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ITU-T

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STANDARDIZATION SECTOR
OF ITU

Y.1540

Amendment 1
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SERIES Y: GLOBAL INFORMATION
INFRASTRUCTURE, INTERNET PROTOCOL ASPECTS
AND NEXT GENERATION NETWORKS

Internet protocol aspects – Quality of service and network
performance

Internet protocol data communication service – IP
packet transfer and availability performance
parameters

**Amendment 1: New Appendix VIII: Background
on IP service availability**

ITU-T Recommendation Y.1540 (2002) – Amendment 1

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GENERATION NETWORKS**

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ITU-T Recommendation Y.1540

Internet protocol data communication service – IP packet transfer and availability performance parameters

Amendment 1

New Appendix VIII: Background on IP service availability

Source

Amendment 1 to ITU-T Recommendation Y.1540 (2002) was agreed by ITU-T Study Group 13 (2001-2004) on 1 August 2003.

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.

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ITU-T Recommendation Y.1540

Internet protocol data communication service – IP packet transfer and availability performance parameters

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New Appendix VIII: Background on IP service availability

VIII.1 Introduction

This appendix gives the rationale for the current IP service availability function definition in clause 7. The purpose is to provide additional background information and aid the appreciation for this complex and important topic.

VIII.2 Background

There are many ways to define availability, and many perspectives that translate into evaluation using a range of sensitivities and time scales. This Recommendation uses a simple, adequate definition (from a network operator's perspective) that specifies the minimum evaluation conditions. In order to understand why the IP service availability function is sufficient, an understanding of the causes of unavailability is needed.

Figure VIII.1 shows a Venn Diagram where the universe is all service time. The body of this Recommendation notes that IP service providers may identify maintenance intervals where service availability is not guaranteed. Thus, the service time universe is usually different from the universe of *all* time.

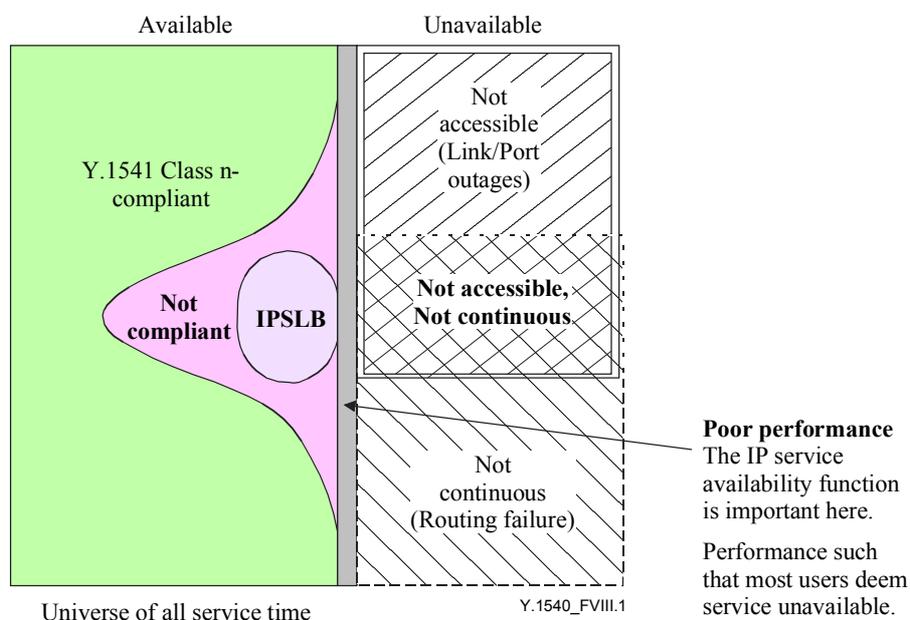


Figure VIII.1/Y.1540 – Illustration of service time as a Venn Diagram

We indicate that service time is divided in two main categories: available time (on the left) and unavailable time (on the right).

VIII.3 Definitions of the regions in Figure VIII.1

Unavailable time is composed of the following regions:

- **Not accessible:** The service user is unable to communicate with the IP network because of failure in the access network transport or network elements. The access link itself or router interface failure are common causes. Packet loss ratio is typically 100%, and this failure will often take much longer than 5 minutes to correct. Maintenance forces should be almost immediately alerted to the failure by fault management systems.
- **Not continuous:** The service user is unable to communicate with the desired destination, because of a failure in IP network global routing information. The user may be able to communicate with some destinations, but not the desired destination. Packet loss ratio is typically 100%, and this failure will often take much longer than 5 minutes to correct.
- **Not accessible, Not continuous:** The service user is unable to communicate while both of the above conditions exist simultaneously.
- **Poor performance:** The service user is unable to communicate reliably with the desired destination. The packet loss ratio is 75% or greater, and the user will deem the service unavailable for communicating with almost any form of IP network application. When congestion is the primary cause for this level of packet loss, end-to-end flow control should be activated to alleviate it (as provided in TCP).

Available time is composed of the following regions:

- **Y.1541 Class n-complaint:** The service user is able to communicate with the desired destination and the packet transfer performance is compliant with the objectives of the agreed class. Evaluation of this state is usually conducted in 1-minute intervals. Note that any user application will have specific capacity needs; the ability to support a traffic contract (as defined in ITU-T Rec. Y.1221) must also be considered.
- **Not compliant:** The service user is able to communicate with the desired destination, but the packet transfer performance does not meet one or more of the objectives of the agreed class. Evaluation of this state is usually conducted in 1-minute intervals.
- **IP Packet Severe Loss Block (IPSLB):** The service user is able to communicate with the desired destination, but the packet transfer performance does not meet one or more of the objectives of the agreed class. Specifically, the loss ratio is sufficient to determine that an IPSLB has occurred (provisionally defined as more than 20% loss in a 1-minute interval).

VIII.4 Summary

We observe that the criteria of the IP service availability function are only important in the Poor Performance region, and that the Unavailable Time contributed by this region is small compared to the other causes of Unavailability. Therefore, the evaluation of state based on loss alone, and the criteria provisionally agreed for state evaluation (5 minutes, 75% loss), are deemed sufficient.

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