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SERIES G: TRANSMISSION SYSTEMS AND MEDIA,
DIGITAL SYSTEMS AND NETWORKS

Digital networks – Quality and availability targets

Availability performance parameters and objectives for end-to-end international constant bit-rate digital paths

ITU-T Recommendation G.827

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ITU-T Recommendation G.827

Availability performance parameters and objectives for end-to-end international constant bit-rate digital paths

ITU-T Rec. G.827 (09/2003)

Summary

This Recommendation defines network performance parameters and objectives for the path elements and end-to-end availability of international constant bit-rate digital paths. These parameters are independent of the type of physical network supporting the end-to-end path, e.g., optical fibre, radio relay or satellite. Guidance is included on methods for improving availability and calculating the end-to-end availability of a combination of network elements.

Source

ITU-T Recommendation G.827 was approved on 13 September 2003 by ITU-T Study Group 13 (2001-2004) under the ITU-T Recommendation A.8 procedure.

Keywords

Availability, availability objectives, availability performance, availability ratio, unavailability ratio.

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. 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 Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

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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ITU-T Recommendation G.827

Availability performance parameters and objectives for end-to-end international constant bit-rate digital paths

1 Introduction

This Recommendation is part of a set of Recommendations that define the end-to-end transmission performance of the international telecommunications transport network. The performance definitions are based upon a 27 500 km Hypothetical Reference Path (HRP) defined in ITU-T Rec. G.826.

1.1 Scope

This Recommendation specifies the availability parameters and their objectives for path elements and end-to-end international constant bit rate (CBR) digital paths. These paths are based on the Plesiochronous Digital Hierarchy (PDH) as defined in ITU-T Rec. G.705, the Synchronous Digital Hierarchy (SDH) as defined in ITU-T Rec. G.707 or the Optical Transport Network (OTN) technology as defined in ITU-T Rec. G.709.

Future revisions of this Recommendation may consider the availability specification of other transmission technologies.

The availability parameters and their objectives are independent of the transmission media supporting the path, e.g., optical fibre, radio relay or satellite.

The availability objectives are considered to be complementary to the error performance objectives defined in ITU-T Recs G.821, G.826, G.828 and G.8201.

Packet or cell-based transport technologies are covered by other ITU-T Recommendations such as X.137 and I.357. The availability performance for switched connections in the ISDN is defined in ITU-T Rec. I.355.

The objectives given in this Recommendation may be used as a basis for the negotiation of enhanced performance, between the customer and the service provider, via a Service Level Agreement (SLA) as described in ITU-T Recs E.800 and E.801.

This Recommendation calls up other Recommendations for details about particular transport technologies such as measurement points and conditions and testing strategies. These Recommendations are

- for networks in general, including path protection arrangements: ITU-T Rec. G.805;
- for terrestrial optical fibre cable systems: ITU-T Recs G.872 and G.911;
- for microwave radio-relay transmission systems: ITU-R Recs F.1492 and F.1493;
- for satellite systems: ITU-R Rec. S.579-5;
- for details of the control protocol employed to switch between main and protection paths in SDH transport systems: ITU-T Recs G.841 and G.842.

1.2 Purpose

This Recommendation is intended to be useful to:

- purchasers of telecommunication capacity;
- transmission-network-planners, to determine the required infrastructure to support the telecommunication service offering;

- organizations responsible for the supply of capacity, to determine what additional end-to-end support may be needed (such as end-to-end protection switching) to fulfil the contracted quality of service objectives;
- network operators providing the network elements, to ensure that the contracted availability objectives are met;
- national public network supervisory bodies.

1.3 Application of this Recommendation

This Recommendation defines the availability of international end-to-end CBR digital paths based upon the availability of their constituent path elements.

A path is constructed using path elements that meet availability objectives obtained using the principles specified in 7.2. The designer will assemble the path elements into the path such that the path will meet the Table 2 objectives. The path may include various protection topologies; examples are given in Annex A.

The characteristics of path elements depend upon their length, their location in the end-to-end circuit and their quality category. More detailed analysis of their availability down to network operator domains, server layers, subnetworks or access groups is outside the scope of this Recommendation.

Techniques for improving the end-to-end availability by employing additional protection network elements are described in Annex A.

The availability is calculated from unity minus the unavailability.

Note that one or both of the end-to-end path's end points may be located at the user's premises.

Annex A also gives detailed guidance on methodologies for evaluating the end-to-end availability.

In some cases, an international telecommunications circuit may be provided by a group of private network operators. Then, the customer must negotiate the availability objectives required between these network operators to establish a SLA contract possibly using the performance specified in this Recommendation as guidance.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

- [1] ITU-T Recommendation E.800 (1994), *Terms and definitions related to quality of service and network performance including dependability*.
- [2] ITU-T Recommendation E.801 (1996), *Framework for Service Quality Agreement*.
- [3] ITU-R Recommendation F.1492 (2000), *Availability objectives for real digital radio-relay links forming part of the international portion constant bit rate digital path at or above the primary rate*.
- [4] ITU-R Recommendation F.1493 (2000), *Availability objectives for real digital radio-relay links forming part of national portion constant bit rate digital path at or above the primary rate*.