Timely, Reliable, and Cost-Effective Internet Transport Service using Dissemination Graphs
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Motivation
• New applications require both extreme timeliness and high reliability
• State-of-the-art: Overlay networks support applications like live video with 99.999% reliability and 200ms one-way latency on continent scale
• Remote manipulation: 130ms roundtrip, with 80ms roundtrip propagation delay

Dissemination Graphs
• Goal: Maximize the probability that a packet makes it to its destination on time (65ms)
• Approach: Send messages over a subgraph of the network, rather than a single path
• Case study: Washington (1) to San Jose (3)
  – Occurred May 25, 2016 7:22 am EDT
  – 25-40% loss on San Jose’s incoming links
  – 72-94% single-path reliability (with recovery)

Constructing Dissemination Graphs
• Overlay flooding: optimal reliability, high cost
• Disjoint paths: uniform investment, can do better
• Optimal calculation (based on cost, reliability): too computationally expensive (NP-hard problem)
• Data-informed: what problems occur in real networks?

Data-informed Approach
• Use 2 disjoint paths graph in normal case
• If problem detected around source and/or destination, switch to graph maximizing links out of source and/or into destination
• Problems over 1 week in August 2016: 154 with single path, 40 with 2 paths; improves 23/40