PFC Response Time

IEEE 802.1 Interim Meeting

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Jan 2010

Background

- Status Quo
  - The IEEE 802.1 Qbb allows for a PFC response time of 614.4ns (without MACSec)
- Issue
  - Two concerns have been raised in the ballot comments regarding the PFC response time

Issue 1: PFC Response Time at 10Gbps

- Comment: *The PFC response time definition is still not satisfactory. The relaxation of the constraint to 12 pause quanta from 8 for 10Gb/s may result in unusable buffering requirements for implementations.*

- Proposed Change: *Change the PFC response time for 10Gb/s to 8 pause quanta*

Issue 1: PFC Response Time at 10Gbps

- The Annex O provides a numerical example on receive buffer calculation
- Analysis
  - Receive Buffer requirements with 12 PQ response time: 15.38 kBytes
  - Receive Buffer requirements with 8 PQ response time: 15.13 kBytes
  - Percentage Savings: 1.6%
- Conclusion: Current PFC response time
  - Supports a wide range of implementation options
  - Results in negligible increase in the receive buffer requirements
- Recommendation: Do not reduce the PFC response time

Issue 2: PFC Response time at 40/100 Gbps

- Comment: *The PFC response time should take into account the speed (i.e. 10, 40, 100 Gb/s). However, picking either an absolute time or absolute pause quanta for all speeds shouldn't be necessary. Picking an absolute pause quanta decreases the response time by the multple of the speed increase and may place unreasonable constraints on implementation clocks (per past comment ballots). On the other hand, picking an absolute time assumes implementations will not increase their clock speeds at all and may result in requiring excessive buffering for handling this upper layer response delay.*

- Proposed Change: *Instead of selecting a single number for all speeds, specify a delay value that is appropriate for each speed - which takes into account implementation approaches as well as reasonable buffering requirements. For example, consider a delay factor which increases by a factor of one half of the link speed increase, then, given a response delay of 8 PQ at 10Gb/s, For 40G, it gives 16PQ = 8PQ x 4/2, as speed increased by a factor of 4 from 10G.For 100G it gives 20PQ = 16PQ x 2.5/2, as speed increased by a factor of 2.5 from 40G.*

Issue 2: PFC Response time at 40/100 Gbps

- Analysis:

Link Speed	Receive Buffer (kBytes)		Percentage Savings
	Current Response Time (614.4 ns)	Proposed Response Time (40G : 204.8 ns) (100G: 102.4 ns)	
40 Gbps	16.38	14.38	12%
100 Gbps	31.74	28.00	11.78%

- *Observation*
  - *At 40G, a 67% reduction in response time results in 12% buffer savings*
  - *At 100G, a 83% reduction in response time results in 11.78% buffer savings*
  - *A significant reduction in response time produces meager reduction in receive buffer requirements*

- Conclusion: Current PFC response time
  - Supports a wide range of implementation options
  - Results in a small increase in the receive buffer requirements

- Recommendation: Do not reduce the PFC response time