

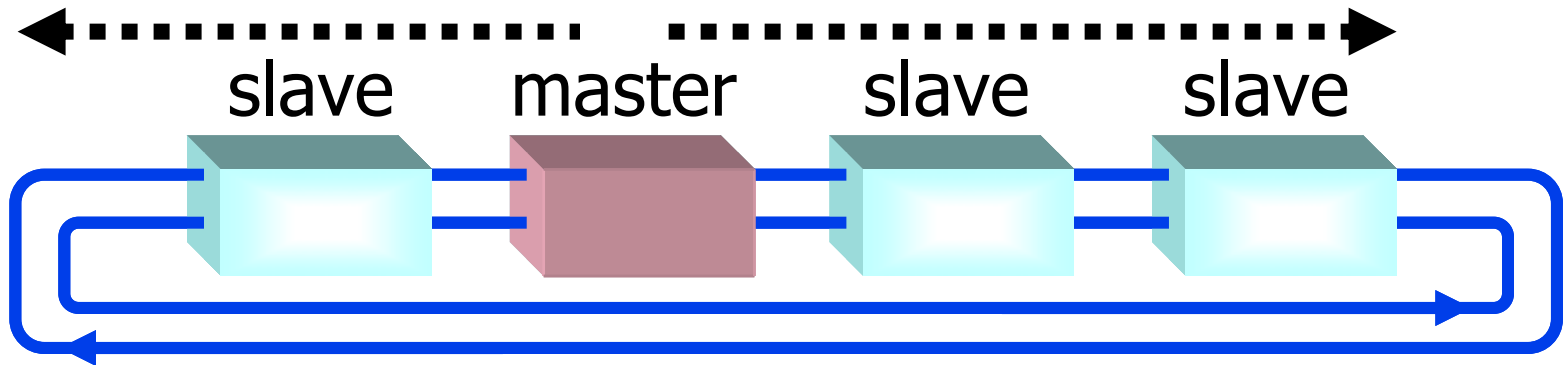
RPR time synchronization

- Prepared for 802.17, Nov 2002
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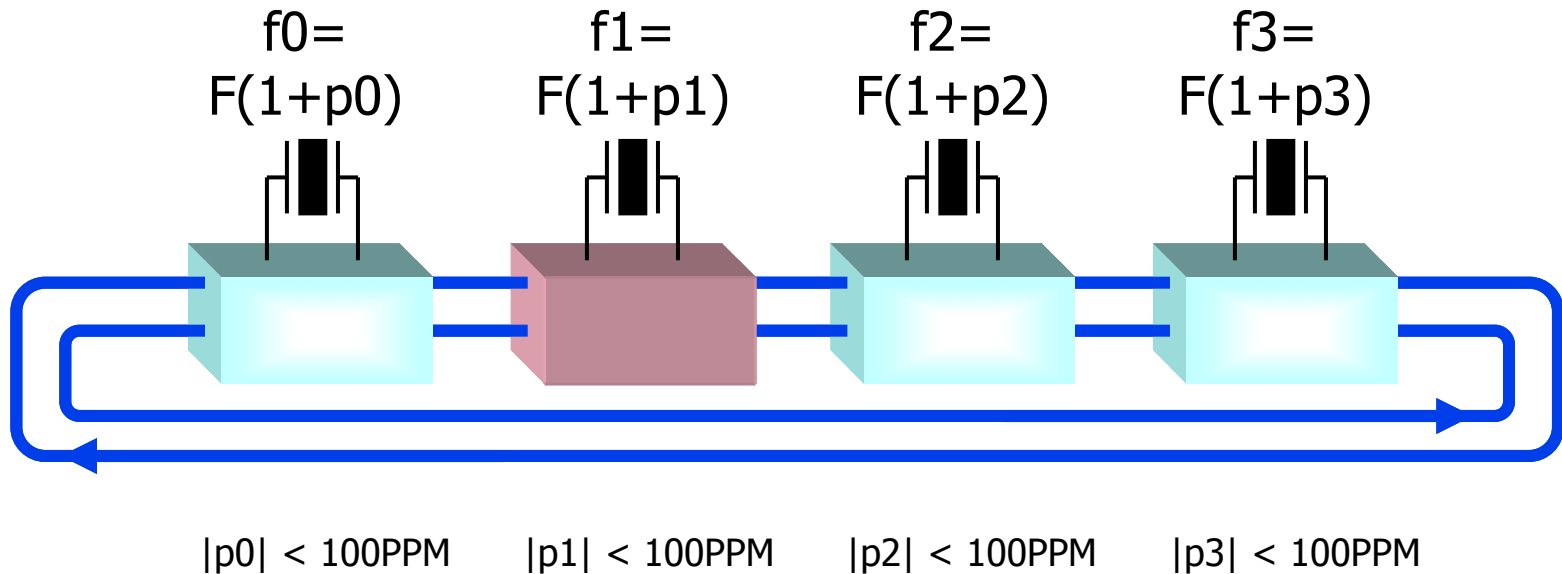
Motivation

- **PHY-provided STRATUM clocks cannot be ensured**
- **High accuracy time references are needed:**
 - **TDM traffic forwarding (fixed RPR delay)**
 - **inputRate!=outputRate → deletions or insertions**
 - **Diagnostic time stamps → MTU resolution required**
 - **Digital audio → phase differences between speakers**
- **Client-based protocols induce buffer-time ambiguities**
 - **Easily > ~10us**
- **Software-based protocols induce interrupt-ambiguities**
 - **Easily > ~1ms**

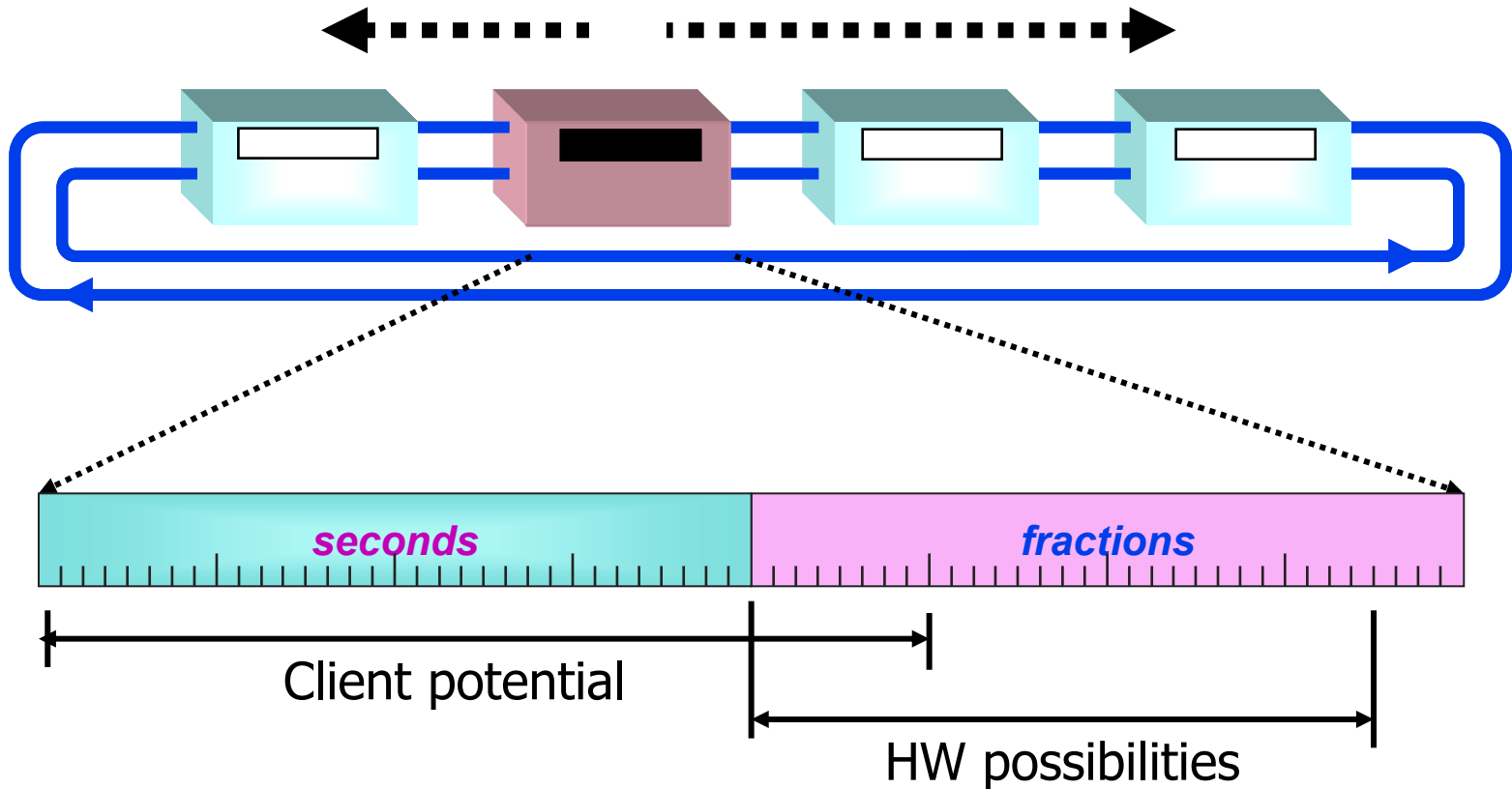
Time-of-day master and slaves



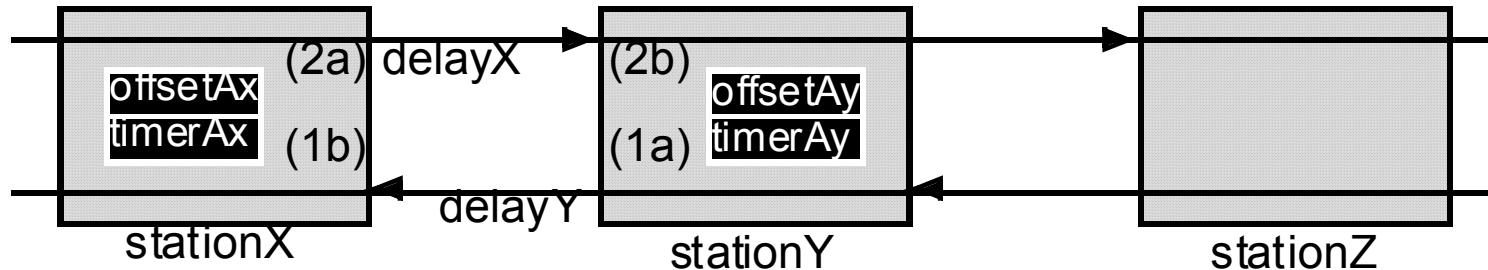
This is not bit-clock synchronization!



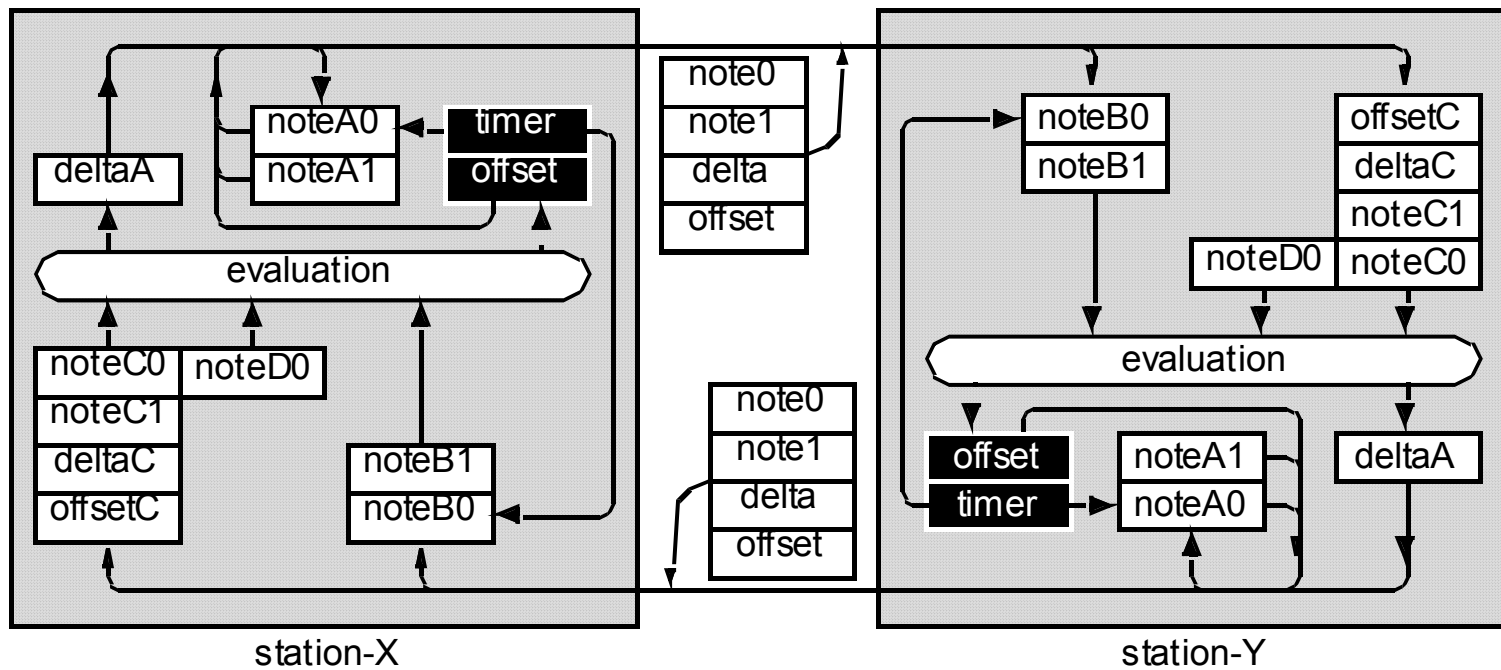
This is time-of-day synchronization!



Precise duplex-link synchronization



Precise duplex-link synchronization



Directions

- **PHY provide time-stamp references**
 - **Selective frames is needed**
 - **All frames could be diagnostic friendly**
- **Software protocols for all the “complex stuff”**
 - **Relies on MAC-level stamps**
- **Piggy-back something that is sent periodically**
 - **Rate-matching idles**
 - **Already there**
 - **Space available**