Worst-case Ethernet Network Latency for Shaped Sources

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Background

- Deterministic QoS guarantees dictate a need for an analytical evaluation of QoS parameters: worst-case latency, worst-case latency variation.
- Shortage in the existing research of the QoS performance of the Ethernet with well-behaved end-points

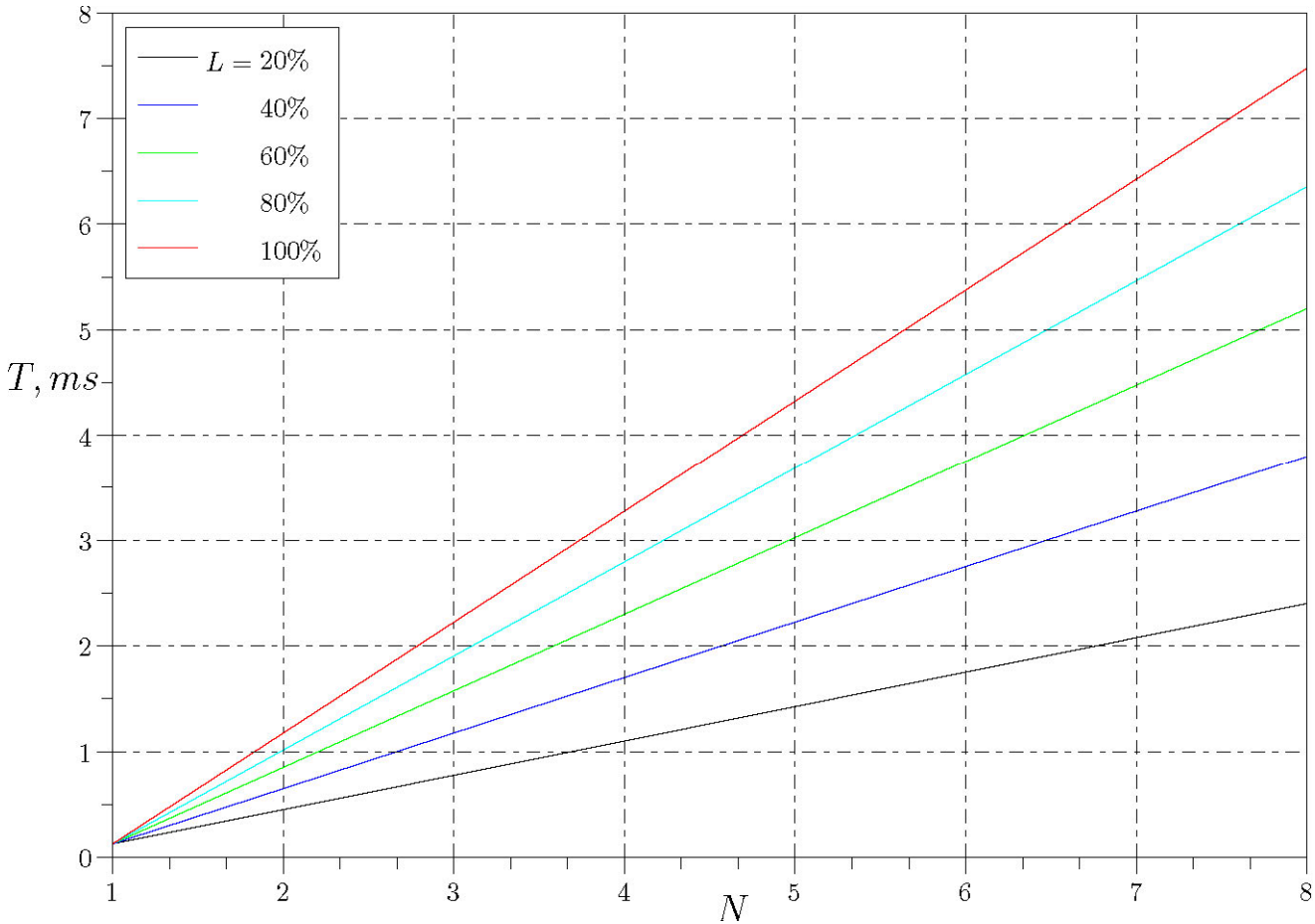
Approach

1. Define a mathematical model
   - define bandwidth shaping period
   - define shaped sources, abiding to a bandwidth reservation on a shaping period
2. Illustrate worst-case latency configuration
3. Provide analytical proof of the worst-case latency formula
4. If needed, complement model with more details, go to step 2.

Current results

- Provided proof of the worst-case latency formula for a network of sources emitting same-sized packets
- Provided worst-case configuration and latency formula for the extended network model:
  - varying packet sizes
  - lower-priority interfering traffic
  - partial load and arbitrary shaping period
  - Internal routing delay
  - varying number of ports on switches

Worst-case latency for shaping period = 1ms, 5-port switches



N – number of switches, L – network load in %

In Progress…

- Add network model with more details:
  - higher-priority interfering traffic
  - two or more classes of traffic – low-latency and higher-latency – with different priorities and different shaping periods
  - add formula for latency variation
- Use results as a basis for a QoS-enabled traffic routing and policing (reservation enforcement) architecture