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

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