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ITU-T I.351/Y.801/Y.1501

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SERIES I: INTEGRATED SERVICES DIGITAL NETWORK

Overall network aspects and functions – Performance objectives

SERIES Y: GLOBAL INFORMATION INFRASTRUCTURE AND INTERNET PROTOCOL ASPECTS

Global information infrastructure – Performances

Internet protocol aspects – Quality of service and network performance

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Relationships among ISDN, Internet Protocol and GII performance Recommendations

ITU-T Recommendation I.351/Y.801/Y.1501

(Previously CCITT Recommendation)

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ITU-T RECOMMENDATION I.351/Y.801/Y.1501

RELATIONSHIPS AMONG ISDN, INTERNET PROTOCOL AND GII PERFORMANCE RECOMMENDATIONS

Summary

This ITU-T Recommendation defines relationships among a set of existing and draft ITU-T Recommendations that collectively provide the basis for the specification and apportionment of performance in narrowband and broadband ISDNs, Internet Protocol (IP)-based networks, and the emerging Global Information Infrastructure (GII) including physical layer digital transmission performance, network synchronization and timing performance. These Recommendations are intended to be used in describing performance between the measurement points that delimit and apportion international ISDNs, IP-based networks, and the GII.

Source

ITU-T Recommendation I.351/Y.801/Y.1501 was revised by ITU-T Study Group 13 (1997-2000) and was approved by the World Telecommunication Standardization Assembly (Montreal, 27 September-6 October 2000).

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 Assembly (WTSA), 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 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.

INTELLECTUAL PROPERTY RIGHTS

The ITU draws attention to the possibility that the practice or implementation of this Recommendation may involve the use of a claimed Intellectual Property Right. The ITU takes no position concerning the evidence, validity or applicability of claimed Intellectual Property Rights, whether asserted by ITU members or others outside of the Recommendation development process.

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 I.351/Y.801/Y.1501

RELATIONSHIPS AMONG ISDN, INTERNET PROTOCOL AND GII PERFORMANCE RECOMMENDATIONS

(1988, 1993, 1997, 2000)

1 Scope

This ITU-T Recommendation defines relationships among the following existing and draft ITU-T Recommendations: G.810, G.811, G.812, G.813, G.821, G.822, G.823, G.824, G.825, G.826, G.827, G.827.1, G.828, G.829, I.350, I.351, I.352, I.353, I.354, I.355, I.356, I.357, I.358, I.359, I.35AAL, I.35av, Y.800, Y.801, Y.1501, Y.1530, Y.1540 and Y.1541. Collectively, these Recommendations provide the basis for the specification and apportionment of performance in narrowband and broadband ISDNs, Internet Protocol (IP)-based networks, and the emerging Global Information Infrastructure (GII). They include specifications for physical layer digital transmission performance and network synchronization and timing performance. These Recommendations are intended to be used in describing performance between the measurement points that delimit and apportion international ISDNs, IP-based networks, and the GII.

The relevant Recommendations and their relationships are illustrated in Figure 1. The 3×3 performance description framework defined in ITU-T Recommendation I.350 is used to illustrate the relationships among particular Recommendations. Three protocol-independent telecommunication functions are identified in the matrix: access, user information transfer, and disengagement. These general functions correspond to specified aspects of ISDN, IP, and GII services conforming to ITU-T standardized protocols[1]. Each function is considered with respect to three general performance concerns (or "performance criteria"): speed, accuracy, and dependability. These express, respectively, the delay or rate, degree of correctness, and degree of certainty with which the function is performed. Recommendations shown within the matrix define sets of protocol-specific parameters ("primary parameters") that describe performance criteria relative to each function. An associated model provides a basis for describing overall service availability. A specified availability function compares the values for a subset of the primary parameters with corresponding outage thresholds to classify the services as "available" (no service outage) or "unavailable" (service outage) during scheduled service time. Figure 1 presents the Recommendations that specify availability functions and define availability parameters associated with ISDN, IP, and GII services. Recommendations concerning timing and synchronization performance of digital networks including ISDNs, IP-based networks, and the emerging GII are illustrated in Figure 1 by their relationships to the complementary aspects of network jitter, wander, and synchronization and timing equipment performance description.

This ITU-T Recommendation is organized as follows. The scope of the Recommendation is provided in clause 1. A list of abbreviations is provided in clause 2. The general scope and content of each Recommendation illustrated in Figure 1 is described in clause 3[2]. An index listing key concepts and associated Recommendations is provided in clause 4.

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[1] For B-ISDN, these general functions include multiparty and multipoint connection types.

[2] The most recent editions of draft and approved Recommendations should be consulted.

General Performance Aspects of ISDNs, IP-Based Networks and the GII
I.350 (Quality of Service/Network Performance Framework in Digital Networks, including ISDNs) I.351/Y.801/Y.1501 (Relationships Among ISDN, Internet Protocol, and GII Performance Recommendations) I.353 (Reference Events for Defining ISDN Performance Parameters (planned for deletion)) Y.800 (GII Quality of Service/Network Performance Framework)

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Narrow-band and Broadband ISDN, IP and GII Performance (including physical layer digital transmission performance)			
Criteria / Function	Speed	Accuracy	Dependability
Access	I.352 (N-ISDN - CKT) I.354 (N-ISDN - PKT) I.358 (B-ISDN) Y.1530 (IP)	I.354 (N-ISDN - PKT) I.358 (B-ISDN) I.359 (N-ISDN - CKT) Y.1530 (IP)	I.354 (N-ISDN - PKT) I.358 (B-ISDN) I.359 (N-ISDN - CKT) Y.1530 (IP)
Information Transfer	I.354 (N-ISDN - PKT) I.356 (ATM) Y.1540 (IP) Y.1541 (IP)	G.821(CKT) G.826 (CKT) G.828 (CKT) G.829 (CKT) I.354 (N-ISDN - PKT) I.356 (ATM) I.35AAL (AAL) Y.1540 (IP) Y.1541 (IP)	I.354 (N-ISDN - PKT) I.356 (ATM) Y.1540 (IP) Y.1541 (IP)
Disengagement	I.352 (N-ISDN - CKT) I.354 (N-ISDN - PKT) I.358 (B-ISDN) Y.1530 (IP)	I.354 (N-ISDN - PKT) I.358 (B-ISDN) I.359 (N-ISDN - CKT) Y.1530 (IP)	I.354 (N-ISDN - PKT) I.358 (B-ISDN) I.359 (N-ISDN - CKT) Y.1530 (IP)

↓

Availability
G.827 (B-ISDN CKT) G.827.1 (B-ISDN CKT) I.355 (N-ISDN - CKT & PKT) I.357 (ATM) I.35av (ATM) Y.1540 (IP) Y.1541 (IP)

Timing and Synchronization Performance	
Network Jitter, Wander, and Synchronization	Timing Equipment
G.810 (Terminology) G.822 (Slips) G.823 (Jitter/Wander – 2048 kbit/s Hierarchy) G.824 (Jitter/Wander – 1544 kbit/s Hierarchy) G.825 (Jitter/Wander – SDH)	G.810 (Terminology) G.811(Primary Reference Clock) G.812 (Synchronization Supply Unit) G.813 (SDH Equipment Clock)

Figure 1/I.351/Y.801/Y.1501 – Relationships among ISDN, IP, and GII performance Recommendations

2 Abbreviations

This ITU-T Recommendation uses the following abbreviations:

AAL	ATM Adaptation Layer
ATM	Asynchronous Transfer Mode
B-ISDN	Broadband ISDN
CBR	Constant Bit Rate
CKT	Circuit Mode
GII	Global Information Infrastructure
IP	Internet Protocol
ISDN	Integrated Services Digital Network
kbit/s	kilobit/second
MTIE	Maximum Time Interval Error
N-ISDN	Narrowband ISDN
NP	Network Performance
PDH	Plesiochronous Digital Hierarchy
PKT	Packet Mode
PRC	Primary Reference Clock
QoS	Quality of Service
RMS	Root Mean Square
SDH	Synchronous Digital Hierarchy
SEC	SDH Equipment Clock
STM	Synchronous Transport Module
TDEV	Time Deviation
VC	Virtual Channel
VCC	Virtual Channel Connection

3 General scope and content of performance Recommendations

The general scope and content of each of the ISDN, IP, and GII performance Recommendations identified in Figure 1 is provided below. (For ease of reference, the Recommendations are listed alphanumerically.)

ITU-T Recommendation G.810 – Definitions and terminology for synchronization networks (1996)

Recommendation G.810 provides definitions and terms for describing network synchronization performance. These definitions and terms are used in Recommendations G.811, G.812, G.813, G.822, G.823, G.824, and G.825.

ITU-T Recommendation G.811 – Timing characteristics of primary reference clocks (1997)

Recommendation G.811 defines parameters and objectives for describing Primary Reference Clock (PRC) performance. The parameter definitions utilize Recommendation G.810 terminology. Key parameters are frequency accuracy, MTIE, TDEV, phase discontinuity, and peak-to-peak jitter. The

parameters and objectives apply to PRC jitter and wander performance. This Recommendation provides part of the basis for the slip performance objectives in Recommendation G.822 and the wander reference model in Recommendation G.823.

ITU-T Recommendation G.812 – Timing requirements of slave clocks suitable for use as node clocks in synchronization networks (1998)

Recommendation G.812 defines parameters and objectives for describing timing equipment synchronization supply unit performance. The parameter definitions utilize Recommendation G.810 terminology. Key parameters are frequency accuracy, pull-in, pull-out, and hold-in ranges, MTIE, TDEV, phase discontinuity, and peak-to-peak jitter. The parameters and objectives apply to slave clock jitter, wander, transient, and holdover performance. Six clock types are defined, designated Type I through VI, respectively. Clock types I, V and VI are intended for PDH networks of the 2048 kbit/s hierarchy and SDH networks optimized for this hierarchy. Clock types II, III and IV are intended for PDH networks of the 1544 kbit/s hierarchy and SDH networks optimized for this hierarchy.

ITU-T Recommendation G.813 – Timing characteristics of SDH equipment slave clocks (SEC) (1996)

Recommendation G.813 defines timing equipment parameters and objectives for describing SDH equipment clock performance. The parameter definitions utilize Recommendation G.810 terminology. Key parameters are frequency accuracy, pull-in, pull-out, and hold-in ranges, MTIE, TDEV, and peak-to-peak jitter. The parameters and objectives apply to interfaces of "Option 1" and "Option 2" SDH equipment clocks. Option 1 applies to SDH networks optimized for the 2048 kbit/s hierarchy and Option 2 applies to SDH networks optimized for the particular 1544 kbit/s hierarchy that includes the rates 1544 kbit/s, 6312 kbit/s, and 44 736 kbit/s.

ITU-T Recommendation G.821 – Error performance of an international digital connection operating at a bit rate below the primary rate and forming part of an integrated services digital network (1996)

Recommendation G.821 defines accuracy parameters and objectives for describing N-ISDN circuit mode information transfer performance. Key parameters are errored second ratio and severely errored second ratio. The parameters and objectives apply to specified portions of an international end-to-end digital connection operating at a bit rate below the primary rate. This Recommendation provides a basis for N-ISDN circuit mode availability performance specified in Recommendation I.355.

ITU-T Recommendation G.822 – Controlled slip rate objectives on an international digital connection (1988)

Recommendation G.822 defines parameters and objectives for describing network slip performance. The parameter definitions utilize Recommendation G.810 terminology. Key parameters are the mean slip rate and its associated proportion of time. The parameters and objectives apply to specified portions of an international digital connection. This Recommendation provides a basis for Option 1 and Option 2 network wander limits in Recommendation G.813.

ITU-T Recommendation G.823 – The control of jitter and wander within digital networks which are based on the 2048 kbit/s hierarchy (2000)

Recommendation G.823 defines parameters and objectives for describing network jitter and wander performance based on the 2048 kbit/s hierarchy. The parameter definitions utilize Recommendation G.810 terminology. Key parameters are peak-to-peak jitter and wander, RMS jitter, and associated measurement filter bandwidths. The parameters and objectives apply to jitter and wander tolerance and network limits for PDH interfaces based on the 2048 kbit/s hierarchy and to jitter and wander transfer for equipment with PDH interfaces based on the 2048 kbit/s hierarchy.

ITU-T Recommendation G.824 – The control of jitter and wander within digital networks which are based on the 1544 kbit/s hierarchy (2000)

Recommendation G.824 defines parameters and objectives for describing network jitter and wander performance based on the 1544 kbit/s hierarchy. The parameter definitions utilize Recommendation G.810 terminology. Key parameters are peak-to-peak jitter and wander, RMS jitter, and associated measurement filter bandwidths. The parameters and objectives apply to jitter and wander tolerance and network limits for PDH interfaces based on the 1544 kbit/s hierarchy and to jitter and wander transfer for equipment with PDH interfaces based on the 1544 kbit/s hierarchy. This Recommendation provides input to the Option 2 wander budget and network wander limits in Recommendation G.813.

ITU-T Recommendation G.825 – The control of jitter and wander within digital networks which are based on the synchronous digital hierarchy (SDH) (2000)

Recommendation G.825 defines parameters and objectives for describing network synchronization jitter and wander performance based on the SDH. The parameter definitions utilize Recommendation G.810 terminology. Key parameters are peak-to-peak jitter and wander, RMS jitter, and associated measurement filter bandwidths. The parameters and objectives apply to jitter and wander tolerance and network limits for SDH interfaces based on the SDH hierarchy. This Recommendation provides part of the basis for the Option 1 SEC bandwidth specification in Recommendation G.813.

ITU-T Recommendation G.826 – Error performance parameters and objectives for international constant bit-rate digital paths at or above the primary rate (1999)

Recommendation G.826 defines accuracy parameters and objectives for describing B-ISDN circuit mode information transfer performance. The key parameters are errored second ratio, severely errored second ratio, and background block-error ratio. The parameters and objectives apply to specified portions of an international end-to-end CBR digital path operating at or above the primary rate.

ITU-T Recommendation G.827 – Availability performance and objectives for path elements of international constant bit-rate digital paths at or above the primary rate (2000)

Recommendation G.827 defines parameters and objectives for describing B-ISDN circuit mode availability performance. The parameters are defined on the basis of G.826 parameter thresholds. Key parameters are availability ratio and mean time between digital path outages. The parameters and objectives apply to path elements of an end-to-end international CBR digital path at or above the primary rate.

ITU-T Recommendation G.827.1 – Availability performance objectives for end-to-end international constant bit-rate digital paths at or above the primary rate (2000)

Recommendation G.827.1 specifies network performance objectives for describing end-to-end availability performance of international constant bit rate digital paths at or above the primary rate. The parameters to which these objectives apply are defined in G.827. The objectives given are independent of the physical network supporting the path. Guidance on determining expected end-to-end performance using the objectives for path elements is provided in an annex, and depends on the actual path topology. Three different path categories are defined, each offering a different level of availability performance.

ITU-T Recommendation G.828 – Error performance parameters and objectives for international, constant bit-rate synchronous digital paths (2000)

Recommendation G.828 defines accuracy parameters and objectives for describing transfer performance of synchronous digital paths. The key parameters are errored second ratio, severely errored second ratio and background block-error ratio. The parameters and objectives apply to specified portions of an international, end-to-end CBR digital path supported by the Synchronous

Digital Hierarchy (SDH). Compared with Recommendation G.826, Recommendation G.828 defines tighter performance objectives, is restricted to SDH and covers tandem connection monitoring.

ITU-T Recommendation G.829 – Error performance events for SDH multiplex and regenerator sections (2000)

Recommendation G.829 defines error performance events and block structures applicable to error performance assessment on SDH multiplex and regenerator sections. The Recommendation defines the events errored second, severely errored second, and background block errors. Block structures are given for bit rates less than STM-1, STM-1 to STM-16, and STM-64. Definitions given for regenerator sections are only applicable to radio and satellite systems.

ITU-T Recommendation I.350 – General aspects of quality of service and network performance in digital networks, including ISDNs (1993)

Recommendation I.350 defines Quality of Service (QoS) and Network Performance (NP) principles; illustrates how the QoS and NP concepts are applied in digital networks including ISDNs (providing both narrowband and broadband capabilities); describes the features of, and the relationships between, these concepts; indicates and classifies performance concerns for which parameters may be needed; and identifies generic performance parameters.

ITU-T Recommendation I.351/Y.801/Y.1501 – Relationships among ISDN, Internet protocol, and GII performance Recommendations (2000)

ITU-T Recommendation I.352 – Network performance objectives for connection processing delays in an ISDN (1993)

Recommendation I.352 defines speed parameters and objectives for describing N-ISDN circuit mode access and disengagement performance. Key parameters are call set-up delay and call clearing delay. The parameters and objectives apply to specified portions of an international end-to-end circuit mode connection. This Recommendation provides a basis for N-ISDN circuit mode availability performance specified in Recommendation I.355.

ITU-T Recommendation I.353 – Reference events for defining ISDN and B-ISDN performance parameters (1996 – planned for deletion)

Recommendation I.353 defines the measurement points and performance-significant reference events that are used in Recommendations I.352, I.354, I.355, I.356, I.357, I.358 and I.359 to define performance parameters for international ISDN services. Recommendation I.353 is planned for deletion after material currently contained in I.353 is incorporated as needed into the relevant performance Recommendations.

ITU-T Recommendation I.354 – Network performance objectives for packet-mode communication in an ISDN (1993)

Recommendation I.354 defines speed, accuracy, and dependability parameters and objectives for describing N-ISDN packet-mode access, information transfer, and disengagement performance. Key parameters are call set-up delay, call set-up denial probability, errored packet ratio, packet loss ratio, and call clearing delay. The parameters and objectives apply to specified portions of an international end-to-end packet mode connection. This Recommendation provides a basis for N-ISDN packet-mode availability performance specified in Recommendation I.355.

ITU-T Recommendation I.355 – ISDN 64 kbit/s connection type availability performance (2000)

Recommendation I.355 defines parameters and objectives for describing N-ISDN circuit mode and packet mode availability performance. The parameters are defined on the basis of G.821, I.352, and I.354 parameter thresholds. Key parameters are percent service availability and mean time between

service outages. The parameters and objectives apply to specified portions of international end-to-end N-ISDN circuit mode and packet mode connections.

ITU-T Recommendation I.356 – B-ISDN ATM layer cell transfer performance (2000)

Recommendation I.356 defines speed, accuracy, and dependability parameters and objectives for describing B-ISDN ATM information transfer performance. The key parameters include cell transfer delay, cell delay variation, cell error ratio, cell loss ratio, severely errored cell block ratio, frame transmission delay, and corrupted frame ratio. It includes adjusted parameter definitions that can be used when cell flows do not conform with the negotiated traffic contract. The parameters and objectives apply to specified portions of an end-to-end international B-ISDN ATM connection. Parameter values are grouped together into five distinct QoS classes that users may request on a connection-by-connection basis. This Recommendation provides a basis for B-ISDN ATM availability performance specification in Recommendations I.357 and I.35av.

ITU-T Recommendation I.357 – B-ISDN semi-permanent connection availability (2000)

Recommendation I.357 defines parameters, objectives and measurement methods for describing B-ISDN ATM availability performance. The parameters are defined on the basis of I.356 parameter thresholds and apply to semi-permanent connections. Key parameters are availability ratio and mean time between outages. The parameters and objectives apply to specified portions of an international end-to-end B-ISDN ATM semi-permanent connection. The objectives, which are worst-case values, are intended to assist providers in network planning by limiting the aggregate effect of network impairments, including congestion, equipment failures and transmission errors.

ITU-T Recommendation I.358 – Call processing performance for Switched Virtual Channel Connections (VCCs) in a B-ISDN (1998)

Recommendation I.358 defines speed, accuracy, and dependability parameters and objectives for describing B-ISDN access and disengagement performance, including call processing functions supporting multipoint connections and the adding and dropping of parties. The key parameters are connection establishment delay, party establishment delay, connection release delay, party release delay, disconnect delay, party disconnect delay, and connection failure probability. The parameters and objectives apply to specified portions of an international end-to-end B-ISDN connection.

ITU-T Recommendation I.359 – Accuracy and dependability of ISDN 64 kbit/s circuit mode connection types (1999)

Recommendation I.359 defines accuracy and dependability parameters for describing N-ISDN circuit mode access and disengagement performance. Key parameters are connection denial probability, incorrect call setup probability, and premature disconnect probability. The parameters apply to specified portions of an international end-to-end 64 kbit/s circuit mode connection.

ITU-T Recommendation I.35AAL – ATM Adaptation Layer (AAL) Performance (draft)

Recommendation I.35AAL (draft) defines performance parameters associated with the ATM Adaptation Layer (AAL) of a B-ISDN. The Recommendation takes into account different AAL types in addressing the end-to-end information transfer performance involving the collective performance effects of both network and customer equipment. In the case of AAL Type 2, performance effects of switching at that protocol layer are considered. The Recommendation builds upon the parameter definitions and performance objectives defined in I.356.

ITU-T Recommendation I.35av – B-ISDN Switched Virtual Channel Connection Availability (draft)

Recommendation I.35av (draft) defines availability performance parameters for B-ISDN ATM point-to-point switched connections. These parameters will be characterized by the ability of a network to provide a connection and to maintain the connection while user information is

transferred. Where possible the parameters will be defined with reference to thresholds associated with the parameters defined in I.356 and I.357.

ITU-T Recommendation Y.800 – Performance Framework for the GII (draft)

Recommendation Y.800 (draft) provides descriptions of quality of service (QoS) and network performance (NP) for the emerging global information infrastructure (GII). The Recommendation illustrates how the QoS and NP concepts are applied in the context of the applications, middleware, and baseware that create the vertical aspects of the GII and describes the features of, and the relationships between, these concepts. Y.800 also indicates and classifies higher layer performance concerns for which parameters may be needed and identifies generic performance parameters for the non-transport aspects of the GII. The initial version of Y.800 will focus on the performance of heterogeneous networks.

ITU-T Recommendation Y.801/Y.1501/I.351 – Relationships among ISDN, Internet protocol, and GII performance Recommendations (2000)

ITU-T Recommendation Y.1501/I.351/Y.801 – Relationships among ISDN, Internet protocol, and GII performance Recommendations (2000)

ITU-T Recommendation Y.1530 – Call processing performance for voice service interworking in ISDN and IP networks (draft)

Recommendation Y.1530 (draft) defines performance parameters and (planned) objectives for point-to-point call processing in voice service interworking for ISDN and IP networks. Call processing delay parameters in ISDNs are defined in Recommendation I.352. The accuracy and dependability performance parameters of call processing in ISDNs are defined in Recommendation I.359. These call processing performance parameters are used where relevant. The QoS relevant network performance objectives (planned) provided by Y.1530 are based on the general principles and generic performance parameters of Recommendation I.350. Information transfer performance of IP service is addressed in Recommendations Y.1540 and Y.1541.

ITU-T Recommendation Y.1540 – Internet protocol data communication service – IP packet transfer and availability performance parameters (draft)

Recommendation Y.1540 (ex I.380) defines parameters that may be used in specifying and assessing the speed, accuracy, dependability, and availability of Internet Protocol (IP) packet transfer in international IP data communication service. Connectionless transport is a distinguishing aspect of the IP service that is considered in Y.1540. The defined parameters apply to end-to-end, point-to-point IP service and to the network portions that provide, or contribute to the provision of, such service. The key parameters include IP packet transfer delay, IP packet delay variation, IP packet error ratio, IP packet loss ratio, spurious IP packet rate, and per cent IP service availability. Performance objectives for the parameters defined in Y.1540 are specified in Recommendation Y.1541. Access and disengagement performance associated with IP service are addressed in Recommendation Y.1530.

ITU-T Recommendation Y.1541 – Internet protocol communication service – IP performance objectives and allocations (draft)

Recommendation Y.1541 (draft) specifies provisional objectives for IP network performance parameters defined in Recommendation Y.1540. Certain Y.1541-specified objectives depend on the user's selection of QoS class; Y.1541 includes the definitions for those QoS classes. Each performance objective is allocated to the individual network portions involved in providing the international end-to-end flow. The Recommendation includes guidance relative to performance specification in the case that traffic is not conformant with the negotiated traffic contract.

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