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

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

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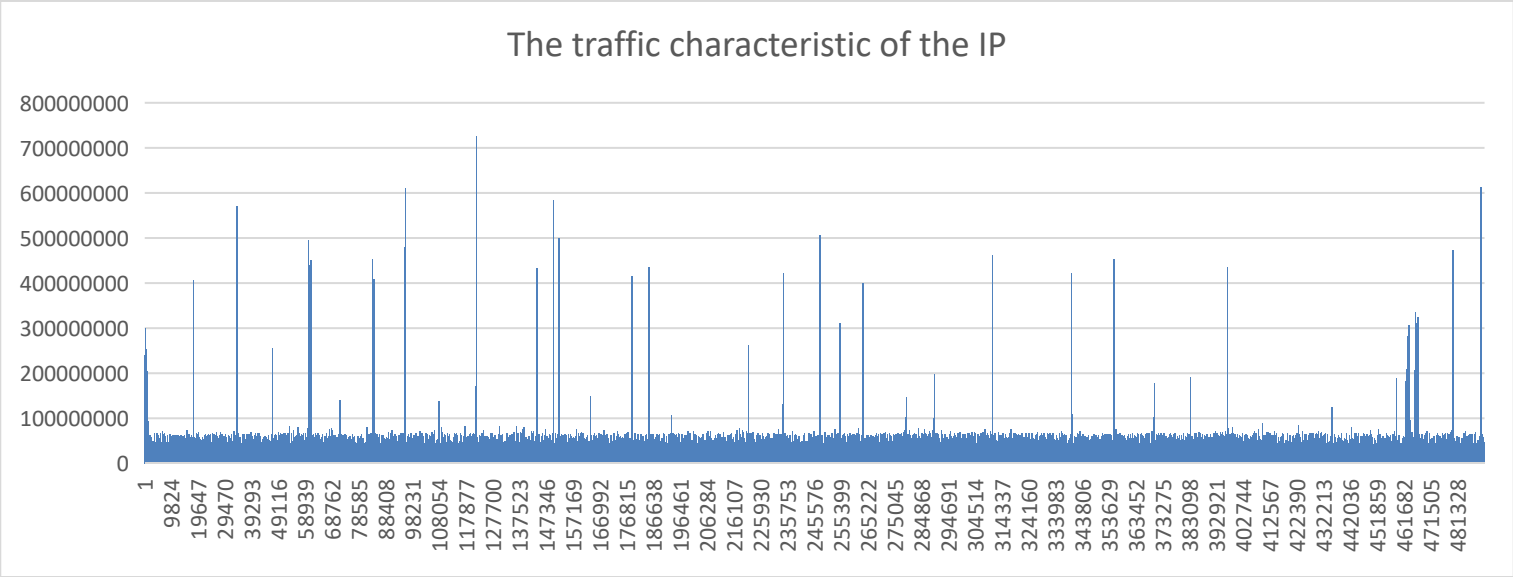
Modifications

- 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 mothod, 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