Micro-burst Decreasing in Layer3 Network for Low-Latency Traffic

draft-du-detnet-layer3-low-latency-04
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Modifications

• Adjust the catalogue to clarify “the purpose of the draft”
  – the purpose: explore the methods to decrease micro-bursts

• Add a new section to analyse the requirements of the method to decrease micro-bursts

• Adjust the proposed method as an example of the method to decrease micro-bursts
The traffic characteristic of the IP

• The traffic passes through a 4G network, and a fixed access network
• Every 62.5ms, a test packet is sent between two CPEs with GPS
• The test lasts about 10 hours. The minimal delay is 7.73ms, and the maximal delay is 726.18ms. The average delay is about 26ms
• It can be observed that the IP traffic has an instinct of burstiness
Three ways to decrease micro bursts

• This document focuses on the micro burst on the interface
  – which will show similar characteristic as in the macro aspect in the previous page
• Three ways to decrease the micro bursts on the interface:
  – Traditional IP in a light loaded network
  – TSN mechanisms such as the CQF (Cyclic Queuing and Forwarding)
  – A proposed method in the draft as an example
Traditional IP in a light loaded network

• Network will not be congested for the critical traffics, if the critical traffic has a high priority, and there is only a small amount of critical traffic in the network
  – however, in DetNet, we want to convey more critical traffics in the network

• The IP forwarding has a good scalability
  – because, in most cases, only per-packet treatment in the forwarding nodes is needed
  – but in theory, IP forwarding can only provide an unreliable connection
TSN mechanisms such as the CQF

• TSN mechanisms can provide a reliable path through the network
• In a DetNet network
  – BE traffics are forwarded by using the traditional IP forwarding
  – DetNet traffics are forwarded by using the TSN mechanisms
• However, TSN mechanisms are much more complicated than the IP forwarding, so that they cannot have a good scalability as the traditional IP forwarding does
  – the scalability is essential for a large scale network
Exploration of a third method

• We are looking for a mechanism that
  – can have a good scalability, i.e., the intermediate nodes should not do per-flow process on the date plane
  – can provide a better performance for critical traffic, i.e., provide a different treatment, and get a better E2E user experience

• On the intermediate nodes, we suggest to separate the process of the control plane and data plane
  – in a large-scale network, the status of the aggregated DetNet traffic on the control plane may change frequently
  – we should not assume that the control plane on an intermediate node can interact with the data plane frequently, for example, to change a shaper parameter frequently
  – on the data plane, some self-decision process should be supported
A proposed method as an example

• In the method, we can do the shaping at the edge, and try to keep the traffic shaped on the intermediate nodes
  – on the intermediate nodes, the aggregated critical traffic will be shaped again as a whole on the interface
  – we suggest some self-decision process in the shaping, and the purpose is to maintain a reasonable buffer depth while shaping the traffic

• The first step in our thought is that
  – not to forward the packets as soon as possible as the traditional IP forwarding does
  – because we think it is one of the reason causing the micro bursts on the interface
Next Step

• Continue to modify the draft according to the comments received
• Call for contributions from anyone who are interested in the work
Thanks for listening

Welcome for comments