802.1ASbt overview on asCapable hair-trigger issue for Clause 11 (MD layer for FullDup P2P links)

Bob Noseworthy (ren@iol.unh.edu)
University of New Hampshire's
InterOperability Laboratory (UNH-IOL)
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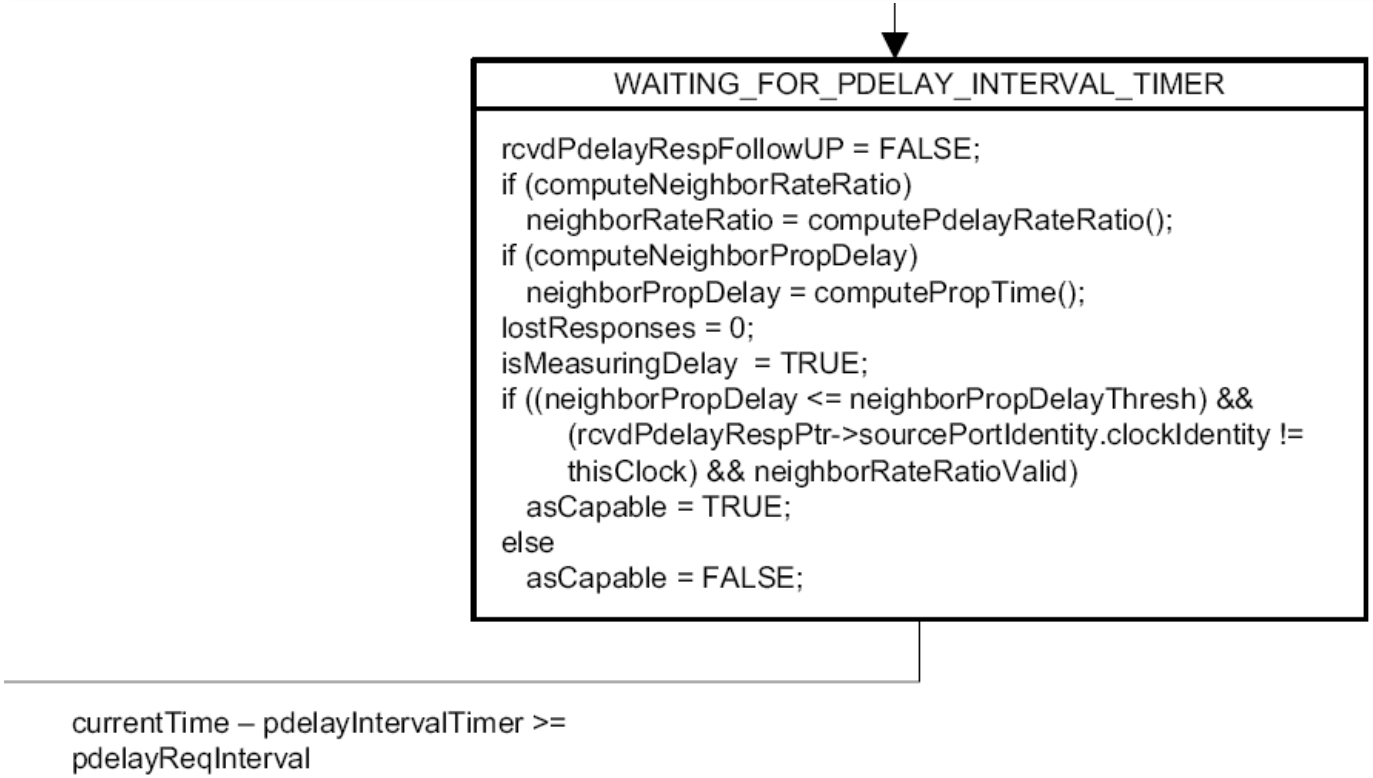
Introduction

- asCapable can be set false with a ‘hair trigger’.
  - An occasional fault (high neighborPropDelay exceeds neighborPropDelayThresh just once) results in asCapable = FALSE
    - This causes an SRPDomainBoundary to be detected;
    - which causes Talker Advertises to propagate as Talker Fails;
    - When a Talker Failed is being propagated, the associated stream is not forwarded by the Bridge, hence this ‘hair trigger’ interrupts stream traffic.

The MDPdelayReq State Machine (Fig 11-8 per 802.1AS-cor)



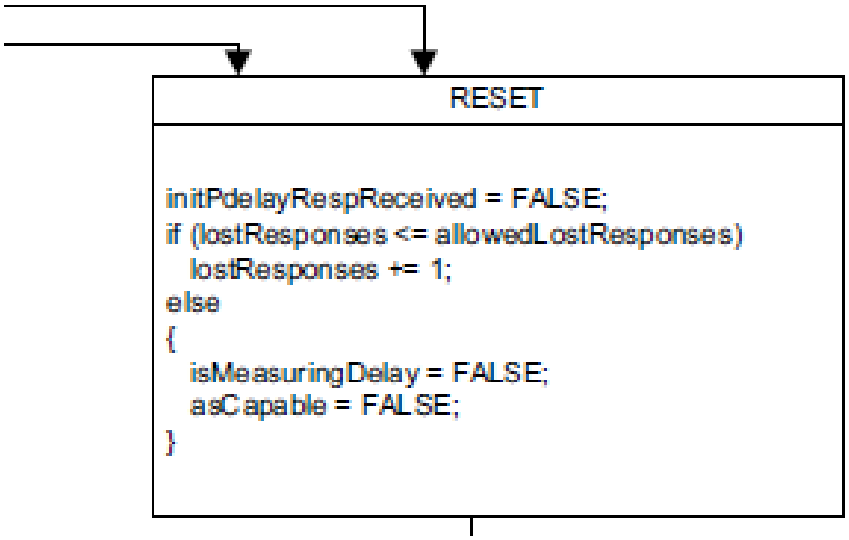
- Focus is on the if-else block
- A single violation of the 3 conditions result in asCapable being set FALSE at anytime.

3 Hair-trigger Conditions

```
if ((neighborPropDelay <= neighborPropDelayThresh) &&
      (rcvdPdelayRespPtr->sourcePortIdentity.clockIdentity !=
      thisClock) && neighborRateRatioValid)
```

- neighborPropDelay
  - Left to implementation to define, this could ‘momentarily’ be set above the threshold by system fault, time stamp uncertainty, etc if sufficient averaging is not being performed
- rcvdPdelayRespPtr->sourcePortIdentity.clockIdentity
  - Sensitive to a single received error in the received Pdelay Resp (but it is impossible to reach this state if the value is !thisClock)
  - Recommendation: Delete this condition
- neighborRateRatioValid:
  - Left to implementation to define, should define ‘wisely’ to never glitch

Additional “hair triggers” (RESET state of Fig 11-8)



– Consideration should be given to increasing the value of allowedLostResponses (currently 3), which also sets asCapable to FALSE

Reminder: Meaning of asCapable

- 10.2.4.1 defines asCapable as a boolean indicating both link partners are capable of executing 802.1AS and specifically item (c):
  - "there are no non-IEEE-802.1AS systems in between this time-aware system and the time-aware system at the other end of the link that introduce sufficient impairments that the end-to-end time synchronization performance of B.3 cannot be met."
- Hence, once a determination has been made for a given active link, it would seem desirable to strongly favor the continued consideration of the link as asCapable=TRUE until a link state change or a "substantial" issue is detected.

Summary

- Vendor specific implementations of neighborPropDelay and neighborRateRatioValid could substantially impact entire AVB network.
  - Currently these functions are unconstrained by the standard, perhaps remedied by further definition or aided by addition of informative notes.
- Should IEEE 802.1ASbt or 802.1AS change? (or both)?

  Possible remedy:
  - Add further hysteresis for asCapable, favoring 'rapid'(*1) set of asCapable=TRUE and slow reset to asCapable=FALSE.
    - (*1)How fast asCapable can be set is unbounded currently in the standard (e.g: neighborRateRatioValid may take 10s of seconds)
  - Impact on use-cases of delaying transition from asCapable=TRUE to FALSE must be further considered