A Framework for Traffic Engineering in Enhanced DetNet

draft-xiong-detnet-te-framework-00

Quan Xiong (ZTE)
Bin Tan (ZTE)
Zongpeng Du (China Mobile)
Junfeng Zhao (CAICT)
Dong Yang (Beijing Jiaotong University)

IETF 120 DetNet, July 2024
Recap

• The co-authors would like to thank the comments and suggestions from Adrian Farrel, Lou Berger, János Farkas et al.

• The draft has been presented at IETF 118 meeting and we also had a side meeting for detailed discussion, thanks for your attention.

• The updates are like following shown.
  • Modifies draft name/title
  • Changes status to informational
  • Clarifies the purpose of the draft
  • Editorial updates
Problems

• As per RFC9522, DetNet is described:
  • “DetNet can be seen as a specialized branch of TE”
  • “since it sets up explicit optimized paths with allocation of resources as requested.”
  • “A DetNet application can express its QoS attributes or traffic behavior using any combination of DetNet functions described in sub-layers.”
  • “They are then distributed and provisioned using well-established control and provisioning mechanisms adopted for traffic engineering.”

• As per RFC9522, the scalability concerns for DetNet:
  • “In DetNet, a considerable amount of state information is required to maintain per-flow queuing disciplines and resource reservation for a large number of individual flows.”
  • “This can be quite challenging for network operations during network events such as faults, change in traffic volume or re-provisioning.”
  • “DetNet recommends support for aggregated flows, however, it still requires a large amount of control signaling to establish and maintain DetNet flows”
Motivation

- DetNet can be seen as a specialized branch of Traffic Engineering (TE) and needs to resolve the scalability issues. There is a requirement to use Enhanced DetNet to provide Quality of Service (QoS) in large-scale networks. TE can be a valuable tool to help scale DetNet.

- This document provides a framework for traffic engineering to achieve DetNet QoS in enhanced DetNet.

- [I-D.ietf-detnet-controller-plane-framework] provides a framework for the DetNet controller plane. This document also describes the enhancement considerations for control plane to deliver DetNet traffic engineering.
TE Framework for Enhanced DetNet

• Policy
  • The routing policy including bounded latency constraint-based routing can be considered when selecting and distributing the candidate paths.

• Path Steering
  • Provide path steering to forward packet with deterministic behaviors for data plane to achieve deterministic latency.
  • The deterministic latency information may be provided to forward packets for path steering in IPv6/SRv6/MPLS.
  • Class-based aggregation should be considered for differentiated DetNet QoS.

• Resource Management
  • Provide fine-grained resource scheduling and management to meet the bounded latency requirements, rational utilization of resources, improvement of network performance.
  • Time-based resource-aware control and forwarding should be considered based on the queuing mechanisms and different classes.
Considerations for Control Plane of DetNet TE

- This document also describes the enhancement considerations for control plane to deliver DetNet TE.
  
  1. Information advertisement by IGP such as time-based resources and deterministic links.
  2. The controller may collect the resources and topology information by BGP-LS.
  3. The controller receives the service request from users or northbound interface.
  4. The controller performs the deterministic paths planning based on the service requirements.
  5. The controller distributes the results to the DetNet domain by PCEP or NETCONF.
  6. The DetNet nodes will establish the deterministic path and related time-based resource allocation based on the configuration from the controller.
  7. The controller may set the admission control and policy for traffic scheduling.
Next Steps

• Seek feedback from TEAS WG.

• Ask for WG reviews and comments.

• Comments and discussions are very welcome!
Thank you!