IEEE 802.3ba: MAC Response Times
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Status Quo

• Response Time @ 10G
  – MAC, RS and MAC-Control layer has a delay limit of 16 Pause Quanta

• Response Time @ 40G
  – MAC, RS and MAC-Control layer has a delay limit of 20 Pause Quanta
Issue

• Delay Limitations do not scale with the line rate
  – To support 40G rates, it is unlikely that the clock frequency is increased 4x when compared to 10G
  – More common implementation choice is to increase the data-bus width
  – Increased data-bus width implies higher delay in the MAC/RS/MAC-Control layer
  • Example:
    – Doubling data-bus width of an IEEE 802.3 compliant 10G MAC would imply that a 40G MAC must be allowed at least 32 Pause Quanta of MAC/RS/MAC-Control delay
    – IEEE 802.3ba/D2.1 allows for ONLY 20 Pause Quanta
Recommendation

• Increase MAC/RS/MAC-Control delay limit for 40G from 20 to 32 Pause Quanta
Buffering Impact

• Increasing the MAC/RS/MAC-Control Delay increases the overall headroom requirements during PFC/PAUSE operation

• Calculation of the increased buffer size
  — Assumptions
    • Bit rate: 40 Gbps
    • PHY delay: 32 PQ (FEC turned off)
    • Cable length: 10 km
    • Speed of light: $2 \times 10^8$ ms$^{-1}$ (0.66c)
  — Status Quo Buffering requirement: 7916.5 PQ
    • MAC /RS/MAC-Control delay: 40 PQ (0.5%)
    • Other delays: 7876.5 PQ (99.5%)
  — Buffering requirement with Proposed Change: 7940.5 PQ
    • MAC/RS/MAC-Control delay: 64 PQ (0.8%)
    • Other delays: 7876.5 PQ (99.2%)
  — Percentage Increase in the buffering requirement: 0.3%

• Buffering impact is marginal