International Telecommunication Union

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

Y.1541

Amendment 1

(12/2013)

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

Internet protocol aspects – Quality of service and network performance

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Network performance objectives for IP-based services

Amendment 1: New Appendix XII – Considerations for low speed access networks

Recommendation ITU-T Y.1541 (2011) – Amendment 1

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For further details, please refer to the list of ITU-T Recommendations.

Recommendation ITU-T Y.1541

Network performance objectives for IP-based services

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New Appendix XII – Considerations for low speed access networks

Summary

Amendment 1 to Recommendation ITU-T Y.1541 (2011) introduces Appendix XII.

History

Edition	Recommendation	Approval	Study Group	Unique ID*
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2.1	ITU-T Y.1541 (2006) Amd. 1	2006-06-13	12	11.1002/1000/8865-en
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* To access the Recommendation, type the URL http://handle.itu.int/ in the address field of your web browser, followed by the Recommendation's unique ID. For example, http://handle.itu.int/11.1002/1000/11830-en.

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.

Compliance with this Recommendation is voluntary. However, the Recommendation may contain certain mandatory provisions (to ensure, e.g., interoperability or applicability) and compliance with the Recommendation is achieved when all of these mandatory provisions are met. The words "shall" or some other obligatory language such as "must" and the negative equivalents are used to express requirements. The use of such words does not suggest that compliance with the Recommendation is required of any party.

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As of the date of approval of this Recommendation, ITU had received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementers are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database at http://www.itu.int/ITU-T/ipr/.

Recommendation ITU-T Y.1541

Network performance objectives for IP-based services

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New Appendix XII – Considerations for low speed access networks

1) Appendix XII

Add Appendix XII as shown below after Appendix XI.

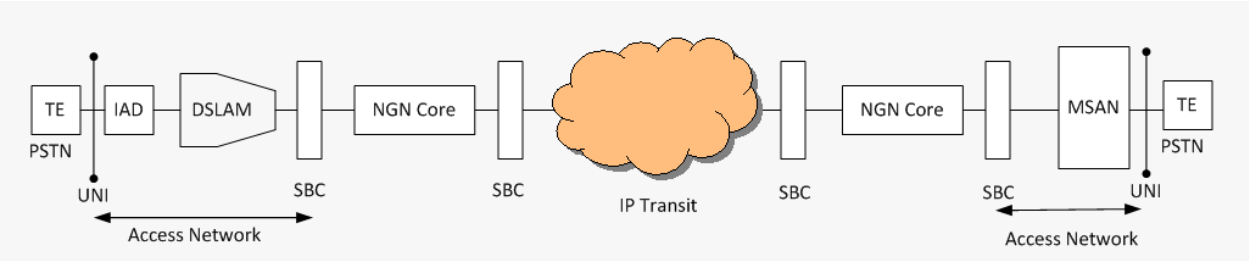
Appendix XII

Considerations for low speed access networks

(This appendix does not form an integral part of this Recommendation.)

XII.1 Reference configuration

QoS objectives in ITU-T Y.1541 are deemed to be applicable when access link speeds are at the T1 or E1 rate and higher. Today, many network providers use technologies where they offer access link speeds much smaller than T1 or E1. Fortunately, de-jitter buffers in an international MGW are often limited to a size of 100 ms, and it is suggested the total jitter should not exceed 80 ms in order to leave some extra space for clock drift/skew.



TE: Terminal Equipment, IAD: Integrated Access Device, DLSAM: Digital Subscriber Line Access Manager, SBC: Session Border Controller, , MSAN/MGW: Media Gateway.

Figure XII.1 – Example configuration for low speed access network communications

In the context of such low access rates, the focus is on details of jitter introduced by network elements, jitter caused by access bandwidth limitations and on reference connection scenarios. The objectives provided are a pre-requisite for network operators to be able to provide good quality connections as perceived by the user.

For example, UNI-UNI paths with a 384 kbit/s uplink will have at least a 32 ms insertion time (for a 1543 octet packet), increased to 40 ms to account for the additional link layer overhead, and nominally one packet's insertion time or 40 ms maximum delay variation for real-time traffic. When combined with backbone and egress delay variation, the UNI-UNI IPDV may exceed 50 ms, but some media gateway equipment allows 80 ms "jitter". Clearly if the upstream 384 kbit/s link inserts more than one packet in front of real-time traffic, the 80 ms media gateway allowance will be

exceeded. Thus, the desired path forward is to set the link hardware queue at one packet, or provide link interleaving or other mitigations to approach an IPDV of 40 ms (99.9 percentile) for a DSL uplink.

With a hardware buffer containing one packet, the maximum delay variation introduced on a VoIP real-time service packet (properly prioritized) is 40 ms. This is a significant portion of the 50 ms IPDV objective for ITU-T Y.1541 Class 0, and also a significant portion of the 100 ms mean IPTD objective.

Note that the downlink of DSL facilities is usually operated at rates greater than or equal to T1 or E1, and is covered by UNI-UNI objectives in the body of this Recommendation. The IPDV contribution of DSL downlinks is expected to contribute a fraction of the IPDV consistent with the UNI-UNI Class 0 objective of 50 ms (99.9 percentile), as described in Appendix IV (see clause IV.3.3). Also, the IPDV contributions of individual links are not additive, as the calculations of clause 8 and Appendix X clearly show.

XII.2 Guidance on delay variation

The suggested limit for the IPDV of access links (from TE to SBC) which have 384 kbit/s rates (lower than T1 or E1 rates which are covered in the body of the Recommendation) is as follows:

Table 1 – Limit on IPDV values of low rate links

Parameter	Value
Access network (sending side)	< 40 ms

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