Time Sensitive Networking Queue Names & Parameters
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Don Pannell
Marvell Semiconductor
dpannell@marvell.com

Overview

- AVB (Gen 1) defines two SR Classes (in 802.1BA)
  - These are Class A and Class B
- Class A has the following defined parameters:
  - PCP value of 3
  - Class Measurement (observation) Interval of 125 uSec
  - Higher Queue Priority vs. Class B & non-AVB flows
- Class B has the following defined parameters:
  - PCP value of 2
  - Class Measurement (observation) Interval of 250 uSec
  - Lower Queue Priority vs. Class A but higher than non-AVB flows

Goal

- It was the goal of AVB (Gen 1) to define 'defaults' that 'simply work' for plug-n-play reasons, and to define mechanisms to allow management to customize a network by changing these defaults

- It was the intention of the group to allow management changing of the PCP for SR Classes, but it turns out there is currently no way to do this

- It is now clear that new industry segments for TSN (AVB Gen 2) require Class Measurement Intervals other than 125 uSec or 250 uSec and this parameter too is not changeable today

Opportunity

- In TSN (AVB Gen 2) we have an opportunity to fix this!

- We have to add more parameters to fully define a queue in TSN anyway
  - Such as what Shaper is being used by the queue
  - And if it's Qbv (Time Aware Shaper) then what are the gates and their window times

- No matter what we do we must be 100% backward compatible and interoperable with an AVB (Gen 1) neighbor!
  - i.e., we always start up with the AVB (Gen 1) defaults

Problem

- Now how can we 'talk' or write about these 'parameterized' queues?

- SR Class A or Class B doesn't work since we have done such a good job 'marketing' AVB that the end users consider the definition of Class A (& B) to mean ALL of their performance parameters

  - And that they don't change!

- So we need a 'new' name or way to refer to these Queues that have configurable parameters where the names of the Queues denote some ordering significance (for strict priority scheduler's selection)

Options

- ## Can we use the PCP?
  - No, as these are already abstracted & a possible 3rd ultra low latency queue may use a PCP lower than SR Class A & B's PCPs for interoperability w/ AVB (Gen 1)
    - And the PCP is expected to be one of the configurable parameters of a given queue that we are trying to name!

- ## Can we use Numbers?
  - That is what 802.1 started with to designate PCP so that would be confusing
    - Which of the numbers would be referencing the frame's PCP and which numbers would be referencing the internal queue ordering?

Options

- Can we use Letters as we did in AVB?
  - Assuming the definitions (parameters) of Class A & B are 'fixed' (in the minds of our users), then how can we define a Class C set of parameters that should use a queue that is higher priority than Class A (for ultra low latency)? Or a lower priority than Class B?
  - Do we even want to give a new set of parameters a new name like Class C? I hope not because then each application that requires new set of parameters will need a new SR Class letter (and standard revision change)
  - And clearly we don't want each new SR Class to use a new PCP as we only have 7!

Proposed Solution

- We have not seen any application that needs more than 2 or 3 TSN/AVB queues at any given time
  - But which 2 or 3? That is where the programmable parameters requirement comes in!

- So again we need to 'name' these 2 or 3 queues maintaining there priority order relative to each other

- I propose 'Alpha', 'Beta', 'Gamma', …
  - These denote an order (Alpha is ahead of Beta which is ahead of Gamma)
  - These names have not been used – and are well known

Usage

- Queue Alpha defaults to SR Class A's parameters
- Queue Beta defaults to SR Class B's parameters
  – This has to be done for backwards compatibility to AVB
- Via 'some mechanism' a Queue's parameters can be changed
  – For example, Queue Alpha could have its Class Measurement Interval changed to 1000 uSec or some other value and its Shaper changed to be a Time Aware Shaper, or… And Queue Beta could have its parameters set to Class A
    - This results in 2 TSN queues w/an Ultra Low Latency above Class A

Summary

- We need Parameterized Queues
- We need a way to indicate the Queue priority order
- I propose calling these Parameterized Queues by the names Alpha, Beta, etc. where Alpha is higher priority than Beta, etc.

- Other ideas?

- Thanks!