Flow Aggregation for Enhanced DetNet

draft-xiong-detnet-flow-aggregation-04

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Updates from last version

- Presented at IETF#120, #122 and #124 , and comments at meetings and on the mailing list are appreciated from :
  - Toerless, Janos and Lou
- The updates from v-0 to v-04 is like following:
  - revise the objectives and requirements for flow aggregation in enhanced DetNet
  - clarify the multi-domain requirements for aggregated flows
  - add Carlos as co-author and thanks for the contribution

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Motivation

- For enhanced DetNet data plane, [I-D.ietf-detnet-scaling-requirements] proposed the data plane requirements and it should support the *explicit aggregated flow identification and provide aggregated flows over multi-domains* with different levels of SLAs requirements.
- For multi-domain DetNet control plane, [I-D.bernardos-detnet-multi-domain-framework] discussed the consideration to achieve the *end-to-end QoS guarantees for aggregated flows that span across multiple domains*.
- This document describes the *specific requirements and enhancements for flow aggregation in both data plane and control plane in scaling networks.*

Requirements for Flow Aggregation in Scaling Networks

1. **Aggregated Flows across Multi-domains:**
   - Flow-aggregation in the multi-domain scenario to achieve the end-to-end QoS guarantees for aggregated flow(s) that span across multiple domains.
   - The flow aggregate should be identified and the related information should be exchanged and coordinated among different network domains.
2. **Aggregated Flows with Fine-grained QoS Provisioning:**
   - The draft [I-D.ietf-detnet-scaling-requirements] specifies that scalable flows are co-existed and different levels of applications differ in the SLAs requirements.
   - The DetNet flows with the same level of service requirements can be aggregated to receive collective treatments and forwarding behaviors within several pre-defined classes.
3. **Aggregated Flows with Bursts Flows across Multiple Hops:**
   - Flow aggregations will be frequent with flows frequently joining and leaving in scaling network, which may potentially lead to accumulated bursts of flows across multiple hops.
   - The DetNet flows should be aggregated while coordinating packets within aggregated flows.

Enhancements for Flow Aggregation in Scaling Networks

- Flow Classification
  - the DetNet flows MAY be classified to pre-defined levels based on the service SLAs requirements of applications in scaling networks, such as tight/loose latency, jitter guarantee, low delay and jitter guarantee and so on.
  - the service should be provisioned on an aggregated-class level and the resources and routed should be controlled and scheduled on a per-class basis.
- Flow Identification
  - dynamically and simplistically identify the aggregated flow to indicate the required treatment and forwarding behaviors by the aggregation ID or the aggregated-class level.
  - the encoding of the aggregated flow informationcan be encapsulated with the aggregation-based metadata such as end-to-end budget.
- Flow Coordination
  - The control plane may advertise inter-domain resources and QoS coordination information for aggregated flows .
  - The burst of aggregated flows could be mitigated by coordinating packets within aggregated flows such as proportional scheduling and interleaving.

Next Step

- Comments and suggestions are very welcome!
- A useful work for WG adoption?
- Thank you!