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TELECOMMUNICATION
STANDARDIZATION SECTOR
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G.8275.2/Y.1369.2

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

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

Amendment 1

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.

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Amendment 1 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 1

Summary

Amendment 1 to Recommendation ITU-T G.8275.2 (2016/06) provides the following updates:

- Updated Scope and References
- Modified Clauses 6.6, 6.7.9, 6.7.11, 6.8, A.10
- Added Annex F *Mapping from PTP clockClass values to Quality Levels*
- Added Appendix III *PTP Monitoring Backup Scenario Example*
- Added Appendix IV *Description of PTP clock states and associated contents of Announce messages*
- Added Appendix V *BMCA cycling between masters*
- Added Appendix VI *Considerations of PTP over IP transport in ring topologies*

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Amendment 1 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 1

1) Clause 1 Scope

Replace Scope with the following:

This Recommendation specifies a profile for telecommunication applications based on IEEE 1588 precision time protocol (PTP). The profile specifies the IEEE 1588 functions that are necessary to ensure network element interoperability for the delivery of accurate phase/time (and frequency) synchronization. The profile is based on the partial timing support (PTS) from the network architecture as described in [ITU-T G.8275] and definitions described in [ITU-T G.8260].

It is assumed that this profile will be used in well-planned cases where network behaviour and performance can be constrained within well-defined limits, including limits on static asymmetry. Control of static asymmetries can be achieved in case of assisted partial timing support. Use of this profile in unassisted mode would require careful considerations on how to control static asymmetries. Additional considerations are included in [ITU-T G.8271.2]. This version of the profile specifies the high-level design requirements, modes of operation for the exchange of PTP messages, the PTP protocol mapping, the best master clock algorithm (BMCA) options, as well as the PTP protocol configuration parameters.

At the time of publication of this profile, performance analysis, network limits, and clocks used in the profile, namely boundary and slave clocks, are for further study.

This Recommendation also specifies some aspects necessary for use in a telecom environment that are outside the scope of the PTP profile, but complement it.

2) Clause 2 References

Add the following reference:

[ITU-T G.8271.2] Recommendation ITU-T G.8271.2/Y.1366.2 (2017), *Network limits for time synchronization in packet networks with partial timing support from the network*.

3) Clause 6.6 Unicast message negotiation

Replace the following paragraph from clause 6.6:

In the event of being denied service by a grant-port, or receiving no response to the service request:

- A request-port should wait a minimum of one second (after denial or no response received) before issuing a new unicast service request for that message type to the same grant-port.
- If a request-port has issued three service requests for the same message type with either no response or a "grant denied" response, it should either:
 - cancel any granted unicast service it may have for other message types, and request service from a different grant-port, or

- wait a further 60 seconds before re-issuing the request to the same grant-port.

with the following:

In the event of being denied service by a grant-port, or receiving no response to the service request:

- A request-port should wait a minimum of one second (after denial or no response received) before issuing a new unicast service request for that message type to the same grant-port.
- If a request-port has issued three service requests for the same message type with a "grant denied" response, it should either:
 - cancel any granted unicast service it may have for other message types, and request service from a different grant-port, or
 - wait a further 60 seconds before re-issuing the request to the same grant-port.

4) **Clause 6.7.9 Data set comparison algorithm**

Replace clause 6.7.9 with the following:

The data set comparison algorithm for the Alternate BMCA of the PTP profile specified in this Recommendation is given in Figures 3 and 4 below. With this algorithm, one clock is compared with another using the data sets representing those clocks, appended with the localPriority attribute. Details on the use of the algorithm are given in clause 9.3.4 of [IEEE 1588].

If either of the data sets, A or B, in Figures 3 and 4 contain the data of the parent clock or a foreign master clock, the corresponding localPriority for its data set is the localPriority of the local port r on which the information from that parent clock or foreign master clock has been received (see item (d) of clause 6.7.1).

If either of the data sets, A or B, in Figures 3 and 4 contain the data of the local clock, D₀, the corresponding localPriority for that data set is the localPriority of the local clock (see item (e) of clause 6.7.1).

NOTE 1 – It is recommended that the entire data set comparison algorithm described in Figures 3 and 4 be implemented even if some parameters are currently static, because they may be used in future versions of this Recommendation.

NOTE 2 – If portDS.SF is TRUE on port r, then the PTP port should set the respective Erbest to the empty set. As a result, the computation of Ebest will not use the information contained in any Announce messages received on the port r. Signal fail (SF) is described in clause 6.7.11.

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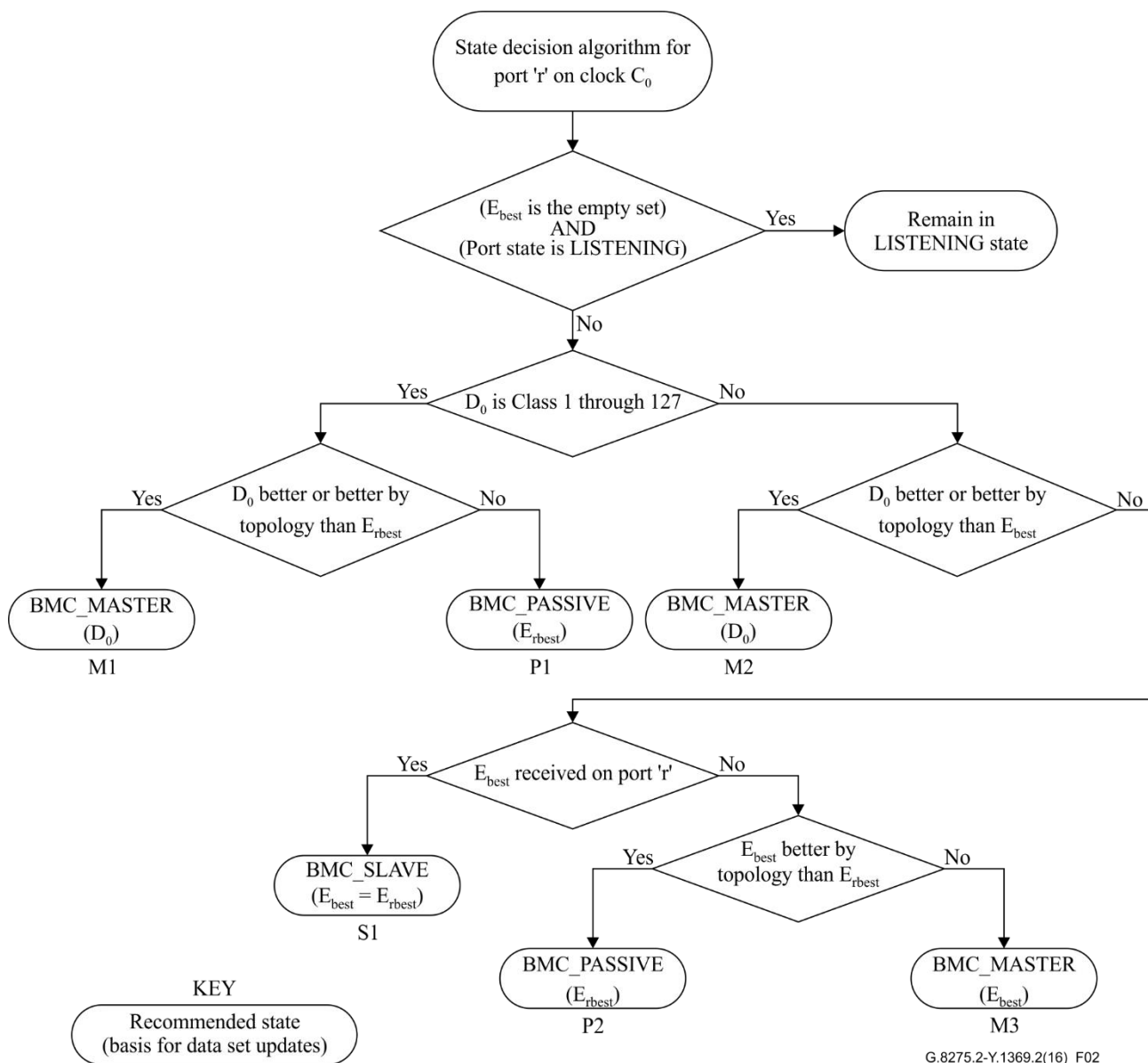


Figure 2 – State decision algorithm for Alternate BMCA

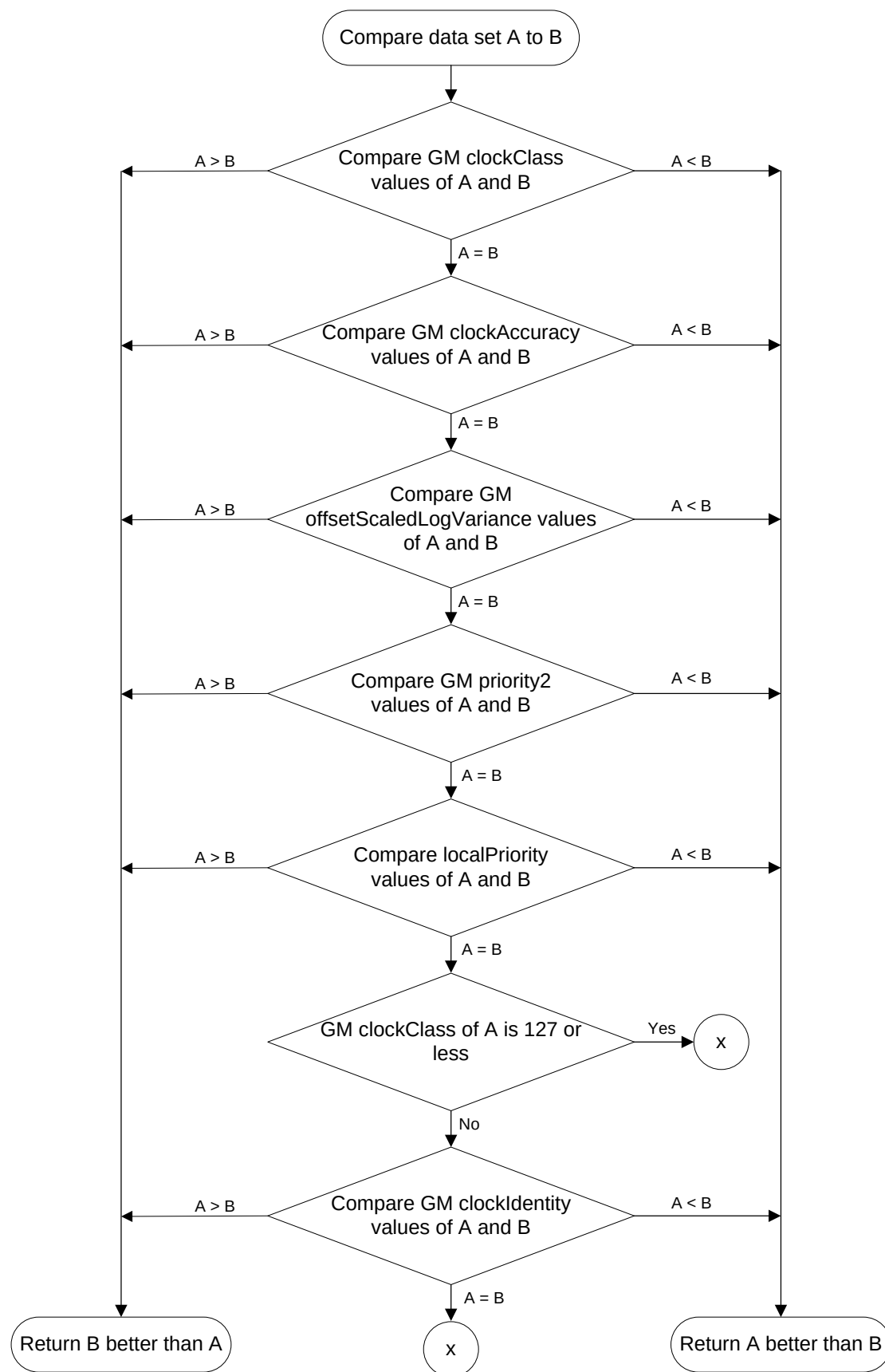


Figure 3 – Data set comparison algorithm, part 1, for Alternate BMCA

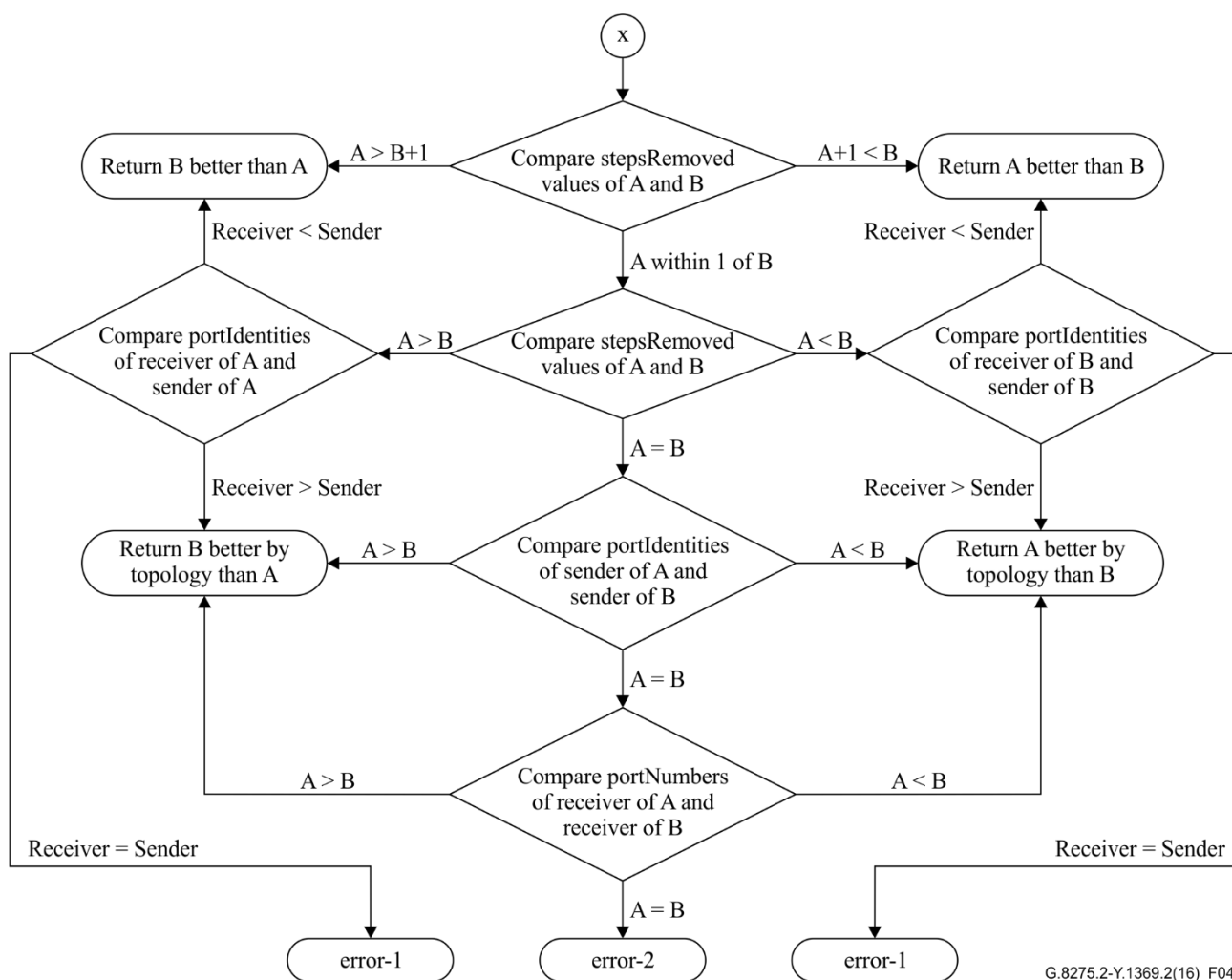


Figure 4 – Data set comparison algorithm, part 2, for Alternate BMCA

NOTE 3 – stepsRemoved used in the BMCA does not characterize or reflect the amount of packet delay variation (PDV) or asymmetry on a connection. The BMCA may not select the path with the lowest PDV or asymmetry.

5) Clause 6.7.11 Packet timing signal fail

Add the following note to the end of clause 6.7.11:

NOTE – See Appendix V for further information.

6) Clause 6.8 Phase/time traceability information

Add the following note to clause 6.8:

NOTE 3 – For the T-BC, the traceability information of the currently selected best master clock will be passed to the downstream nodes, as per PTP. This means that the attributes & flags in the PTP header will always reflect the phase/time traceability information from the current parent clock, regardless of the frequency traceability of the T-BC's physical layer clock. Failure scenarios including holdover are for further study.

Replace Table 3 with the following:

Table 3 – Mapping of [ITU-T G.781] clock QLs to Category 1, 2, 3 frequency sources

Category (in Table 2)	ITU-T G.781 Option I QLs	ITU-T G.781 Option II QLs
Category 1 frequency source	QL-PRC	QL-PRS
Category 2 frequency source	QL-SSU-A	QL-ST2
Category 3 frequency source	QL-SSU-B	QL-ST3E
NOTE – Other frequency source categories, while not used in Table 2, are possible. An example is a category containing QL-EEC1 and QL-EEC2.		

7) Clause A.10 PTP common header flags

Replace clause A.10 with the following:

The PTP common header flag values, and whether or not each flag is used in this profile, are given in Table A.6.

NOTE – Some of these flags are used only in certain PTP messages, and not in all the PTP messages, see [IEEE 1588] clause 13.3.2.6. The following rule defined in [IEEE 1588] clause 13.3.2.6, must be respected: "For message types where the bit is not defined in Table 20, the values shall be FALSE."

Table A.6 – PTP flags

Octet	Bit	Flag	Value to be sent	Behaviour for the receiving node
0	0	alternateMasterFlag	See clause 6.9 of this Recommendation	Used
0	1	twoStepFlag	As per PTP	Used
0	2	unicastFlag	TRUE	Used
0	5	PTP profile Specific1	FALSE	Flag is ignored
0	6	PTP profile Specific2	FALSE	Flag is ignored
0	7	Reserved	FALSE	Reserved by PTP and flag is ignored
1	0	leap61	As per PTP (Note 2)	Used
1	1	leap59	As per PTP (Note 2)	Used
1	2	currentUtcOffsetValid	As per PTP (Note 2)	Used (Note 3,4)
1	3	ptpTimescale	TRUE	Used
1	4	timeTraceable	See Table 2	Used
1	5	frequencyTraceable	See Table 2	Used
1	6	(Note 1)	(Note 1)	(Note 1)
NOTE 1 – An additional flag "synchronizationUncertain" has been defined in Annex E; the use of the "synchronizationUncertain" flag is optional.				
NOTE 2 – When a clock is in holdover, within holdover specification, the PTP clock may continue to advertise the last known leap second event. If there was no pending leap second				