

Maintenance Item #278 – Input Needed

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Introduction - 1

- Maintenance item #278 points out inconsistencies in 802.1AS-2020 regarding whether the (a) AnnounceIntervalSetting state machine, (b) SyncIntervalSetting state machine, and (c) LinkDelayIntervalSetting state machine are required or optional (they were required in 802.1AS-2011)
 - The maintenance item states that Clause 5 indicates that (a) is optional, (b) is optional in (stated in one place) and mandatory (stated in another place), and (c) is not mentioned; in contrast, the PICS indicates that all three are mandatory
 - The maintenance item states that they should be optional, in accordance with the resolution of Comment #92 against 802.1AS-Rev/D7.0
 - It is the recollection of the editor that the question of whether these should be required or optional was discussed at the time this comment was resolved; however, the final comment resolution document does not indicate that these state machines be made optional
 - The maintenance item proposed revision text makes all three state machines optional
 - In the initial discussion of maintenance item #278 in the Maintenance TG, it was indicated that more research was needed to determine how this item should be resolved
 - The editor has researched this issue, but is unable to determine whether it was decided to make these state machines optional
- This presentation summarizes the issues and requests input on how this should be resolved

Maintenance Item #278

□ Rationale for Revision

- Clause 5 and the PICS are inconsistent with respect to whether the support of the AnnounceIntervalSetting state machine and SyncIntervalSetting state machine are required or optional. Clause 5 indicates that these are optional [5.4.2 b) 3) and 5.4.2 h)], while the PICS indicates that these are mandatory (A.11, MIMSTR-1 and A.13, MDFDPP-5). In addition, the PICS entry A.11, MDFDPP-6 indicates that support of the LinkDelaySyncIntervalSetting state machine is mandatory, while there is no mention at all of this state machine in Clause 5. In fact, based on the resolution of Comment #92 against 802.1AS-Rev/D7.0, these should all be optional.

□ Proposed Revision Text

- In A.11, MIMSTR-1, change ‘M’ to ‘O’ under status, and add ‘No []’ under support. In A.13, MDFDPP5, change ‘M’ to ‘O’ under status, and add ‘No []’ under support. In A.13, MDFDPP6, change ‘M’ to ‘O’ under status, and add ‘No []’ under support. In 5.5 add a new item (i) (this is in the section under the text ‘An implementation of a PTP Instance with IEEE 802.3 MAC services to physical ports may:’): “Support the LinkDelayIntervalSetting state machine.”

□ Impact on Existing Networks

- There is no impact on existing networks. However, users who need these features will need to check that equipment they are considering obtaining supports the features, as they are now optional.

Current Cited Text in Clause 5

Note that only relevant text is shown below:

5.4.2 PTP Instance options

An implementation of a PTP Instance may:

- b) Support the following media-independent master capability on at least one PTP Port:
 - 1) Implement the PortSyncSyncSend state machine (10.2.12).
 - 2) Implement the PortAnnounceTransmit state machine (10.3.16).
 - 3) Implement the AnnounceIntervalSetting state machine (10.3.17).
 - 4) For transmit of the Announce message, support the message requirements as specified in 10.5,10.6, and 10.7.

- h) Implement the SyncIntervalSetting state machine (10.3.18).

5.5. MAC-specific timing and synchronization methods for full-duplex IEEE 802.3 links

An Implementation of a time-aware system with IEEE 802.3 media access control (MAC) services to physical ports shall:

- c) Implement the SyncIntervalSetting state machine (10.3.18).

Current Cited Text in Annex A (PICS)

A.11 Media-independent master

Item	Feature	Status	References	Support
	If MIMSTR not supported, mark N/A.			N/A []
MIMSTR-1	Does the PTP Instance implement the functionality of the <code>AnnounceIntervalSetting</code> state machine in compliance with the requirements of 10.3.17 and Figure 10-19 on each PTP Port?	MIMSTR:M	10.3.17	Yes []
MIMSTR-2	Does the PTP Instance implement the functionality of the <code>PortSyncSyncSend</code>	MIMSTR:M	10.2.9	Yes []

A.13 Media-dependent, full-duplex point-to-point link

Item	Feature	Status	References	Support
MDFDPP-1	Does this PTP Port implement the functionality of the <code>MDSyncReceiveSM</code>	MDFDPP:M	11.2.14	Yes []
MDFDPP-5	Does this PTP Port implement the functionality of the <code>SyncIntervalSetting</code> state machine in compliance with the requirements of 10.3.18 and Figure 10-20?	MDFDPP:M	10.3.18, item c) of 5.5, 10.3.18	Yes []
MDFDPP-6	Does this port implement the functionality of the <code>LinkDelayIntervalSetting</code> state machine in compliance with the requirements of 11.2.21 and Figure 11-11?	MDFDPP:M	11.2.21	Yes []
MDFDPP-7	Does this PTP Port timestamp <code>Sync</code>	MDFDPP:M	11.3.2.1	Yes []

Comment #92 against 802.1AS-Rev/D7.0 - final resolution - 1

Comment

802.1AS requires several "IntervalSetting" state machines that receive a Signaling message in order to change the interval for a transmitted message type (e.g. AnnounceIntervalSetting). Transmit of an "IntervalSetting" Signaling message was optional in AS-2011, and continues to be optional in AS-rev (no need to even mention in clause 5).

The commenter is confident of the following:

- 1) There are shipping products for AS-2011 that never transmit a Signaling message for "IntervalSetting".
 - 2) There are many networks with operational AS-2011 that never use the "IntervalSetting" feature anywhere in the network (i.e. no end-station or relay).
 - 3) Implementation and conformance testing of "IntervalSetting" for receive is burdensome.
- In other words, AS-2011 requires significant investment in a required feature that is never used in many networks. Therefore, for AS-rev we need to transition the "IntervalSetting" state machines from required to optional.

If we transition the "IntervalSetting" state machines from required to optional, the baseline requirement is the initial interval, which works fine for many networks. If desired, a product can also support the new "ManagementSettable" intervals specified in AS-rev. In the commenter's opinion, "ManagementSettable" is more practical and useful than "IntervalSetting".

Suggested Remedy

Make the following changes to clause 5, reflect these changes in the PICS, and confirm that "shalls" in the text are aligned (i.e. only initial interval is required):

- Page 32 line 29: Change "Implement the state machines related to signaling gPTP protocol capability (10.4);" to "Implement the state machines related to gPTP capability receive (10.4.1) and gPTP capability transmit (10.4.2);"
- Page 33 line 33: Add a new optional item "Implement the state machines related to gPTP capability interval setting (10.4.3);"
- Page 32 line 49: Move "Implement the AnnounceIntervalSetting state machine (10.3.16);" up one level in the list, so that it is a standalone optional item (not required as part of the master option).
- Page 34 line 5: Remove item c) (SyncIntervalSetting state machine). This state machine is already optional on 5.3.i), so removing it here makes it optional for full-duplex Ethernet.
- Page 34 line 14: Add a new optional item for full-duplex Ethernet, "Implement the LinkDelayIntervalSetting state machine (11.2.20);"

Comment #92 against 802.1AS-Rev/D7.0 - final resolution - 3

Response

ACCEPT IN PRINCIPLE.

There will be a choice for the rate to be changed via messaging or via management. For a given rate, it can be supported via management, Signaling messages, or both. If a rate is supported via Signaling, the algorithm discussed in conjunction with comments 54-57 applies. We will add PICS entries for the vendor to list the rates supported for Signaling and for management (one list and PICS entry for Signaling, and one list and PICS entry for management).

Note: In the pdf of the final comment resolution document, most of the last two lines of the response above were omitted. This appears to be due to a bug in the comment resolution tool, as the full text of the response is present in the MS Access data base.

Comment #54 against 802.1AS-Rev/D7.0 is reproduced on the following slides for information. Comments 55, 56, and 57 simply reference the response to comment 54, and therefore are not reproduced.

Comment

The current Announce Interval state machine does not change the message interval if the requested interval is not supported (i.e., the requested number is just too fast or too slow as the allowed range of numbers is still huge, even after the range was greatly reduced). This was not the AS-2011 use case intent of the a partner sending a speed up or slow down request that could be out of range (as all but a few numbers were defined to be in range but clearly they could not all be supported today or even in 20 years). The intent was to get a 'lock' as quickly as possible for a new node that may have just joined the network. Then slow the speed down as long as 'lock' was maintained. The slower than the base-line speed when 'locked' allows the CPU more cycles to speed up the gPTP messages for the next new link partner that just joined the network.

Suggested Remedy

To be able to interoperate with all link partners a speed up request that is out of range shall set the interval to the fastest speed currently supportable on the port. Likewise, a slow down request that is out of range shall set the interval to the slowest speed supported. This works with link partners that don't support rate changes (as they are optional in AS-2011 & these messages can simply be ignored). It also works to the maximum benefit a link partner can support without the requestor needing to know the max rate of its link partner. The maximum speed 'currently' supported allows a bridge to adjust its maximum speed based on the number of ports running gPTP and what speed they are currently running at. A balanced guaranteed maximum rate mode for all ports could be added with a managed object and some text. This allows for determinism in use cases where that is needed. The dynamic mode also has use cases and should be allowed. Two new signaling message codes could be created to indicate 'as fast as you can go' and 'as slow as you can go' works. But this approach does not support current AS-2011 implementations that already support this optional feature in AS-2011 as we don't know what codes these link partners use today.

Response

ACCEPT IN PRINCIPLE. Group 54, 55, 56, 57.

The state machine will be modified to adapt to supported rates.

Discussion - 1

- ❑ In accordance with the resolution of comments 54 – 57, the state machines were modified to adapt to the supported rates (i.e., as described in the suggested remedy, but also subject to subsequent comments against subsequent drafts)
- ❑ The resolution of comment #92 does not explicitly say that the state machines are optional
 - It does say that there will be a choice for the rate to be changed via messaging or management. Note that the state machines do allow for this.
 - However, it could be argued that if no rates can be changed via messaging, there is no need for the state machines (or, at least, they could be greatly simplified).
 - The PICS entries for the vendor to list the rates supported for Signaling and for management (one list and PICS entry for Signaling, and one list and PICS entry for management) apparently were not added.

Discussion - 2

- 5.4.2 (b) says that the media-independent master capability may be supported on at least one PTP Port
 - It then lists four items for this capability
 - It appears that the “may” applies to these four items as a group, i.e., supporting the media-independent master capability is optional, but if it is supported, it includes all four items
 - PICS item MIMSTR-1 in A.11 is mandatory, but under the condition that the media-independent master capability, MIMSTR, is supported
 - MIMSTR is listed in A.5 – Major capabilities (see next slide)
 - From A.5, MIMSTR is mandatory in the case of a PTP Relay Instance (BRDG) or Grandmaster PTP Instance (GMCAP), but both of these are optional, i.e., it is not required that a PTP Instance be a PTP Relay Instance or a Grandmaster PTP Instance
- Therefore, it seems that the PICS and Clause 5 actually are consistent with respect to the `AnnounceIntervalSetting` state machine; it is mandatory only if the optional media-independent master capability, MIMSTR, is supported
 - It is only required that MIMSTR be supported in the case of a PTP Relay Instance or a Grandmaster PTP Instance

Discussion - 3

□A.5 Major capabilities (cont.)

Item	Feature	Status	References	Support
DOM0	Does the time-aware system support a PTP Instance with domain number 0, in accordance with the requirements of 8.1?	M	item a) of 5.4, 8.1	Yes []
DOMADD	Does the time-aware system support one or more PTP Instances with domain number in the range 1 to 127?	O	item f) of 5.4.2, 8.1	Yes [] No []
MINTA	Does the PTP Instance support at least one PTP Port with minimal requirements?	M	10.2.13, item c) of 5.4, A.7	Yes []
BMC	Does the PTP Instance implement the best master clock algorithm?	M	10.2.13, item f) of 5.4, 10.3, A.9	Yes []
SIG	Does the PTP Instance transmit Signaling messages?	O	10.2.13, item e) of 5.4.2, 10.6.4, A.8	Yes [] No []
GMCAP	Is the PTP Instance capable of acting as a Grandmaster PTP Instance?	O	10.2.13, item c) of 5.4.2, 10.1.3, A.10	Yes [] No []
BRDG	Does the PTP Instance act as a PTP Relay Instance on two or more PTP Ports?	O	item d) of 5.4.2, 5.4.3	Yes [] No []
MIMSTR	Does the PTP Instance support media-independent master functionality on at least one PTP Port?	GMCAP or BRDG:M	item b) of 5.4.2, A.11	Yes [] N/A []
MIPERF	Does the PTP Instance support the	M	10.2.13,	Yes []

Discussion - 4

□A.5 Major capabilities

	QUESTION			
MIPERF	Does the PTP Instance support the performance requirements?	M	10.2.13, item j) of 5.4, A.12	Yes []
EXT	Does the PTP Instance support external port configuration?	O	item g) of 5.4.2, A.21	Yes [] No []
MDFDPP	Does the PTP Instance support media-dependent full-duplex point-to-point functionality on one or more PTP Ports?	O.1	5.5, Clause 11, A.6, A.13	Yes [] No []
MDDOT11	Does the PTP Instance support media-dependent IEEE 802.11 link functionality on one or more PTP Ports?	O.1	5.6, Clause 12, A.6, A.14	Yes [] No []
MDEPON	Does the PTP Instance support IEEE 802.3 Passive Optical Networking (EPON)?	O.1	5.7, Clause 13, A.6, A.15	Yes [] No []
MDGHN	Does the PTP Instance support media-dependent ITU-T G.hn functionality on one or more PTP Ports?	O.1	item b) of 5.8, 16.6.3, A.18	Yes [] No []
MDMOCA	Does the PTP Instance support media-dependent MoCA functionality on one or more PTP Ports?	O.1	item b) of 5.8, 16.6.2, A.17	Yes [] No []
MDCSN	Does the PTP Instance support media-	MDGHN or	5.8, Clause 16,	Yes [] No []

Discussion - 5

- ❑ 5.4.2 (h) says that the syncIntervalSetting state machine is optional in a PTP Instance (and the statement is not limited to any particular type of PTP Instance)
- ❑ However, 5.5(c) says that the syncIntervalSetting state machine is mandatory in a time-aware system with full-duplex IEEE 802.3 ports
 - Presumably, this statement actually applies to each PTP Instance in such a time-aware system
- ❑ PICS entry MDFDPP-5 is mandatory, but under the condition that the media-dependent full-duplex point-to-point functionality, MDFDPP, is supported on one or more ports
 - MDFDPP is optional
 - Note: Actually, MDFDPP is indicated as O.1; is this correct? In reality, a PTP Instance must have at least one gPTP Port, and that port can support any of the specified transports (full-duplex 802.3, 802.11, EPON, or CSN). See also the next slide
- ❑ Therefore, 5.5(c) and MDFDPP-5 are consistent with each other, but are not consistent with 5.4.2(h)

Discussion - 6

□ Additional point on the Note on the previous slide:

- A.6, item MAC-IEEE-802.3 MAC-IEEE-802.11 has the entry O:2
 - Is this correct (O:2 seems not to be defined in Annex A)

A.6 Media access control methods

Item	Feature	Status	References	Support
MAC-IEEE-802.3 MAC-IEEE-802.11	Which MAC methods are implemented in conformance with the relevant MAC standards?	O:2 O:2	11.1 12.1	Yes [] No [] Yes [] No []
MAC-1	Has a PICS been completed for each of the MAC methods implemented as required by the relevant MAC Standards?	M		Yes []
MAC-2	Do all the MAC methods implemented support the MAC Timing aware Service as specified?	M	Clause 11 Clause 12 Clause 13	Yes []

Discussion - 7

- ❑ PICS entry MDFDPP-6 (implementing the LinkDelayIntervalSetting state machine) is mandatory, but under the condition that the media-dependent full-duplex point-to-point functionality, MDFDPP, is supported on one or more ports
 - As indicated above, MDFDPP is optional
- ❑ However, the LinkDelayIntervalSetting state machine is not mentioned in Clause 5
 - Since it is mentioned in a PICS requirement, it should be mentioned in Clause 5

Request for Input/Information for Next Steps

- ❑ Input is requested on whether it was intended that the (a) AnnounceIntervalSetting state machine, (b) SyncIntervalSetting state machine, and (c) LinkDelayIntervalSetting state machine are required or optional (they were required in 802.1AS-2011)
 - It appears that, regardless of how this is resolved, inconsistencies need to be fixed
- ❑ Input is requested on how to fix the items of Clause 5 and Annex A described in this presentation
- ❑ Should this maintenance item be included in the 802.1AS corrigendum, or in the amendment 802.1ASdm?
- ❑ Is the notation O.1 and O:2 in the PICS correct? O:2 seems not to be defined; can more information be included in A.2 on this?