Service and the network performance concepts are applied in digital networks, including ISDNs;
- describe the features of, and the relationship between these concepts;
- indicate and classify performance concerns for which parameters may be needed;
- identify generic performance parameters.

The generic term “performance” refers to Quality of Service and network performance as they are defined in 1.2.

1.2 Description of Quality of Service (QOS) and Network Performance (NP)**1.2.1 Description of Quality of Service**

QOS is defined in Recommendation E.800 as follows: “Collective effect of service performances which determine the degree of satisfaction of a user of the service”.

The note of Recommendation E.800 underlines that the QOS is characterized by to the combined aspects of:

- service support and service operability performance; and
- servability and service integrity performance.

The definition of Quality of Service in Recommendation E.800 is a wide one encompassing many areas of work, including subjective customer satisfaction. However, within this Recommendation the aspects of Quality of Service that are covered are restricted to the identification of parameters that can be directly observed and measured at the point at which the service is accessed by the user. Other types of QOS parameters which are subjective in nature, i.e. depend upon user actions or subjective opinions, will not be specified in the I-Series Recommendations on QOS.

1.2.2 Description of network performance

Network performance is measured in terms of parameters which are meaningful to the network provider and are used for the purposes of system design, configuration, operation and maintenance. NP is defined independently of terminal performance and user actions.

2 Purpose of QOS and NP**2.1 General**

Bearer services and teleservices as described in the I.200-Series Recommendations are the objects which network and service providers offer to their customers. A major attribute of these services is the set of QOS parameters which a particular service offers. These parameters are user-oriented and take into account the elements involved in a particular service as given in Figure 2/I.211.

Bearer services and teleservices are supported by a range of connection types, each of which comprises several connection elements. The performance of the connection types is characterized by a set of NP parameters. These parameters are network oriented.

Figure 1 illustrates how the concepts of QOS and NP are applied in the ISDN environment.

2.2 Purpose of QOS

A typical user is not concerned with how a particular service is provided, or with any of the aspects of the network's internal design. However, he is interested in comparing one service with another in terms of certain universal, user-oriented performance concerns which apply to any end-to-end service. Therefore from a user's point of view, Quality of Service is best expressed by parameters which:

- focus on user-perceivable effects, rather than their causes within the network;
- do not depend, in their definition, on assumptions about the network internal design;
- take into account all aspects of the service from the user's point of view which can be objectively measured at the service access point;
- may be assured to a user at the service access point by the service provider(s);
- are described in network independent terms and create a common language understandable by both the user and the service provider.

As networks evolve, providers should maintain the Quality of Service of bearer services provided to users within acceptable limits, and where possible, should make Quality of Service improvements. The Quality of Service perceived by users should not be perceptibly degraded by network evolution.

2.3 Purpose of NP

A network provider is concerned with the efficiency and effectiveness of the network, in providing services to customers. Therefore from a network provider's point of view, NP is best expressed by parameters which provide information for:

- system development;
- network planning, both nationally and internationally;
- operation and maintenance.

3 Principles for the development of QOS and NP parameters and values

3.1 General principles

3.1.1 Distinction between QOS and NP

The user-oriented QOS parameters provide a valuable framework for network design, but they are not necessarily usable in specifying performance requirements for particular connections. Similarly, the NP parameters ultimately determine the (user observed) QOS, but they do not necessarily describe that quality in a way that is meaningful to users. Both types of parameters are needed, and their values must be quantitatively related if a network is to be effective in serving its users. The definition of QOS and NP parameters should make mapping of values clear in cases where there is not a simple one-to-one relationship between them.