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

Packet over Transport aspects – Synchronization, quality
and availability targets

SERIES Y: GLOBAL INFORMATION
INFRASTRUCTURE, INTERNET PROTOCOL ASPECTS,
NEXT-GENERATION NETWORKS, INTERNET OF
THINGS AND SMART CITIES

Internet protocol aspects – Transport

Timing characteristics of telecom transparent clocks for use with full timing support from the network

Recommendation ITU-T G.8273.3/Y.1368.3



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Recommendation ITU-T G.8273.3/Y.1368.3

Timing characteristics of telecom transparent clocks for use with full timing support from the network

Summary

Recommendation ITU-T G.8273.3/Y.1368.3 defines the minimum requirements for telecom transparent clocks (T-TCs). These requirements apply under normal environmental conditions specified for the equipment.

This Recommendation includes: clock accuracy, noise generation, noise tolerance, noise transfer, and transient response for T-TCs.

History

Edition	Recommendation	Approval	Study Group	Unique ID*
1.0	ITU-T G.8273.3/Y.1368.3	2017-10-07	15	11.1002/1000/13327
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PTP, phase and time synchronization, telecom profile, transparent clock.

* 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.8273.3/Y.1368.3

Timing characteristics of telecom transparent clocks for use with full timing support from the network

1 Scope

This Recommendation specifies minimum requirements for time and phase synchronization devices used in synchronizing network equipment, which operates in the network architecture as defined in [ITU-T G.8271] and [ITU-T G.8275]. It supports time and/or phase synchronization distribution for packet-based networks. The telecom transparent clock (T-TC) must be operating in end-to-end transparent clock (TC) mode.

This Recommendation assumes operation within the framework specified in [ITU-T G.8273], and that the physical layer reference chain behaviors given in [ITU-T G.803] and [ITU-T G.8261] are followed. It is also assumed that the network limits given in [ITU-T G.8271.1] are met and that the profile given in [ITU-T G.8275.1] is applied.

This Recommendation allows for proper network operation when a network equipment clock is timed from another network equipment clock or a higher quality clock.

This Recommendation defines the minimum requirements for transparent clocks. These requirements apply under normal environmental conditions specified for the equipment.

Guidelines for testing are described in Appendix I.

For T-TC classes A and B, this version of the Recommendation focuses on synchronized T-TCs with frequency reference provided by the physical layer based on [ITU-T G.8262] Option 1 (and [ITU-T G.813] Option 1 as the requirements are identical). [ITU-T G.8262] Option 2 and [ITU-T G.813] Option 2 are for further study. A T-TC without a frequency reference provided by the physical layer is for further study. [ITU-T G.8262.1] is a higher accuracy clock compared to [ITU-T G.8262], therefore it can also be used for T-TC classes A and B.

For T-TC class C, this version of the Recommendation focuses on synchronized T-TCs with frequency reference provided by the physical layer based on [ITU-T G.8262.1].

NOTE 1 – This Recommendation does not modify the physical layer reference chain behaviour, according to [ITU-T G.803] and [ITU-T G.8261]. This Recommendation does not exclude the use of other physical layer clocks (e.g., [ITU-T G.812] Type I) within the frequency transport network. The equipment specification of a T-TC assisted by a physical layer equipment clock, other than [ITU-T G.8262] Option 1 and [ITU-T G.8262.1], such as [ITU-T G.812] Type I, is for further study.

NOTE 2 – This version of the Recommendation was developed based on the hypothetical reference model (HRM) defined in clause II.2 of [ITU-T G.8271.1]. The use of T-TCs for more stringent network limits than that of accuracy level 4 in Table 1 of [ITU-T G.8271] is for further study.

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 G.703] Recommendation ITU-T G.703 (2016), *Physical/electrical characteristics of hierarchical digital interfaces*.

- [ITU-T G.781] Recommendation ITU-T G.781 (2020), *Synchronization layer functions for frequency synchronization based on the physical layer.*
- [ITU-T G.803] Recommendation ITU-T G.803 (2000), *Architecture of transport networks based on the synchronous digital hierarchy (SDH).*
- [ITU-T G.810] Recommendation ITU-T G.810 (1996), *Definitions and terminology for synchronization networks.*
- [ITU-T G.812] Recommendation ITU-T G.812 (2004), *Timing requirements of slave clocks suitable for use as node clocks in synchronization networks.*
- [ITU-T G.813] Recommendation ITU-T G.813 (2003), *Timing characteristics of SDH equipment slave clocks (SEC).*
- [ITU-T G.8260] Recommendation ITU-T G.8260 (2020), *Definitions and terminology for synchronization in packet networks.*
- [ITU-T G.8261] Recommendation ITU-T G.8261/Y.1361 (2019), *Timing and synchronization aspects in packet networks.*
- [ITU-T G.8262] Recommendation ITU-T G.8262/Y.1362 (2018), *Timing characteristics of a synchronous equipment slave clock.*
- [ITU-T G.8262.1] Recommendation ITU-T G.8262.1/Y.1362.1 (2019), *Timing characteristics of an enhanced synchronous equipment slave clock.*
- [ITU-T G.8264] Recommendation ITU-T G.8264/Y.1364 (2017), *Distribution of timing information through packet networks.*
- [ITU-T G.8271] Recommendation ITU-T G.8271/Y.1366 (2020), *Time and phase synchronization aspects of telecommunication networks.*
- [ITU-T G.8271.1] Recommendation ITU-T G.8271.1/Y.1366.1 (2020), *Network limits for time synchronization in packet networks with full timing support from the network.*
- [ITU-T G.8273] Recommendation ITU-T G.8273/Y.1368 (2018), *Framework of phase and time clocks.*
- [ITU-T G.8275] Recommendation ITU-T G.8275/Y.1369 (2020), *Architecture and requirements for packet-based time and phase distribution.*
- [ITU-T G.8275.1] Recommendation ITU-T G.8275.1/Y.1369.1 (2020), *Precision time protocol telecom profile for phase/time synchronization with full timing support from the network.*

3 Definitions

3.1 Terms defined elsewhere

Definitions related to synchronization are contained in [ITU-T G.810] and [ITU-T G.8260].

3.2 Terms defined in this Recommendation

None.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

cTE	Constant phase/Time Error
dTE	Dynamic Time Error