Estimating Required Bandwidth using Flow Measurements

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1. Bandwidth provisioning
- Rules of thumb (30%) completely underestimate estimated required capacity. Rules of thumb (30%) completely under estimated bandwidth requirements in this example.
- Due to the assumption, in our approach, of uniformly bytes within the flow duration, the consequences of averaging in flows are clear when comparing packet and flow time series.
- From 1 second to higher timescales flow-based estimations are as good as packet-based ones. Timescales at millisecond are hard for flows.

2. Flow measurements
- Flow is a "set of packets that share common properties and pass at an observation point". Scalable alternative to packet measurements.
- NetFlow / IPFIX enabled equipment is available.
- Provide information at a coarser granularity.

3. Approach
- Try to reuse existing dimensioning formulas by extracting traffic statistics information from flow-level measurements.
- Estimated required capacity (Mbps)

Estimations using different approaches at timescales from 1ms to 30s.

Comparison between packet and flow time series

Calculated estimations using different approaches at timescales from 1s to 30s.

Calculated estimations using different approaches at timescale on 1s, plotted with the packet-level traffic time series

4. Results
- Rules-of-thumb (30%) completely underestimate estimated required capacity. Rules of thumb (30%) completely under estimated bandwidth requirements in this example.
- Due to the assumption, in our approach, of uniformly bytes within the flow duration, the consequences of averaging in flows are clear when comparing packet and flow time series.
- From 1 second to higher timescales flow-based estimations are as good as packet-based ones. Timescales at millisecond are hard for flows.

5. Conclusions
- At higher timescales (from 1 second) our approach is able to correctly estimate required capacity.
- Future work: improve flow-based estimations at lower timescales (down to milliseconds).