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TELECOMMUNICATION
STANDARDIZATION SECTOR
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G.8272.1/Y.1367.1

Amendment 1
(08/2017)

**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 enhanced primary
reference time clocks**

Amendment 1

**Recommendation ITU-T G.8272.1/Y.1367.1 (2016) –
Amendment 1**

ITU-T G-SERIES RECOMMENDATIONS

TRANSMISSION SYSTEMS AND MEDIA, DIGITAL SYSTEMS AND NETWORKS

INTERNATIONAL TELEPHONE CONNECTIONS AND CIRCUITS	G.100–G.199
GENERAL CHARACTERISTICS COMMON TO ALL ANALOGUE CARRIER-TRANSMISSION SYSTEMS	G.200–G.299
INDIVIDUAL CHARACTERISTICS OF INTERNATIONAL CARRIER TELEPHONE SYSTEMS ON METALLIC LINES	G.300–G.399
GENERAL CHARACTERISTICS OF INTERNATIONAL CARRIER TELEPHONE SYSTEMS ON RADIO-RELAY OR SATELLITE LINKS AND INTERCONNECTION WITH METALLIC LINES	G.400–G.449
COORDINATION OF RADIOTELEPHONY AND LINE TELEPHONY	G.450–G.499
TRANSMISSION MEDIA AND OPTICAL SYSTEMS CHARACTERISTICS	G.600–G.699
DIGITAL TERMINAL EQUIPMENTS	G.700–G.799
DIGITAL NETWORKS	G.800–G.899
DIGITAL SECTIONS AND DIGITAL LINE SYSTEM	G.900–G.999
MULTIMEDIA QUALITY OF SERVICE AND PERFORMANCE – GENERIC AND USER-RELATED ASPECTS	G.1000–G.1999
TRANSMISSION MEDIA CHARACTERISTICS	G.6000–G.6999
DATA OVER TRANSPORT – GENERIC ASPECTS	G.7000–G.7999
PACKET OVER TRANSPORT ASPECTS	G.8000–G.8999
Ethernet over Transport aspects	G.8000–G.8099
MPLS over Transport aspects	G.8100–G.8199
Synchronization, quality and availability targets	G.8200–G.8299
Service Management	G.8600–G.8699
ACCESS NETWORKS	G.9000–G.9999

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



Recommendation ITU-T G.8272.1/Y.1367.1

Timing characteristics of enhanced primary reference time clocks

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Summary

Recommendation ITU-T G.8272.1/Y.1367.1 specifies the requirements for enhanced primary reference time clocks (ePRTC) suitable for time and phase synchronization in packet networks. It defines the error allowed at the time output of the ePRTC.

These requirements apply under the normal environmental conditions specified for the equipment.

Amendment 1 adds a reference, changes a bullet in clause 6.1 and replaces Annex A.

History

Edition	Recommendation	Approval	Study Group	Unique ID*
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Frequency synchronization, phase synchronization, primary reference clock, time synchronization.

* 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.

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Table of Contents

		Page
1	Scope.....	1
2	References.....	1
3	Definitions	2
4	Abbreviations and acronyms	2
5	Conventions	2
6	Time error, wander and jitter in locked mode	2
6.1	Time error in locked mode	2
6.2	Wander in locked mode	3
6.3	Jitter	5
7	Phase discontinuity	6
8	Transient response and holdover performance	6
8.1	Transient between time locked and frequency reference locked.....	6
8.2	Phase/time holdover based on local frequency reference during loss of phase/time input.....	6
9	Interfaces.....	7
9.1	Phase and time interfaces	7
9.2	Frequency interfaces.....	7
	Annex A – ePRTC autonomous primary reference clock requirements.....	9
	Appendix I – ePRTC functional model.....	10
	Appendix II – ePRTC holdover model	12
	II.1 General clock model.....	12
	II.2 Ideal holdover model	12
	II.3 ePRTC holdover performance characterization	13
	Bibliography.....	15

Recommendation ITU-T G.8272.1/Y.1367.1

Timing characteristics of enhanced primary reference time clocks

Amendment 1

Editorial note: This is a complete-text publication. Modifications introduced by this amendment are shown in revision marks relative to Recommendation ITU-T G.8272.1/Y.1367.1 (2016).

1 Scope

This Recommendation specifies the requirements for enhanced primary reference time clocks (ePRTC) suitable for time, phase and frequency synchronization in packet networks. These requirements apply under the normal environmental conditions specified for the equipment.

The ePRTC provides a reference time signal traceable to a recognized time standard (e.g., coordinated universal time (UTC)) and also a frequency reference. Compared to the primary reference time clock (PRTC) as defined in [ITU-T G.8272], the ePRTC is subject to more stringent output performance requirements and includes a frequency input directly from an autonomous primary reference clock. The performance of the autonomous primary reference clock for this particular application is specified in Annex A.

An ePRTC provides the reference signal for time, phase, and frequency synchronization for clocks within a network or section of a network. In particular, the ePRTC can also provide the reference signal to the telecom grand master (T-GM) within the network node where the ePRTC is located.

This Recommendation defines the ePRTC output requirements. The requirements for the ePRTC integrated with a T-GM clock are 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.810] Recommendation ITU-T G.810 (1996), *Definitions and terminology for synchronization networks*.

[ITU-T G.811] Recommendation ITU-T G.811 (1997), *Timing characteristics of primary reference clocks*.

[\[ITU-T G.811.1\] Recommendation ITU-T G.811.1 \(2017\), *Enhanced primary reference clock*.](#)

[ITU-T G.8260] Recommendation ITU-T G.8260 (2015), *Definitions and terminology for synchronization in packet networks*.

[ITU-T G.8271] Recommendation ITU-T G.8271/Y.1366 (2016), *Time and phase synchronization aspects of packet networks*.

[ITU-T G.8272] Recommendation ITU-T G.8272/Y.1367 (2015), *Timing characteristics of primary reference time clocks*.

3 Definitions

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

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

ePRTC	Enhanced Primary Reference Time Clock
FM	Frequency Modulation
GNSS	Global Navigation Satellite System
MTIE	Maximum Time Interval Error
NE	Network Equipment
PPS	Pulse Per Second
PRC	Primary Reference Clock
PRTC	Primary Reference Time Clock
PTP	Precision Time Protocol
SSU	Synchronization Supply Unit
T-GM	Telecom Grand Master
TDEV	Time Deviation
UTC	Coordinated Universal Time

5 Conventions

None.

6 Time error, wander and jitter in locked mode

The noise generation of an ePRTC is characterized by two main aspects:

- 1) the constant time error (time offset) at its output compared to the applicable primary time standard (e.g., UTC);
- 2) the amount of phase error (wander and jitter) produced at its output.

For characterization of the second aspect described above (phase error) the calculation of the maximum time interval error (MTIE) and the time deviation (TDEV) is useful.

Clause 6.1 defines the time error requirements applicable at the output of the ePRTC, which correspond to the combination of the two aspects described above (constant time error and phase error). No requirement is defined for the constant time error component taken alone, only when it is combined with the phase error.

Clauses 6.2 and 6.3 define the wander and jitter requirements applicable at the output of the ePRTC, which correspond to the second aspect described above (phase error).

The performance of the output of the combined ePRTC and T-GM function is for further study.