Correction of Peer Delay Measurement for Frequency Offset of Responder Relative to Requestor

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IEEE 802.1 AVB TG
2008.09.15

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Comment #24 of the initial 802.1AS D4.0 comments indicates that the multiplication by neighborRateRatio $r$ should be a division in Eq. (11-2), given that $r$ is defined as the ratio of the rate of the responder to that of the requester.

Eq. (11-2) in D4.0 is:

$$\text{mean} - \text{propagation} - \text{delay} = \frac{(t_4 - t_1) - r \cdot (t_3 - t_2)}{2}$$

According to comment #24, this equation should read

$$\text{mean} - \text{propagation} - \text{delay} = \frac{(t_4 - t_1) - (t_3 - t_2) / r}{2}$$

The purpose of this presentation is to derive the correct form for this equation (i.e., with the division by $r$)
Timing of Pdelay Message Send and Receive Events

$T_1$, $T_2$, $T_3'$, $T_4'$

$D = D(1 + y)$

$\rho = \text{propagation delay (assumed symmetric) relative to Pdelay Requestor}$

$\rho(1 + y) = \text{propagation delay (assumed symmetric) relative to Pdelay Responder}$

$D = \text{turnaround time (assumed symmetric) relative to Pdelay Requestor}$

$D(1 + y) = \text{turnaround time (assumed symmetric) relative to Pdelay Responder}$

Frequency offset of Pdelay Responder relative to Pdelay Requestor: $y = \Delta f / f$

Rate ratio of Pdelay Responder relative to Pdelay Requestor: $r = 1 + y$
The propagation delay is given by

\[ p = T_2 - T_1 = T_4 - T_3 \]

Then

\[
p = \frac{(T_2 - T_1) + (T_4 - T_3)}{2} = \frac{(T_4 - T_1) - (T_3 - T_2)}{2}
\]

The turnaround time \( D \) is given by

\[ D = T_3 - T_2 = \frac{T_3' - T_2'}{1 + y} = \frac{T_3' - T_2'}{r} \]

Then

\[ D = \frac{(T_4 - T_1) - (T_3' - T_2')}{2}/r \]
The final equation on the previous slide is the desired result.

With the notation of the figure of slide 3, the primed quantities denote the time relative to the Pdelay responder.