Router Buffer Sizes in the WAN
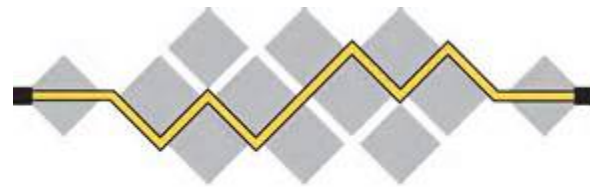## draft-ksubram-lmap-router-buffer-sizes-00

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PROBLEM

- WHAT?
  - Quantify Router Buffer Sizes in the WAN
  - Link latencies ~40 to 150 milliseconds

- WHY?
  - Drive down $/GB

- HOW?
  - Mine, and analyse empirical data

PREVIOUS WORK

- Rule of Thumb
  - Buffer Size = 2RTT * C
  - 2RTT is the Round Trip Time
  - C is the capacity of bottleneck link
  - Holds true for a single TCP flow OR few synchronized TCP flows

- Appenzeller
  - Buffer Size = (2RTT * C)/ sqrt(N)
  - N is the number of concurrent flows in a link
  - Works for a few hundred unsynchronized flows

OBSERVATIONS FROM PREVIOUS WORK

- Theoretical in nature

- Holds true in simulated testbeds

- Does not hold true in links running on a providers backbone
  - Trans-pacific and trans-atlantic links of latencies of 150 and 90 ms with link utilization of < 30% show packet discards with small buffers
  - WAN links within NA with large buffers and link utilization of 60—70% show packet discards

- Need for new work

MAIN ISSUE

- Lack of a standardized way to mine empirical data

- Lack of a concise method to present mined data in a readable fashion

Data required for study of Router Buffer Sizes

1. Number of Concurrent Flows, N

2. Length of the Flow, L

3. Packet Discards, P

4. Reason for Packet Discards, R

5. Resolution of Time Interval, T

6. 5 Tuple Flow Identity, I

Conclusion

- Study of router buffer sizes is important, and incomplete

- Need to mine empirical data for said study is important

- Need to standardize these methods would be useful