

Date: 17 April 2015

IEEE P1588 Working Group Liaison

To: Mr Michael Teener and Mr Jouni Korhonen

From: IEEE P1588 Working Group

Subject: Request to co-author liaison requesting a re-visit to the 802.3bf effort for high accuracy

Dear Mr Michael Teener, Mr Jouni Korhonen, members of 1904.3 and 802.1 TSN groups

The P1588 WG is intending to send a liaison to 802.3 requesting a re-visit to the 802.3bf effort for high accuracy. The expected result is potentially of interest to 1904.3 and 802.1 TSN. Therefore, we would like to invite both groups to co-author the liaison, providing relevant use cases and related requirements. A joint request to 802.3 from 1904.3, 802.1 TSN and 1588 is more likely to be successful. The following text is an initial draft of such a liaison. You are invited to modify it accordingly, adding text relevant to your use cases and requirements.

IEEE 802.3 provides Service Interface and Management Parameters to Support Time Synchronization Protocols at accuracy levels required by current applications (e.g. audio/video, as per IEEE 802.1AS 2012). The P1588 WG is considering adding optional specialized solutions to the next edition of IEEE 1588 to enable enhanced synchronization accuracy, including sub-ns accuracy of synchronization under specific conditions. Such a high degree of accuracy is required in scientific applications of IEEE 1588. Emerging applications such as Radio-over-Ethernet (IEEE1904.3), time transfer (GNSS backup), or Time Sensitive Networks (802.1 TSN) may also benefit from solutions allowing for better accuracy. It should also be noted that IEEE 802.11 is adding a fine timing measurement function, which can achieve a timestamp resolution of 100ps.

High accuracy requires precise knowledge of reception and transmission path delays to account for their asymmetries. Especially challenging is obtaining the actual delays introduced by the PHY with sub-ns levels of precision, including delays that change each time a link is established. A standardized way to obtain these high precision delay values can facilitate high accuracy synchronization in multi-vendor networks. Currently, custom methods and system-wide calibration are used to enable this high accuracy synchronization.

We believe that the facilities provided by IEEE 802.3 through the oTimeSync managed object and its attributes can be readily updated to meet high accuracy requirements. In particular, the enhancements could potentially include:

- Increased resolution of tx and rx max/min delay values provided by oTimeSync managed object (Clause 30.13), or provision for values of actual tx and rx delays with sufficient resolution and defined precision (e.g. 2^{-16} ns)
- Sufficiently detailed description of the delays to encourage compatible implementations
- Provision for delays that are constant but may change each time link is established, such as bit-slide (delay resulting from any bit-level misalignment between the clock signal recovered from the serial bit stream and the parallel word upon which the timestamp is generated).

IEEE 1588 requests that the IEEE 802.3 WG consider this issue as part of the ongoing work on Ethernet standardization and enhance the oTimeSync managed object and/or any other related mechanisms to enable support for high accuracy synchronization. Such an effort would be followed and supported by the P1588 WG, with Patrick Diamond serving as the liaison person between the two Working Groups.

On behalf of IEEE P1588 Working Group,

Sincerely,

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