



INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

G.8275.2/Y.1369.2

Amendment 2

(03/2018)

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

Precision time protocol telecom profile for
phase/time synchronization
with partial timing support from the network

Amendment 2

CAUTION !

PREPUBLISHED RECOMMENDATION

This prepublication is an unedited version of a recently approved Recommendation. It will be replaced by the published version after editing. Therefore, there will be differences between this prepublication and the published version.

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications, information and communication technologies (ICTs). The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

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.

INTELLECTUAL PROPERTY RIGHTS

ITU draws attention to the possibility that the practice or implementation of this Recommendation may involve the use of a claimed Intellectual Property Right. ITU takes no position concerning the evidence, validity or applicability of claimed Intellectual Property Rights, whether asserted by ITU members or others outside of the Recommendation development process.

As of the date of approval of this Recommendation, ITU [had/had not] 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/>.

© ITU 2018

All rights reserved. No part of this publication may be reproduced, by any means whatsoever, without the prior written permission of ITU.

Amendment 2 to Recommendation ITU-T G.8275.2/Y.1369.2 (2016)

Precision time protocol telecom profile for phase/time synchronization with partial timing support from the network – Amendment 2

Summary

Amendment 2 to Recommendation ITU-T G.8275.2 (2016/06) provides the following updates:

- Added new acronym to clause 4: T-BC-A
- Added and replaced text in clause 5 related to addition of T-BC-A
- Added and replaced text in clause 6.2.3 related to T-BC-A addition and reference to “local time reference”, including changes to Table 1
- Changed text in clause 6.6
- Added references to T-BC-A in clauses 6.7.1 and 6.7.4
- Added T-BC-A reference and “local time reference” to clauses 6.7.6 and 6.7.7
- New material and edits to clause 6.8 including T-BC-A references
- Added references to T-BC-A in Appendix I and Appendix III
- Added “local time reference” to Appendix II
- Added and replaced material in Appendix IV
- New material added to Appendix V related to PTSF
- Added new Appendix VIII on PTSF-lossSync

Amendment 2 to Recommendation ITU-T G.8275.2/Y.1369.2 (2016)

Precision time protocol telecom profile for phase/time synchronization with partial timing support from the network – Amendment 2

1) Clause 4 Abbreviations and acronyms

Add the following abbreviation:

T-BC-A Assisted Partial-Support Telecom Boundary Clock

2) Clause 5 Conventions

Replace clause 5 with the following:

5 Conventions

Within this Recommendation, the following conventions are used: the term PTP refers to the PTP version 2 protocol defined in [IEEE 1588]. PTP messages used within this Recommendation are defined in [IEEE 1588] and are identified using italicized text.

The term telecom grandmaster (T-GM) refers to a device consisting of a grandmaster (GM) clock as defined in [IEEE 1588] and this Recommendation, with additional performance characteristics for further study.

The term partial-support telecom boundary clock (T-BC-P) refers to a device consisting of a boundary clock (BC) as defined in [IEEE 1588], with additional performance characteristics for further study. A T-BC-P may optionally have a local time reference (e.g., a PRTC or GNSS-based time source). The term assisted partial-support telecom boundary clock (T-BC-A) refers to a device consisting of a boundary clock (BC) as defined in [IEEE 1588] that is assisted by a local time reference (e.g., a PRTC or GNSS-based time source) as a primary source of time, with additional performance characteristics for further study.

NOTE – In comparing the operation of the T-BC-P having a local time reference and the T-BC-A, the T-BC-P may use either the PTP input or a local time reference (as described in Annex B of [G.8275]) as a primary source of synchronization. The T-BC-A is targeted for the APTS scenario described in [G.8271.2], where the PTP input is used only as a secondary source of synchronization to hold the time for up to 72 hours, and is not intended to use PTP as the primary timing source.

The term partial-support telecom transparent clock (T-TC-P) refers to a device consisting of a transparent clock (TC) as defined in [IEEE 1588], with additional performance characteristics for further study.

The term partial-support telecom time slave clock (T-TSC-P) refers to a device consisting of either an ordinary clock (OC), with one PTP port, or a boundary clock (BC), with multiple PTP ports, as defined in [IEEE 1588] and this Recommendation, that does not support providing synchronization using PTP to other PTP clocks in the PTP domain, and with additional performance characteristics

for further study. A T-TSC-P may optionally have a local time reference (e.g., a PRTC or GNSS-based time source).

The term assisted partial-support telecom time slave clock (T-TSC-A) refers to a T-TSC-P that is assisted by a local time reference (e.g., a PRTC or GNSS-based time source) as a primary source of time. Note: In the case of a T-TSC-A or T-TSC-P, with multiple PTP ports (BC), only one PTP port can be in PTP SLAVE state at any instant in time based on the BMCA. Other PTP ports not in the PTP SLAVE state may actively exchange synchronization messages with other PTP clocks populated in the unicast master table using unicast negotiation.

NOTE – In comparing the operation of the T-TSC-P having a local time reference and the T-TSC-A, the T-TSC-P may use either the PTP input or a local time reference (as described in Annex B of [G.8275]) as a primary source of synchronization. The T-TSC-A is targeted for the APTS scenario described in [G.8271.2], where the PTP input is used only as a secondary source of synchronization to hold the time for up to 72 hours, and is not intended to use PTP as the primary timing source.

The term primary reference time clock (PRTC) refers to the clock defined in [ITU-T G.8272]. The term enhanced primary reference time clock (ePRTC) refers to an enhanced version of the PRTC, which is being studied.

3) **Clause 6.2.3 Types of PTP clocks supported in the profile**

Replace clause 6.2.3 with the following:

6.2.3 Types of PTP clocks supported in the profile

The OC and BC according to [IEEE 1588] are used in this profile.

There are two types of OCs:

- 1) OC that can only be a grandmaster (T-GM according to the architecture defined in [ITU-T G.8275], and as included in [ITU-T G.8272]).
- 2) OC that can only be a slave, i.e., slave-only OC (T-TSC-P with only one port or T-TSC-A with only one port according to the architecture defined in [ITU-T G.8275]). The clock specifications for T-TSC-P and T-TSC-A are for further study.

There are three types of BCs:

- 1) BC that can only be a grandmaster (T-GM according to the architecture defined in [ITU-T G.8275], and as included in [ITU-T G.8272]).
- 2) BC that can become a grandmaster and can also be slaved to another PTP clock (T-BC-P and T-BC-A according to architecture defined in [ITU-T G.8275]). The clock specifications for the T-BC-P and T-BC-A are for further study.
- 3) BC that can only be a slave (T-TSC-P with more than one port or T-TSC-A with more than one port according to the architecture defined in [ITU-T G.8275]). The clock specifications for T-TSC-P and T-TSC-A are for further study.

NOTE – T-GM and GM are different concepts; GM is a status defined in [IEEE 1588] that a PTP clock may obtain if it wins the BMCA, while T-GM is a type of clock defined in the [ITU-T G.8275] architecture.

The mapping between these PTP clock types and the phase/time clocks defined in the [ITU-T G.8275] architecture is described in Table 1.

Table 1 – Mapping between [ITU-T G.8275.2] and PTP clock types

Clock type from [ITU-T G.8275.2]	Description	Clock type from [IEEE 1588]
T-GM	Master-only ordinary clock (master with a single PTP port, cannot be slaved to another PTP clock)	OC
	Master-only boundary clock (master with multiple PTP ports, cannot be slaved to another PTP clock)	BC (Note 1)
T-BC-P (partial)	Boundary clock (may become a GM, or may be slaved to another PTP clock)	BC
T-BC-A (assisted partial)	Boundary clock assisted by a local time reference that is used as a primary source of time (may become a GM, or may be slaved to another PTP clock)	BC (Note 2)
T-TSC-P (partial)	Slave-only, single port, ordinary clock (always a slave)	OC
	PTP clock at the end of the PTP synchronization chain, multiple port clock	BC (Note 1)
T-TSC-A (assisted partial)	Slave-only, single port, ordinary clock (always a slave) assisted by a local time reference that is used as a primary source of time	OC (Note 2)
	PTP clock at the end of the PTP synchronization chain, multiple port clock assisted by a local time reference that is used as a primary source of time	BC (Note 1) (Note 2)
NOTE 1 – According to [IEEE 1588], a clock that has multiple PTP ports is by definition a boundary clock.		
NOTE 2 – Examples of a <i>local time reference</i> : PRTC or GNSS-based time source.		

4) Clause 6.6 Unicast message negotiation

Replace the 5th paragraph of clause 6.6 with the following:

When initiating unicast negotiation with a grant-port, a request-port can use all 1's as the initial value for the targetPortIdentity field of the Signalling message. Based on the response from the grant-port, the request-port can then learn the clockIdentity and portNumber of the grant-port and may use this in any subsequent Signalling message. The request-port may also continue to use all 1's. Similarly, the grant-port may either learn and use the clockIdentity and portNumber of the request-port, or use all 1's value for the targetPortIdentity field of the Signalling messages that it sends. Both grant-port and request-port must be prepared to handle both situations in reception, i.e., receive PTP Signalling messages with either their own clockIdentity and portNumber or with all 1's values for the targetPortIdentity field. A request-port should stop using a previously learned clockIdentity and portNumber when the established unicast session either expires or is cancelled, and the request-port has exhausted the re-try process described in clause 6.6. As indicated above, when a unicast session is granted, a grant-port may use (a) all 1's, or (b) the clockIdentity and portNumber from the

sourcePortIdentity field of the received unicast session request, as the targetPortIdentity in the response.

5) **Clause 6.7.1 Alternate BMCA**

Replace the 5th paragraph of clause 6.7.1 with the following:

The default value and range of values for this attribute, for the ports of a BC that may or may not be a GM (i.e., T-BC-P or T-BC-A) are TRUE and {TRUE, FALSE}.

6) **Clause 6.7.4 Clock attribute priority2**

Replace clause 6.7.4 with the following:

6.7.4 Clock attribute priority2

In this PTP profile, the clock attribute priority2 is configurable.

It is initialized to a default value, equal for T-GM, T-BC-P, and T-BC-A clocks to the midpoint value, 128, of its range {0-255}. The default value for T-TSC-P and T-TSC-A clocks is 255, and the range is {255}.

A T-GM, T-BC-P, or T-BC-A compliant with this PTP profile must support all the values of priority2 defined in the range. A T-TSC-P or T-TSC-A compliant with this profile must support, on reception, all the values of priority2 defined in the full [IEEE 1588] range (i.e., {0-255}).

Appendix I describes possible use cases for the priority2 attribute; other cases are for further study.

7) **Clause 6.7.6 Clock attribute clockAccuracy**

Replace clause 6.7.6 with the following:

A PTP clock compliant with this PTP profile must support all the values of clockAccuracy upon reception (shall not discard) defined in the full [IEEE 1588] range. The values that can be transmitted in the clockAccuracy field are shown in Table A.1. The following values of the clock attribute clockAccuracy apply for the following situations:

- 0x20 for a T-GM connected to an ePRTC in locked-mode (i.e., e PRTC traceable to GNSS).
- 0x21 for a T-GM connected to a PRTC in locked-mode (i.e., PRTC traceable to GNSS).
- 0xFE for a T-BC-P or T-BC-A not connected to a local time reference that is traceable to GNSS in locked mode on a virtual PTP port.

The clockAccuracy for a T-BC-P or T-BC-A when connected to a local time reference that is traceable to GNSS in locked mode on a virtual PTP port is for further study.

8) **Clause 6.7.7 Clock attribute offsetScaledLogVariance**

Replace clause 6.7.7 with the following:

6.7.7 Clock attribute offsetScaledLogVariance

The following values of the clock attribute offsetScaledLogVariance apply for the following situations:

- 0x4B32 for a T-GM connected to an ePRTC in locked-mode (i.e., ePRTC traceable to GNSS). This corresponds to TDEV of 10 ns, at observation interval of 10000 seconds. The