Partner clock calibration protocol for Event-based synchronization

802.1AS Timing and Synchronization for Time-Sensitive Applications in Bridged Local Area Networks

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Link partner exchange of LocalSync frames
Partner clock calibration using LocalSync data (view at device A)

Rate computation

$$\text{yourRate} = \frac{ET_{A,MA0} - ET_{A,MA1}}{IT_{B,MA0} - IT_{B,MA1}}$$

Roundtrip delay computation

$$\text{roundTrip} = (ET_{B,MB1} - IT_{B,MA1}) \times \text{yourRate} + IT_{A,MB1} - ET_{A,MA1}$$

Epoch difference computation

$$\delta \text{Epoch} = IT_{A,MB1} - \text{roundTrip} / 2 - ET_{B,MB1} \times \text{yourRate} + R_B \times (\text{yourRate} - 1)$$

Timescale conversion formula

$$T_A = (T_B - R_B) \times \text{yourRate} + R_B + \delta \text{Epoch}$$
Forwarding of EventTime protocol frames by 802.1AS bridge

\[ T_E = (T_E - R_B) \times yourRate + R_B + deltaEpoch \]

Conversion parameters \( yourRate \) and \( deltaEpoch \) are maintained by lower level media-dependent 802.1AS partner clock calibration protocol exchanging LocalSync frames.

No change at egress.

EventTime frame payload:
- DA
- SA
- EtherType
- SubType
- \( T_E \)
- EventType
- GrandTime
- Precedence

No ingress/egress timestamps.