



INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

Y.1561

(05/2004)

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

Internet protocol aspects – Quality of service and network
performance

Performance and availability parameters for MPLS networks

ITU-T Recommendation Y.1561

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ITU-T Recommendation Y.1561

Performance and availability parameters for MPLS networks

Summary

This Recommendation defines parameters that may be used in specifying and assessing the performance of speed, accuracy, dependability, and availability of packet transfer over a Label Switched Path on a Multi-Protocol Label Switching (MPLS) network. The defined parameters apply to end-to-end, point-to-point and multipoint-to-point LSP and to any MPLS domain that provides, or contributes to the provision of, packet transfer services.

Two categories of MPLS networks are considered:

- 1) TE-LSP: Traffic Engineering Label Switched Path, or configured LSP. These are point-point paths.
- 2) LDP-based LSP: This includes point-to-point and multipoint to point LSPs.

Source

ITU-T Recommendation Y.1561 was approved on 7 May 2004 by ITU-T Study Group 13 (2001-2004) under the ITU-T Recommendation A.8 procedure.

FOREWORD

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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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As of the date of approval of this Recommendation, 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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Performance and availability parameters for MPLS networks

1 Scope

This Recommendation defines parameters that may be used in specifying and assessing the performance of speed, accuracy, dependability, and availability of packet (labelled or not – in the latter case, Penultimate Hop Popping (PHP) may cause loss of Label Switched Paths (LSP) identity at the network edges) transfer over an LSP on a Multi-Protocol Label Switching (MPLS) network. The defined parameters apply to end-to-end, point-to-point and multipoint-to-point LSP and to any MPLS domain that provides, or contributes to the provision of, packet transfer services in accordance with the normative references specified in clause 2.

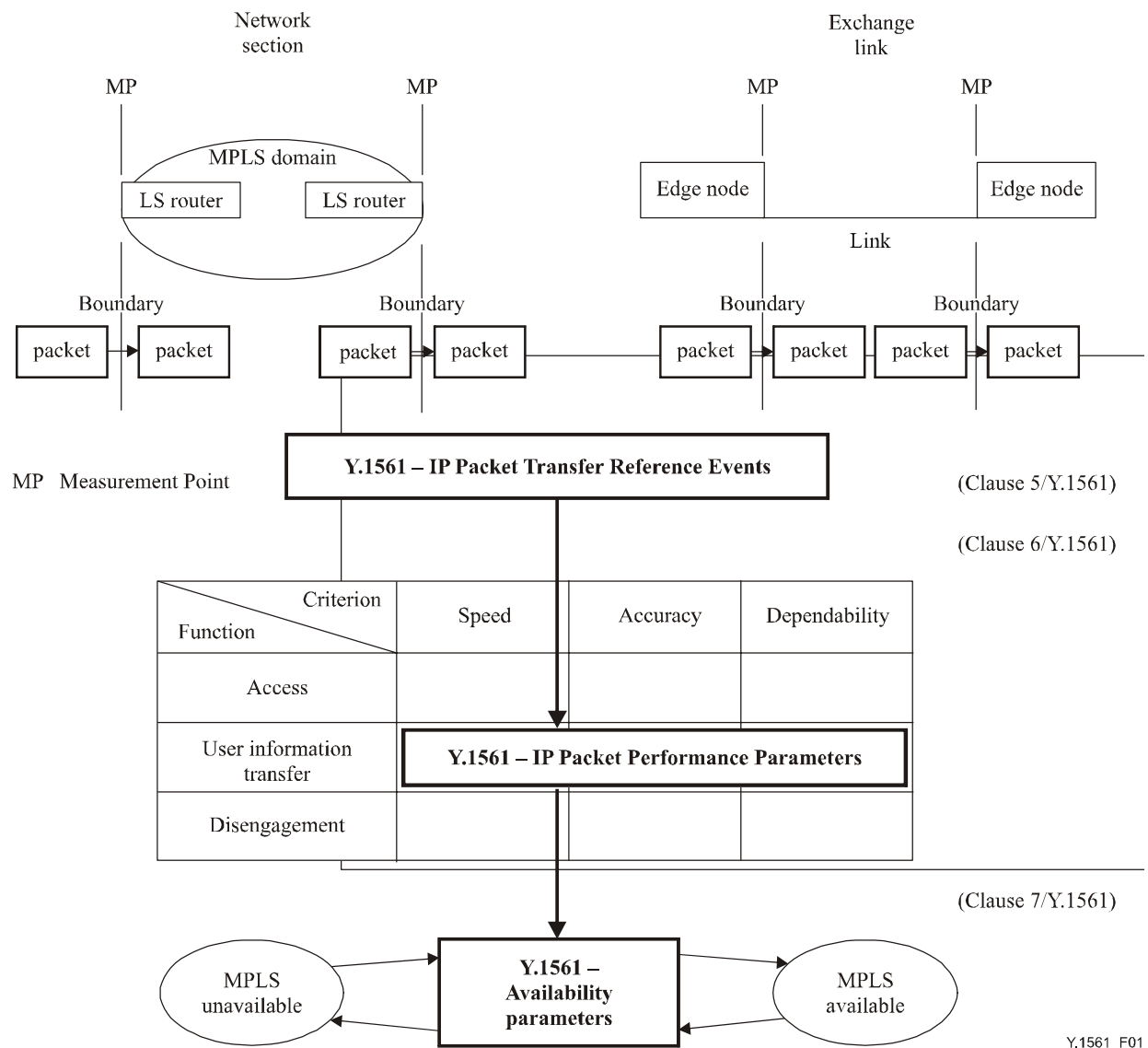


Figure 1/Y.1561 – Scope of this Recommendation

The scope of this Recommendation is summarized in Figure 1. The MPLS network performance parameters are defined on the basis of packet transfer reference events that may be observed at measurement points (MPs) associated with specified functional and jurisdictional boundaries. The

measurement points may be at the ends of LSPs. For comparability and completeness, MPLS network performance is considered in the context of the 3×3 performance matrix defined in ITU-T Rec. I.350. Three protocol-independent communication functions are identified in the matrix: access, user information transfer and disengagement. Each function is considered with respect to three general performance concerns (or "performance criteria"): speed, accuracy and dependability. An associated two-state model provides a basis for describing MPLS network availability.

The performance of MPLS networks providing access and disengagement functions (e.g., Resource ReserVation Protocol – Traffic Engineering, RSVP-TE) and supporting capabilities (e.g., Label Distribution Protocol, LDP, as per RFC 3036) may be addressed in separate Recommendations.

Two categories of MPLS networks will be considered here:

- 1) TE-LSP: Traffic Engineering Label Switched Path, or configured LSP. These are point-point paths. The paths are connection-oriented, explicitly routed, and fixed.
- 2) LDP-based LSP: This includes point-to-point and multipoint to point LSPs. The paths behave more like IP, using the Interior Gateway Protocol (IGP), such as Open Shortest Path First (OSPF) or Intermediate System to Intermediate System (IS-IS) for routing. The LSPs are connectionless.

The point-to-point and multipoint-to-point topologies are accommodated through the concept of *populations of interest*, defined in 6.1. The case of PHP causing loss of LSP identity is specifically addressed in 5.4, where there are three optional criteria for packet transfer reference events. Correspondence between ingress and egress reference events has been dealt with here to the same degree as in different Recommendations (e.g., ITU-T Rec. Y.1540), in 5.5.2.

In this Recommendation, the general term *packet* refers to an IP packet with header and information field, or to other protocols with combinations of header and information fields, so long as there is a standard that describes the encapsulation as an MPLS packet.

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.

- ITU-T Recommendation I.350 (1993), *General aspects of quality of service and network performance in digital networks, including ISDNs*.
- ITU-T Recommendation I.353 (1996), *Reference events for defining ISDN and B-ISDN performance parameters*.
- ITU-T Recommendation Y.1540 (2002), *Internet protocol data communication service – IP packet transfer and availability performance parameters*.
- ITU-T Recommendation Y.1711 (2004), *Operation and maintenance mechanism for MPLS networks*.
- IETF RFC 3031 (2001), *Multiprotocol Label Switching Architecture*.
- IETF RFC 3032 (2001), *MPLS Label Stack Encoding*.
- IETF RFC 3036 (2001), *LDP Specification*.
- IETF RFC 3107 (2001), *Carrying Label Information in BGP-4*.