802.1Qcc D1.0: Background for Resolution of Comments 67, 68, 69

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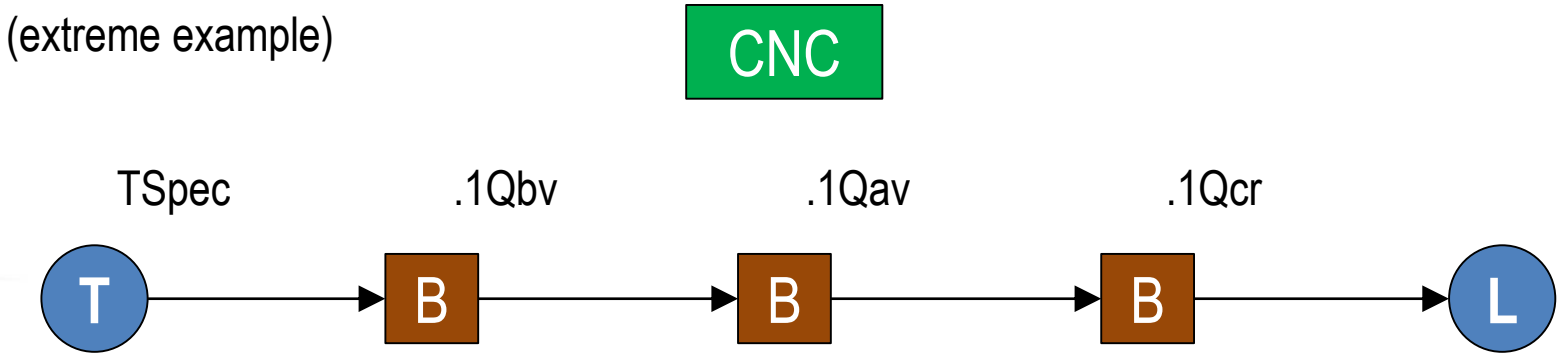
Scheduled Talker/Listeners (1 of 7)

- Qcc 1.0, 99.2.2.5, Talker's TrafficSpecification (TSpec)
  - TSpec is in several standards (e.g. DiffServ, .1Qat, .1Qcc)
  - How does Talker transmit frames of its stream?
    - Technically speaking, this is Talker **only**
    - Does not mandate same behavior at each bridge
      - Fully-distributed (e.g. MSRPv0) mandates consistent shaping
      - CNC: Each bridge can use different shaping/scheduling

(extreme example)



Scheduled Talker/Listeners (2 of 7)

- Qcc 1.0, 99.2.2.6, NetworkRequirements (NReqs)
  - Originally from slide 12 of
    - http://www.ieee802.org/1/files/public/docs2014/cc-nfinn-control-flows-0414-v02.pdf
  - User states **requirements** of the **network**
    - Most fundamental concept of TSN
    - TSN provides worst-case latency and loss
      - New QoS that Talkers and Listeners request from network
      - Goal: Facilitate use of TSN by existing applications
  - Concept is explicit in .1Qcc (and IETF DetNet)
    - AVB (.1Qat) had an implicit requirement (see comment #47)

Scheduled Talker/Listeners (3 of 7)

- Is it possible for Talker to transmit synced to time (e.g. using 802.1AS)?
  - Yes (statement of fact in existing applications)
  - Therefore, TSpec needs a scheduled option
    - Async TSpec of MSRPv0 is the other option
- Is it possible for Listener to read stream synced to time?
  - Yes (statement of fact in existing applications)
  - Time of that read in turn determines the latency requirement
  - Therefore, NReqs needs a scheduled option

Scheduled Talker/Listeners (4 of 7)

- Is Talker's scheduled TSpec limited to .1Qbv?
  - No (statement of fact in existing applications)
  - Maybe we should use a different term than 'scheduling'?
- Example worse than .1Qbv
  - Talker has periodic RTOS timer driven by 802.1AS
  - Talker transmits streams in that timer's interrupt
  - Significant jitter: Timer, interrupt, best-effort interference, ...
- Example better than .1Qbv
  - Talker has per-stream scheduling hardware
  - Low jitter even with multiple streams of same traffic class

Scheduled Talker/Listeners (5 of 7)

- Application can schedule its own components
  - Functions (code), physical inputs, physical outputs, ...
  - Scheduling of app components is outside scope of 802.1
- Clear boundary between network and application
  - TSN frame transmit/receive at PHY (PTP timestamp point)
  - Network time sync (e.g. 802.1AS)
- All timing above boundary is application's problem
  - E.g. Time from function's 'Write' to transmit is outside 802.1

Scheduled Talker/Listeners (6 of 7)

- How do we specify a network point-of-reference for scheduled option of TSpec and NReqs?
  - Assume Talker and Listener use same interval
    - Start of interval is in phase with PTP epoch
    - Application ‘loops’ are synced in time; typical time-triggered app
  - Specify TSpec and NReqs using times relative to start of interval at Talker (as reference)

Scheduled Talker/Listeners (7 of 7)

- Timing diagram of Qcc's scheduled option