International Telecommunication Union

ITU-T G.8261.1/Y.1361.1

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

Amendment 1

(05/2014)

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Packet over Transport aspects – Synchronization, quality and availability targets

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

Internet protocol aspects – Transport

Packet delay variation network limits applicable to packet-based methods (Frequency synchronization)

Amendment 1: Revision to clause 8 on packet delay variation

Recommendation ITU-T G.8261.1/Y.1361.1 (2012) – Amendment 1

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Recommendation ITU-T G.8261.1/Y.1361.1

Packet delay variation network limits applicable to packet-based methods (Frequency synchronization)

Amendment 1

Revision to clause 8 on packet delay variation

Summary

Amendment 1 to Recommendation ITU-T G.8261.1/Y.1361.1 provides a revision of clause 8 (PDV network limit).

History

Edition	Recommendation	Approval	Study Group	Unique ID*
1.0	ITU-T G.8261.1/Y.1361.1	2012-02-13	15	11.1002/1000/11522
1.1	ITU-T G.8261.1/Y.1361.1 (2012) Amd. 1	2014-05-14	15	11.1002/1000/12190

* 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.

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Recommendation ITU-T G.8261.1/Y.1361.1

Packet delay variation network limits applicable to packet-based methods (Frequency synchronization)

Amendment 1

Revision to clause 8 on packet delay variation

1 Clause 8 (PDV network limit)

Replace clause 8 with the following:

8 PDV network limit

The packet delay variation network limit given in this clause represents the maximum permissible levels of packet delay variation at the interface C shown in Figure 3.

In general, these network limits are compatible with the minimum tolerance to packet delay variation that all PEC-S-F equipment are required to provide.

NOTE 1 – It should be recognized that, as a result of some network performance degradations, failure conditions, maintenance actions and other events the PDV network limits might not be met. During these exceptional infrequent conditions and for a short settling period afterwards the slave clock is not required to meet the performance objectives that are specified in [ITU-T G.8263]. The length of the required settling period is for further study.

NOTE 2 – The PEC embedded within the end application, as shown after the connection C2 in Figure 3 is for further study in [ITU-T G.8263].

Note that the PDV network limit specified in this clause assumes that the network equipment composing the hypothetical reference model generates a controlled amount of PDV. It is known that some network equipment may generate excessive PDV and may potentially exceed these PDV network limits. What constitutes a controlled amount of PDV, how to determine if network equipment is suitable for consideration in the hypothetical reference models defined in this Recommendation, or in a reduced hypothetical reference model, as well as how to evaluate the level of PDV generated by network equipment, is for further study.

8.1 HRM-1 network limit

8.1.1 Network limit

The packet delay variation network limit at point C of Figure 3 for the HRM-1 shown in Figure 1 is defined as follows:

With window interval W = 200 s and fixed cluster range δ = 150 µs starting at the floor delay, the network transfer characteristic quantifying the proportion of delivered packets that meet the delay criterion should satisfy:

$$\text{FPP}(n, W, \delta) \geq 1\%$$

That is, the floor packet percentage must exceed 1%.

This means that for any window interval of 200 s at least 1% of transmitted timing packets will be received within a fixed cluster, starting at the observed floor delay and having a range of 150 µs.

NOTE 1 – The selection method (using sliding, overlapping or jumping windows) applicable to the network limit specified in this Recommendation is for further study.

NOTE 2 – The number of packets received within the fixed cluster range depends on the nominal packet rate. For example, with a nominal packet rate of one packet per second, FPP > 1% implies that two or more packets will be received within the fixed cluster range in each 200 s interval. The number of packets in a selection window is important for considering the tolerance limit of a slave clock.

For more details on the measurement methodology refer to clause I.5 of [ITU-T G.8260].

This network limit can be applied independently on the forward or the reverse direction of a packet timing flow. Consideration of the combined effect of both directions is for further study.

Other PDV metrics emulating the behaviour of a packet slave clock are currently under study and might be used in the future for specifying the PDV network limits in a less conservative way. Some information can be found in clause I.4 of [ITU-T G.8260].

NOTE 3 – A packet slave clock tolerating this PDV limit is defined in [ITU-T G.8263].

8.1.2 Networks with lower packet delay variation

Clause 8.1.1 specifies the network limit for HRM-1. Many HRM-1 networks may exhibit much lower packet delay variation than indicated by this limit and therefore it is considered very conservative. For instance, some measurements on HRM-1 networks show that FPP (n, W, δ) $\geq$ 1% is respected when considering δ = 75 µs.

This corresponds to a scenario where the PDV generated by the traffic carried over the network is engineered according to certain rules for transport networks. The rules to meet this network performance are for further study. Nevertheless, networks that are designed to meet the requirement specified in clause 8.1.1 need not be changed.

To accommodate exceptional conditions (e.g., infrequent congestion (overload) of multiple links simultaneously), the FPP (n, 200, 75 µs) may not be met within the following constraints when:

– there are no more than 4 periods over a 24 hour duration where there are less than 1% of packets within the 75 µs FPP cluster range (these are termed "congestion periods");

– there are at least 900 seconds between the end of a congestion period and the start of the next congestion period; and

– an individual congestion period does not exceed 200 seconds in length; and

– the PDV network limit of HRM-1 is still satisfied during all periods of the measurement, including during the periods of congestion (i.e., FPP(n,200,150 µs) > =1%).

It is the responsibility of the operator to decide if its network fits within this scenario.

NOTE – A packet slave clock optimized for these networks but not tolerating the PDV limits defined in clause 8.1.1 is for further study

8.2 HRM-2 network limit

The packet delay variation network limits for the HRM-2 are for further study. For HRM-2, different limits may apply, and may use different metrics.

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