

Mechanism to control jitter caused by policing in Detnet

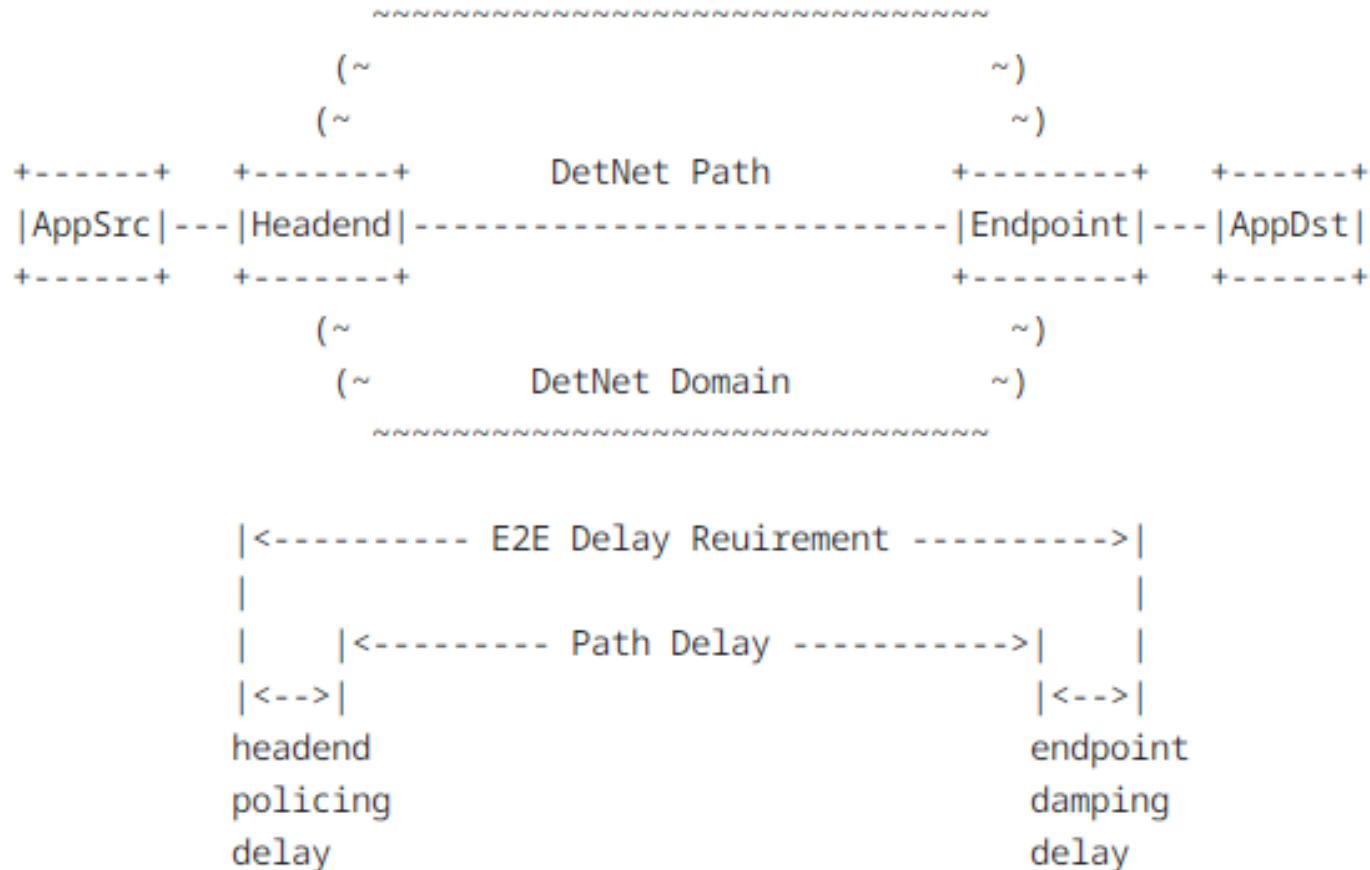
draft-peng-detnet-policing-jitter-control-01

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Background and Motivation

- RFC2216: a policing function differentiates those packets in a flow which conform to a particular token bucket specification ("token rate" r and "bucket size" b) from those packets which do not.
- RFC8655: rate limiting (e.g., using traffic policing) and shaping functions (e.g., shaping as defined in [RFC2475]) at the ingress of the DetNet domain must be applied.
- A conforming packet may experience zero policing delay, while a nonconforming packet may experience non-zero policing delay. Therefore, jitter occurs.
 - Some flows that are extremely sensitive to jitter may not like it.
 - The DetNet path can only provide bounded latency/jitter of the path itself.
 - Additional mechanism is necessary to control it.

Overview of the Solution



- 1) E2E Delay Reuirement = Path Delay + edge-to-edge policing delay budget
- 2) Edge-to-edge policing delay budget = headend policing delay + endpoint damping delay.
- 3) Endpoint damping delay is carried in the packet, used as the holding time imposed on the endpoint before the packet is delivered to the APP destination.

Set Edge-to-edge Policing Delay Budget

- The edge-to-edge policing delay budget can be configured for the individual DetNet flow according to its TSpec and actual possible arrival pattern.
 - It may reach the order of magnitude of SBI (service burst interval).

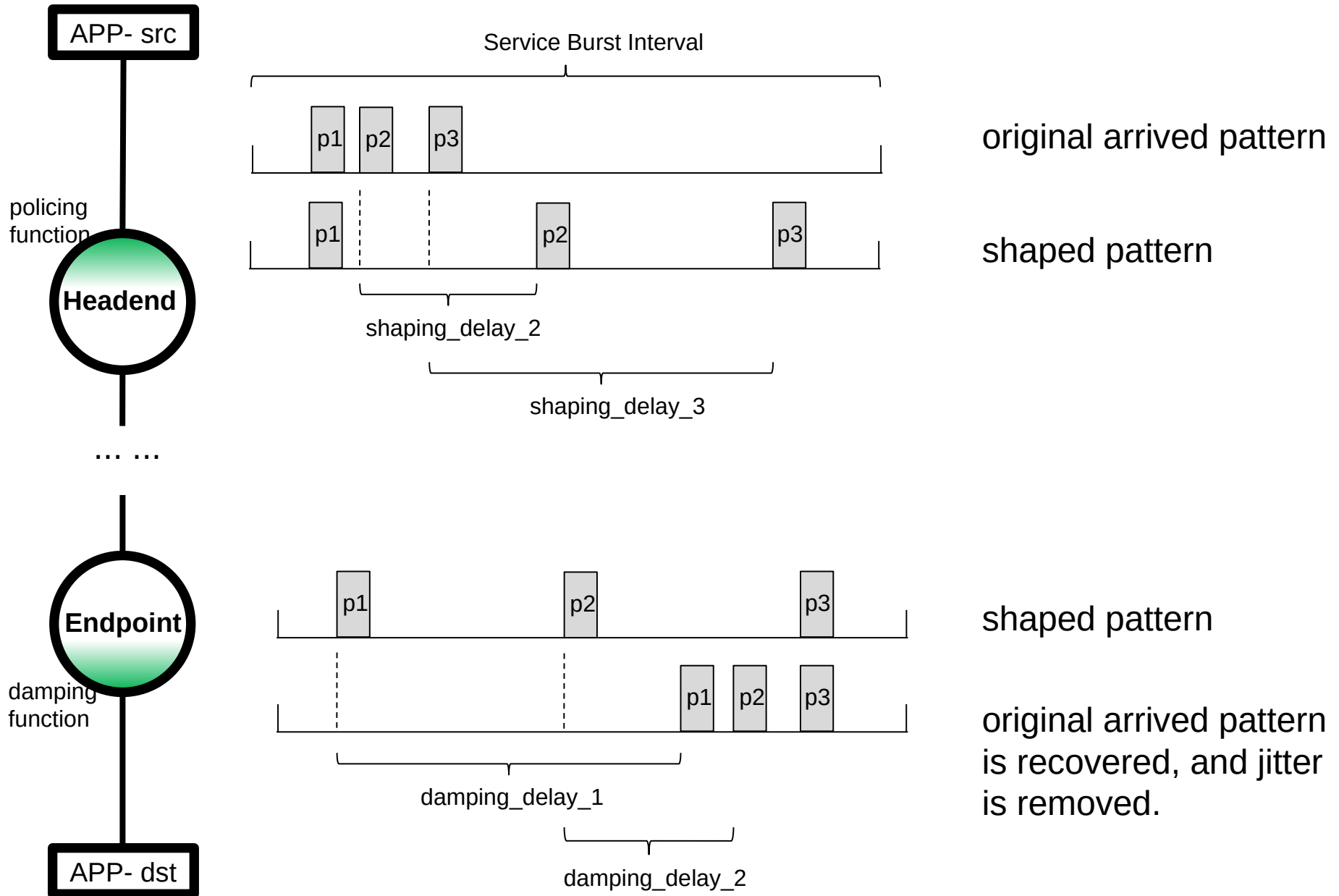
For example, a DetNet flow has service burst interval (SBI) 100 us, and three packets P1, P2, P3 per SBI. An extremely case of nonconforming pattern may be that P1, P2, P3 arrived back-to-back. P3 has the largest policing delay, which may be $2/3$ of SBI and can be used as edge-to-edge policing delay budget.

- Or it may be very small (even zero) based on sampling or configuration.

For example, the APP source control the flow rate to fully comply with TSpec, and edge-to-edge policing delay budget may be 0.

- Smaller value is better, in order to make room for DetNet path.

Damping on the Endpoint to Recovery Pattern



Multiple Domain Considerations

- Two options to implement policing jitter control. An explicit indication in the packet should be provided for the selected option.
 - One option is to implement policing jitter control at the entrance and exit of each domain independently. Each domain entrance should maintain the edge-to-edge policing delay budget for the flow. Each domain contribute a separate edge-to-edge policing delay budget to the end-to-end delay.
 - Another option is to implement policing jitter control only at the ingress domain entrance and the egress domain exit. Only a single edge-to-edge policing delay budget is contributed to the end-to-end delay

Encoding Considerations

- The “Endpoint Damping Delay” value is independent of any specific queueing mechanisms. It may be carried in:
 - a new IPv6 option for DOH Options header
 - a new ancillary data for MPLS MNA header
 - or IPv6 Routing Header

Next step

- Any questions/comments ?

Thank you!