

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

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# Introduction

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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:

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

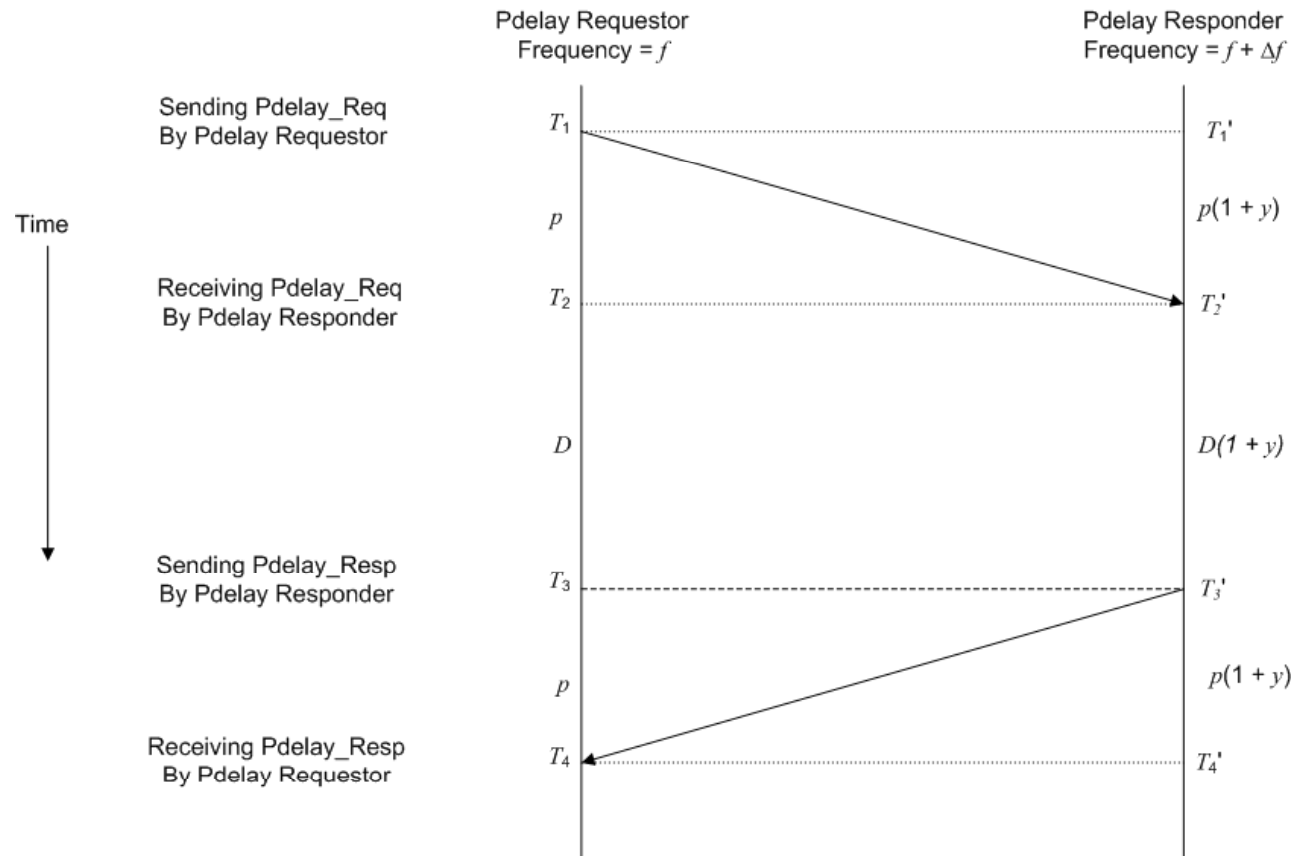
- ❑ According to comment #24, this equation should read

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

- ❑ 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

Times of various events, relative to the Pdelay Requestor and Pdelay Responder



$p$  = propagation delay (assumed symmetric) relative to Pdelay Requestor  
 $p(1+y)$  = propagation delay (assumed symmetric) relative to Pdelay Responder  
 $D$  = turnaround time (assumed symmetric) relative to Pdelay Requestor  
 $D(1+y)$  = 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:  $r = 1 + y$

# Derivation of Propagation Delay - 1

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□ 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

$$D = \frac{(T_4 - T_1) - (T_3' - T_2')}{2} / r$$

# Derivation of Propagation Delay - 2

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- 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