



INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

G.116

(09/99)

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

International telephone connections and circuits – General
Recommendations on the transmission quality for an
entire international telephone connection

**Transmission performance objectives
applicable to end-to-end international
connections**

ITU-T Recommendation G.116

(Previously CCITT Recommendation)

ITU-T RECOMMENDATION G.116**TRANSMISSION PERFORMANCE OBJECTIVES APPLICABLE TO
END-TO-END INTERNATIONAL CONNECTIONS****Summary**

This Recommendation is intended to provide guidance to network and service planners who are concerned with the performance of international connections, and to network element designers who are responsible for the equipment specification. Information relating to analogue, digital, and analogue/digital terminal and network elements is provided. Additionally, this information is provided in the context of hybrid networks, i.e. networks built using analogue and digital network elements; integrated digital networks, i.e. networks with digital core network elements and analogue accesses; and integrated services digital networks, i.e. networks which have only digital network, digital access and digital terminal elements. The transmission systems used to create these connections may operate as analogue or digital systems. Digital switches and transport systems may operate as ATM, frame relay, plesiochronous digital hierarchy (PDH), synchronous digital hierarchy (SDH), systems.

The current regulatory operating environment in certain countries has made allowance for other networks to interconnect with the PSTN, e.g. private networks and digital cellular networks, and for customers to provision their own terminal equipment. The information in this Recommendation will provide guidance for all parties that wish to operate in this changing environment.

Source

ITU-T Recommendation G.116 was prepared by ITU-T Study Group 12 (1997-2000) and was approved under the WTSC Resolution No. 1 procedure on 30 September 1999.

FOREWORD

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

The approval of Recommendations by the Members of the ITU-T is covered by the procedure laid down in WTSC Resolution No. 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 term *recognized operating agency (ROA)* includes any individual, company, corporation or governmental organization that operates a public correspondence service. The terms *Administration*, *ROA* and *public correspondence* are defined in the *Constitution of the ITU (Geneva, 1992)*.

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As of the date of approval of this Recommendation, the ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementors are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database.

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Recommendation G.116**TRANSMISSION PERFORMANCE OBJECTIVES APPLICABLE TO
END-TO-END INTERNATIONAL CONNECTIONS***(Geneva, 1999)***1 Preamble**

This Recommendation is intended to provide guidance to network and service planners who are concerned with the performance of international connections, and to network element designers who are responsible for the equipment specification. Information relating to analogue, digital, and analogue/digital terminal and network elements is provided. Additionally, this information is provided in the context of hybrid networks, i.e. networks built using analogue and digital network elements; integrated digital networks, i.e. networks with digital core network elements and analogue accesses; and integrated services digital networks, i.e. networks which have only digital network, digital access and digital terminal elements. The transmission systems used to create these connections may operate as analogue or digital systems. Digital switches and transport systems may operate as ATM, frame relay, plesiochronous digital hierarchy (PDH), synchronous digital hierarchy (SDH), systems.

The current regulatory operating environment in certain countries has made allowance for other networks to interconnect with the PSTN, e.g. private networks and digital cellular networks, and for customers to provision their own terminal equipment. The information in this Recommendation will provide guidance for all parties that wish to operate in this changing environment.

Digital technology has matured and it is recommended that all new switches, i.e. those used for national and international switching, should be of digital design. Additionally, it is recommended that all new large private automatic branch exchanges (PBXs) should be digital and that interconnection with the PSTN should be digital, if practical, especially in those cases where the PBX performs a tandem function. It is also recommended that all new international circuits be implemented on digital transmission systems, e.g. SDH. It is recognized that while it is desirable that national transmission systems should trend to digital operation, there may be a need to increment existing analogue systems and guidance in this regard has been provided. It is also recognized that private networks may operate using PDH/SDH, ATM, frame relay, or other digital types of transport systems and may incorporate use of digital circuit multiplication equipment.

Recommendation G.107 presents the E-model, which is a computational model, that can be used for transmission planning. This Recommendation provides a model which can be used to determine the collective impact of impairments on overall connection performance.

2 Introduction

Networks are in various stages of evolution towards being all-digital. Thus, there will be instances where: connections will be routed utilizing all-digital components (end-to-end including the terminals); other connections will use all-digital network components and analogue access facilities; and still other connections will use portions of the network which are analogue while other network components may be digital. This Recommendation is intended to address each of these scenarios. Because the trend is towards digital, the masking benefits of significant channel noise for certain impairments found in analogue networks can no longer be assumed. As a result, the guidance provided in this Recommendation will reflect this new environment.

**Documents**

Document Sharing Hub

Recommendation G.116 (09/99)**1**