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| **itu-old** | INTERNATIONAL TELECOMMUNICATION UNION | **COM 15 – LS 443 – E** |
| **TELECOMMUNICATIONSTANDARDIZATION SECTOR**STUDY PERIOD 2009-2012 |  |
| **English only****Original: English** |
| **Question(s):** | 13/15 |  |
| **LIAISON STATEMENT** |
| **Source:** | ITU-T Study Group 15 |
| **Title:** | Considerations of IEEE 1588-2008 Transparent Clock related to IEEE 802.1Q |
| **LIAISON STATEMENT** |
| **For action to:** | IEEE 802.1 Working Group |
| **For comment to:** | - |
| **For information to:** | - |
| **Approval:** | Agreed to at Study Group 15 meeting (Geneva, 10-21 September 2012) |
| **Deadline:**  | 15 January 2013 |
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ITU-T Study Group 15, Question 13 (Q13/15) would like to request assistance from the IEEE 802.1 Working Group in clarifying the use of IEEE 1588-2008 [2] Transparent Clocks (TCs) in conjunction with IEEE 802.1Q forwarding. Q13/15 is currently specifying a new IEEE 1588-2008 Precision Time Protocol (PTP) profile for the purpose of Time and Phase delivery. The first version of this profile is based on a chain of IEEE 1588 Boundary Clocks. The integration of the Transparent Clock in this profile may be considered for future versions of this document.

A Transparent Clock, as defined in IEEE 1588-2008, will modify the CorrectionField inside of a PTP header to record the residence time of the packet in a networking node while that node is bridging, forwarding, or routing that packet. This is the primary function of a Transparent Clock in order to reduce the uncertainty associated with the residence time of each packet. The PTP header may be carried directly in an 802.3 frame (IEEE 1588-2008 Annex F), a IPv4/UDP packet (IEEE 1588-2008 Annex D) or a IPv6/UDP packet (IEEE 1588-2008 Annex E).

The operation of a TC is shown in the below picture from IEEE 1588-2008.



Questions have been raised concerning an IEEE 1588-2008 Transparent Clock layer 2 bridge modifying the CorrectionField of Ethernet transported PTP frames without changing the Ethernet source MAC address. The question is if this operation is permitted by IEEE 802.1Q [1]. The original intent of the IEEE 1588-2008 standard was that a Transparent Clock will forward PTP event frames with no modifications except for the CorrectionField and FCS updates, however IEEE 1588-2008 does not mandate that.

Below is a partial extract of some information from IEEE 1588-2008 Interpretation Committee Question #1 that is relevant to this topic.

*In summary, PTP does not mandate that transparent clock must not override the source protocol address of PTP messages. If the source protocol address is modified, the experimental PTP security extension can not be used, and automatic discovery as detailed above or other similar features (outside the scope of PTP) that assume that transparent clocks are 'transparent' with regards to the protocol addresses must be implemented with care.*

*Writers of PTP profiles are encouraged to highlight any 'non-transparent' modifications of the transport layer fields performed by the transparent clocks designed to the profile.*

Of particular note in the interpretation is that the changing of the source protocol address will affect some functionality of the PTP protocol, when using the Annex F mapping. This primarily relates to the operation of some automatic discovery and negotiation mechanisms known as acceptable master table and unicast master table. Experimental PTP security extensions are not used and are not currently considered in Q13/15.

Q13/15 has a number of questions and points for clarification that it gratefully requests the IEEE 802.1 Working Group to answer, as we review the options for TC operation, to either update or not update the source MAC address:

1. If the PTP layer of the TC is above the MAC relay and the higher- layer entities of the bridge, does IEEE 802.1Q [1] require that the source MAC address of a frame sent by the TC that contains a PTP message be the MAC address of the port of the TC on which the frame is sent? [The case where the PTP layer of the TC is above the MAC relay and the higher-layer entities of the bridge is shown in Figure 1.]
2. Is the source MAC address of this frame allowed to be the MAC address of the port of the upstream boundary clock or ordinary clock where the timing information originates? [The case where the PTP layer of the TC is above the MAC relay and the higher-layer entities of the bridge is shown in Figure 1.]



**Figure 1**

1. Would it be compliant to forward a frame thorough the normal MAC relay function but update the CorrectionField and the FCS without any other modification of the frame? [In this case, the PTP processing done by the TC (including the updating of the correctionField) is done in the MAC relay, rather than in a PTP layer that is above the Higher Layer Entities.]
2. Does the IEEE 802.1 Working Group have an alternate proposal or possibilities that would be compliant with IEEE 802 specifications, such as MAC relay service function, that may support IEEE 1588-2008 Transparent Clock functionality, and whether such proposal relates to current or planned specifications or specification revisions?

**References**

[1] IEEE Std 802.1Q-2011, *IEEE Standard for Local and Metropolitan area Networks: Virtual Bridged Local Area Networks*, 2005

[2] IEEE Std 1588-2008, *IEEE Standard for a Precision Clock Synchronization Protocol for Networked Measurement and Control Systems*, July 2008

[3] Interpretation request/response #1 to IEEE 1588 Working Group, <http://standards.ieee.org/findstds/interps/1588-2008.html>

[4] IEEE Std C37.238™-2011, *IEEE Standard Profile for Use of IEEE 1588™ Precision Time Protocol in Power System Applications*, July 2011

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