Criteria and Assessment for DetNet Services Forwarding Plane Methods

draft-eckert-detnet-criteria-assessment-00

DETNET WG IETF116

Toerless Eckert, Futurewei USA (tte@cs.fau.de)
03/29/2023
Goals

• Q: How should we (DetNet WG) and later implementers/operators compare and select
  • For a particular deployment (network, speed, scale, application)
  • The most fitting forwarding plane method?

• A: Ideally there was a “Spec-Sheet”
  • Describing the Method
  • Maybe later also implementations of the method (adds more implementation parameters)

• This draft is an attempt at defining such a “Spec Sheet”
  • Definition / explanation of criteria
  • Example spec-sheet for one method (TCQF)
Criteria (1)

End-to-end Service characteristics
- Latency guarantee: NA / Bounded or Heuristic
- Hop-by-hop jitter bounds: in-time / on-time / <other>

Network Applicability
- Intended / applicable for IP / IPv6 / MPLS (subset)
- Intended for 100Gbps networks and faster (Yes/No)
- Requires new on-the-wire packet header fields (Yes/No/Optional)

Link Latency/Jitter requirements
- Latency requirements for links
- Jitter requirements/impact for wireline links
- Jitter requirements/impact for radio links

Asynchronous: Yes / No (No =~ Asynchronous)

Clocking: MTIE impact on jitter and bounded latency
Criteria (2)

Traffic Model – of flows to use the model
Forwarding model
  (per-hop, per-flow) Stateful: Yes / No (No =~ stateless)
Algorithm parameters and mechanisms
Calculus
  Published per-hop calculus: Yes/No
  Published linear per-hop, per-flow calculus: Yes/No
  Hop-by-hop jitter bounds: in-time / on-time / <other>
Packetization
  Per-flow compatibility with per-hop source-routing: Yes/No (SR-MPLS, SRv6, BIER-TE,...)
  End-to-end packet header requirements (~N bits/bytes)
  Hop-by-hop packet header requirements (M + N/per-hop bits/bytes)
Assessment – TCQF (1)

End-to-end Service characteristics

Latency guarantee: Bounded
Hop-by-hop jitter bounds: on-time \((2 \times \text{cycle-time } T)\)

Network Applicability

Intended / applicable for: IP, IPv6, MPLS
Intended for 100Gbps networks and faster: Yes
Requires new on-the-wire packet header fields: No

Link Latency/Jitter requirements

Latency requirements for links: arbitrary
Jitter requirements/impact for wireline links: supported \(\text{at cost of higher latency}\)
Jitter requirements/impact for radio links: TBD

Asynchronous: No

Clocking: MTIE impact on jitter and bounded latency: higher MTIE translates into added latency
Assessment – TCQF (2)

Traffic Model – of flows to use the model: bits/cycle time $T$ for a flow

Forwarding model

(per-hop, per-flow) Stateful: No

Algorithm parameters and mechanisms:

mapping table on each egress interface:

(input-interface, ingress-cycle) -> (egress-cycle / egress-cycle-buffer)

Calculus

Published per-hop calculus: Yes

Published linear per-hop, per-flow calculus: Yes

Hop-by-hop jitter bounds: on-time $(2 * T)$ – same as end-to-end jitter

Packetization

Per-flow compatibility with per-hop source-routing: Yes (SR-MPLS, SRv6, BIER-TE,...)

End-to-end packet header requirements: 2 bits (3 cycle values)

Hop-by-hop packet header requirements: 0 bits
Summary

• Very early proposal how we could start capture “common parameters”
• If other methods propose would attempt to apply criteria, it would hopefully help to identify gaps / improve these parameters

• Feedback / collaboration highly welcome!