Decoupling .1Qbv from .1AS

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Wilfried Steiner, Corporate Scientist
wilfried.steiner@tttech.com

Quality of Clock Synchronization: max|RTE|

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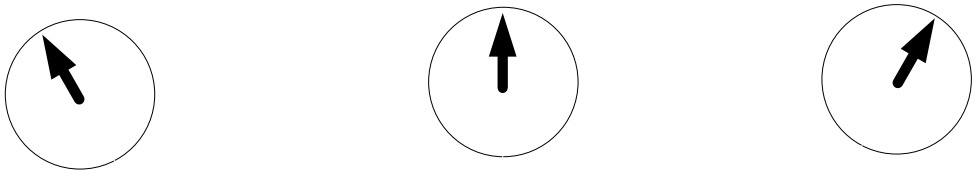
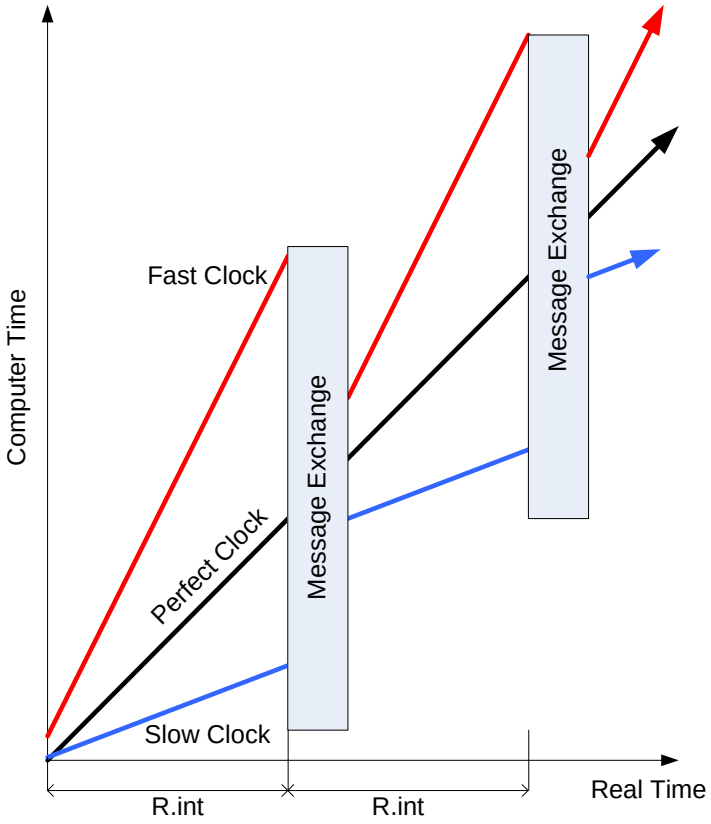
In an ensemble of clocks, the maximum absolute value relative time error max|RTE| is defined in .1ASbt-D0.6 as: The maximum absolute value relative time error, between two clocks over a measurement interval of duration T.



Late Clock Perfect Clock Early Clock

$$\max|\mathrm{RTE}| = \max_{t_0 \le t \le t_0+T} |x_2(t) - x_1(t)|$$

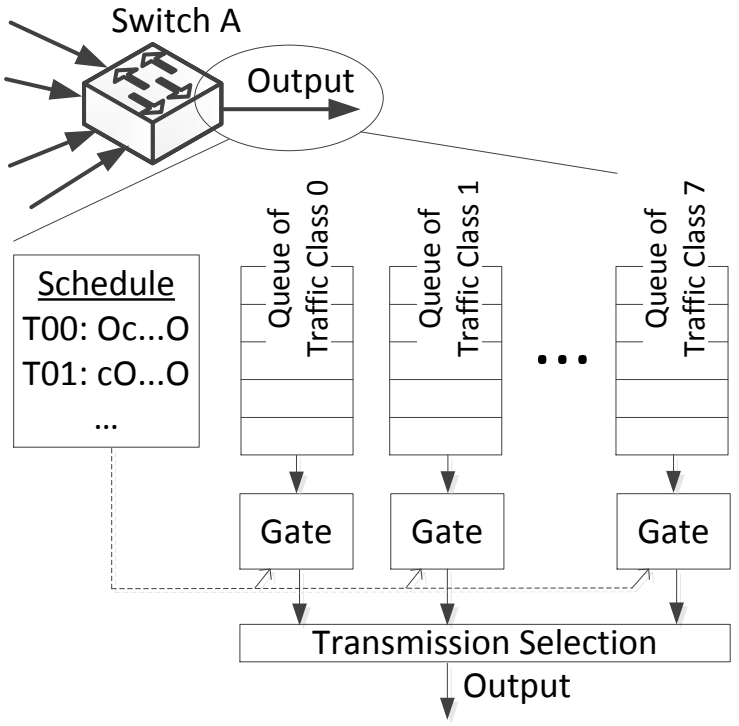
Computer Time vs. Real Time



max|RTE| defines the maximum difference in computer time of any two clocks at any point in real time.

Use of .1AS in .1Qbv

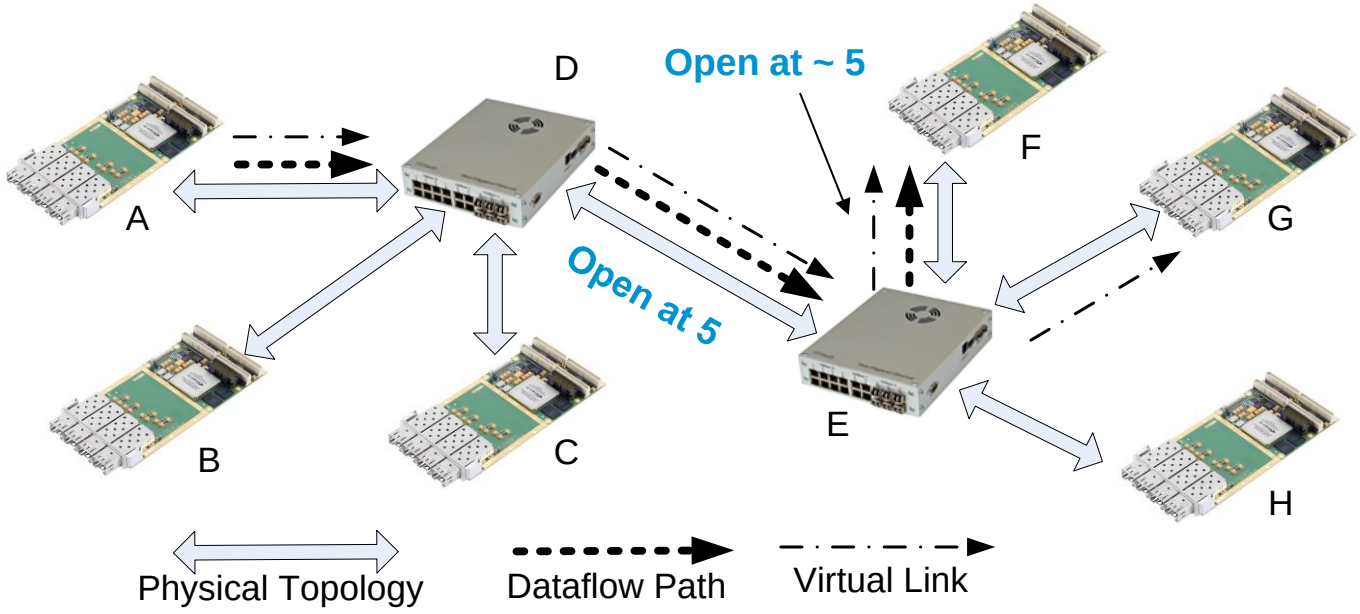
- .1AS timing defines the timing of gate open/close events, i.e., the schedule.
- In a network of bridges the schedule entries are a function of the max|RTE| parameter.
  - Because, typically the gate open/close events will be synchronized in multiple bridges.



Path-Dependent Constraints

Definition

- Within the path of a frame *x* the gate open/close points in time on two adjacent edges need to be well-timed.
- For example this can mean that that gate open event on a succeeding edge will be scheduled before the gate open event on the preceding edge.



.1Qbv PAR

…

This amendment specifies time-aware queue-draining procedures, managed objects and extensions to existing protocols that enable bridges and end stations to schedule the transmission of frames based on timing derived from IEEE Std 802.1AS.

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→ This is not good!

And I believe it has been recognized by the group and also considered in the current .1Qbv drafts.

PAR modification

- This amendment specifies time-aware queue-draining procedures, managed objects and extensions to existing protocols that enable bridges and end stations to schedule the transmission of frames based on a synchronized time.
- Note: synchronized = max|RTE|
- Examples of such time standards:
  - IEEE 802.1AS
  - IEEE 1588-2011
  - IEEE 1588 C37.238-2011
  - SAE AS6802

What else?

- Start .1BA equivalent for TSN
  - To capture TSN system-level configuration variants.

→ What else?

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