DetNet

Bounded Latency-03

draft-finn-detnet-bounded-latency-03

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A reminder to new attendees ...

- DetNet is about an upper bound on end-to-end latency – not low average latency.
- Bounded latency leads to the ability to compute exactly how many buffers are required to achieve zero congestion loss.
- Feedback that slows down flows to avoid congestion is not an option for the application space of interest to DetNet.
- Mathematically sound assurances can be given on latency and congestion loss.
Major changes from -02 to -03

- The draft has been made Informational.
- Section 3.1 is added to address the dynamic and static flow creations.
- Section 6.4 is updated for delay bound calculation in TSN with ATS.
  - Flow admission control is added in Section 6.4.1.
- Section 6.5 is simplified to address IntServ end-to-end delay bound calculation.
Section 3.1: Static and Dynamic flow creations

• The **Static** flow admission was already described in bounded-latency-02.
  • All the flows information is available.

• The **Dynamic** flow admission is added for the per-class scheduling with regulators in Section 6.4.1.
  • A flow can be added and removed.
Per-class dynamic flow admission decision

- A flow is **admitted** if at all the nodes it traverses, the following conditions hold:
  - \( r_f + R_{acc} \leq R \)
  - \( b_f + b_{acc} \leq b_t \)

- If one of the above equations does not hold at any of the nodes flow \( f \) is traversing, the flow is **rejected**.
Counter updates for per-class dynamic flow admission

- When a flow is **admitted**, the counters are updated:
  - $R_{acc} = R_{acc} + r_f$
  - $b_{acc} = b_{acc} + b_f$

- When a flow **leaves**, the counters are updated:
  - $R_{acc} = R_{acc} - r_f$
  - $b_{acc} = b_{acc} - b_f$
Per-class one hop delay bound calculation

\[ C_{1,2} = \sup_{f'} \{ d_{f'} \} \]

\[ d_f = T + \frac{b_t - L_{\text{min}}^f}{R} + \frac{L_{\text{min}}^f}{c} \]

R: Regulator
Q: Queuing Subsystem

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Per-class end-to-end delay calculation

End-to-end delay bound for flow $f$:

$$D = C_{1,2} + C_{2,3} + \cdots + C_{k-2,k-1} + d_f$$

$R$: Regulator

$Q$: Queuing Subsystem

Ref: [Mohammadpour, Stai, Mohiuddin, Le boudec, 2018]
Further updates planned

• Improvement of the delay bound calculation (both dynamic and static).

• Formal delay analysis of CQF.

• Per-node buffer size calculation.
Next step

• Call for WG adoption?
Thank you