IEEE 802.1 Working Group Liaison Communication

Source: IEEE 802.1 Working Group

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Subject: Liaison Response to ITU-T Study Group 15 Question 13 from IEEE 802.1 (re: OLS 443)

From: Tony Jeffree – Chair, IEEE 802.1 Working Group (tony@jeffree.co.uk)

Approval: **Proposed** at IEEE 802.1 Plenary meeting, San Antonio, TX November 2012

Dear Mr. Ferrant and members of ITU-T Study Group 15 Question 13,

The IEEE 802.1 Working Group thanks you for your liaison on "IEEE 1588™-2008 Transparent Clock."

IEEE 802.1Q makes a number of assumptions about the proper behavior of networks that follow the ISO layering model. Therefore, there are many actions that are not specifically prohibited by 802.1Q, but which if taken, would violate the underlying assumptions made by many standards, including 802.1Q. The deployment of protocols violating these assumptions might be possible in the short term, but in the long term, their existence would severely restrict the ability of standards to continue to add new capabilities. Rigorous adherence to layering principles is fundamental to the continued growth of networking. For this reason, 802.1 is supplying a more extensive reply to your liaison than simply supplying direct answers to your specific questions.

IEEE Std 802.1 Q™-2011 does not specify an "IEEE 1588-2008 Transparent Clock layer 2 bridge." The 802.1Q relay function does not interpret header fields following the Ethertypes for IPv4 or IPv6, nor for PTP over Ethernet, and forwards the MSDU (payload) of frames without modification.

Q1: "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?

A1: The SA of the frame should be the MAC address of the port. Transmitting a frame with another SA disrupts the learning and filtering mechanisms of 802.1Q bridges.

Q2: "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?

A2: See Answer 1 for dangers of this. Using the SA of the transmitting port is in line with the 802.1 architecture.

Q3: "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?

A3: No, this would not be compliant because 802.1Q does not specify such behaviour.

Q4: "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?"

A4: 802.1 discussed this issue at its November plenary meeting. Discussion topics included modeling the behavior using higher-layer entities and modifying the forwarding behavior of the bridge. Modification of the correction field, if made in the 802.1Q MAC Relay function, is not inconsistent with the 802.1Q architecture; however, for this to be a solution it would need to be specified in 802.1Q. If Q13 decides to model the Transparent Clock using the higher-layer entities of the bridge, 802.1 recommends a solution that is perfectly clean from a layering point of view for the Ethernet multicast encapsulation described in Annex F of IEEE Std 1588. You:

- use the address of the port as the source address;
- use one of the two multicast addresses listed in Annex F of IEEE Std 1588. If using the 01-1B-19-00-00-00 address, then install a static filtering entry in the filtering database, so that frames with this destination MAC address will not be forwarded by the data plane;
- do not send the frame out on ports which are blocked by RSTP;
- use fields in the PTP message to identify the master clock, as opposed to using the source MAC address.

This does not mean that other clean solutions do not exist; only that the committee has examined this solution and agrees that it is viable.

Further contributions are anticipated on this topic. The next opportunity for 802.1 to discuss this is at our interim meeting in Vancouver, January 13-16, 2013. We look forward to such continuing cooperation with ITU-T SG15 Question 13 on this topic in the future.

Sincerely,

Tony Jeffree
Chair, IEEE 802.1 Working Group