Evaluating the Potential of Bandwidth Estimators

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Overview

Background

Bandwidth Estimators

Evaluations

Preliminary Results

Conclusions
Network Model in Bandwidth Estimation

Bottleneck Link
Existing Techniques

• Design justification
  - Use single-hop path with constant rate fluid CT to identify measurement rationale

![Graph showing ro vs ri with point A](image)

• Performance evaluation
  - Compare to Router MRTG report
Problems

• A lot of factors can affect the measurement accuracy
  - Practical issues
  - Algorithmic problems

• Current performance evaluation is monolithic
  - Can not identify the source of measurement errors
  - Less reproducible and even can be conflicting
Bandwidth Estimators and performance metric

- **Avail-bw inference algorithm**
  - Input: the probing input and output
  - Output: Avail-bw estimation result

- **Performance metrics**
  - Single-hop potential
  - Multi-hop robustness

BW Estimator
Measurement targets of Bandwidth Estimators

Input Poisson cross-traffic

Input construction

Bandwidth Estimator

Output construction

10mb/s

Output cross-traffic
Classification of Bandwidth Estimators

• Non-iterative estimators
  - Fixed probing input
  - Every probing produces an estimation
  - Delphi, Spruce, Pathchirp

• Iterative estimators
  - Adapt probing input to find the construction that bring out AW.
  - Pathload, IGI/PTR, TOPP
Trace-driven testing
Why not just do NS2 simulation.

• Need much longer trace and time

• Inter Probing pattern introduces ASTA bias
Results: Cross-traffic trace
Results for Spruce Estimator

![Graph showing Spruce Estimation vs. Input Rate $r_1$ (Mbps)]
Results for PTR Estimator
Results for IGI Estimator
Results for TOPP Estimator

![Graph showing TOPP expected curve and real probing curve against probing input rate vs. ratio r/l']
Conclusion and Future Work

• Our testing procedure
  - Quickly and easily evaluate one performance aspect of BW estimators
  - Provide guidance to choose better tunable parameters.

• Ongoing work
  - Evaluating pathload and pathChirp
  - Understanding the phenomenon observed
Thank You!