Broadband Internet Performance: A View from the Gateway

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What Affects Broadband Performance?


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Money › Internet, phones & broadband

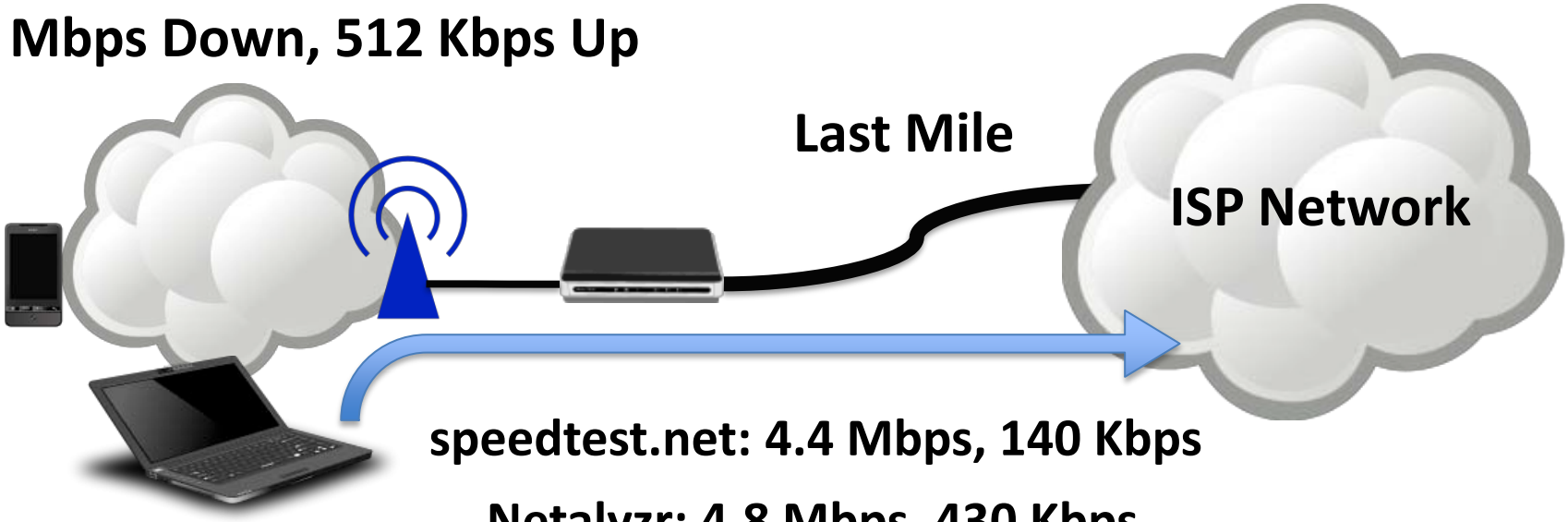
Ofcom: Broadband ISPs are pulling a fast one

- Average speed 46% below that promised by ISPs
- Mandatory code and clear penalties vital, experts say

- Important for regulators, consumers, ISPs
- Notion of performance is fuzzy
  - What metrics should we measure?
  - How to measure them?

Accurate Measurements are Difficult

Home Network: AT&T DSL
6 Mbps Down, 512 Kbps Up



End host measurements are not continuous, and affected by *confounding factors*

The Case For the Gateway

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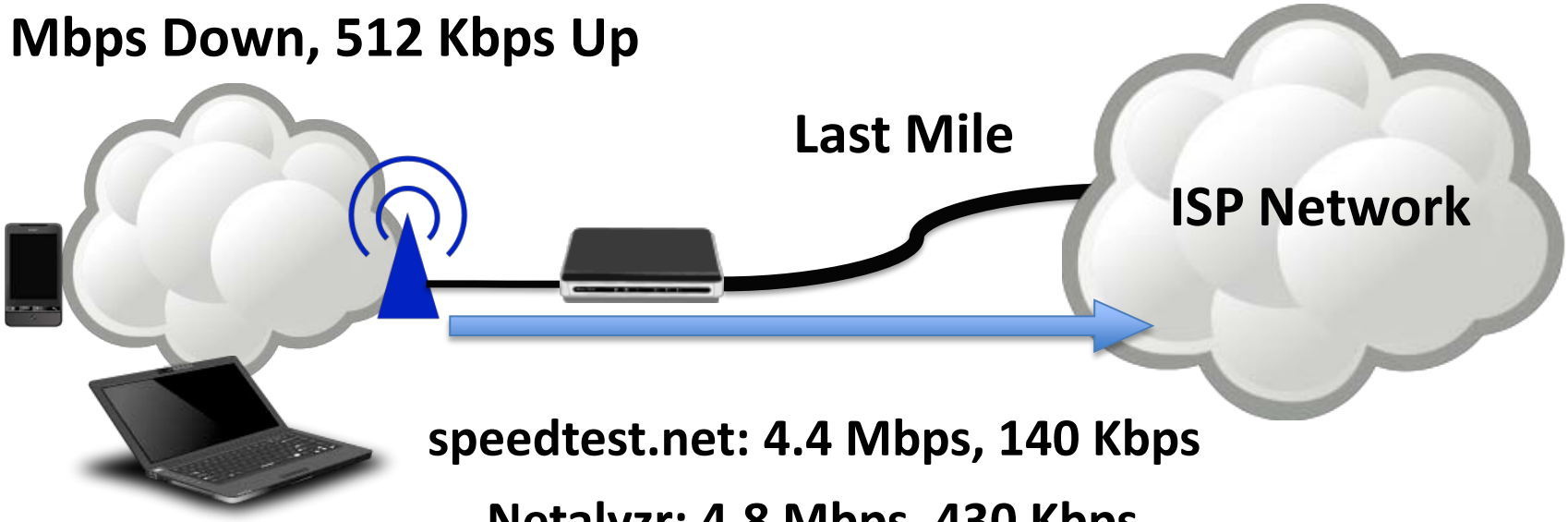


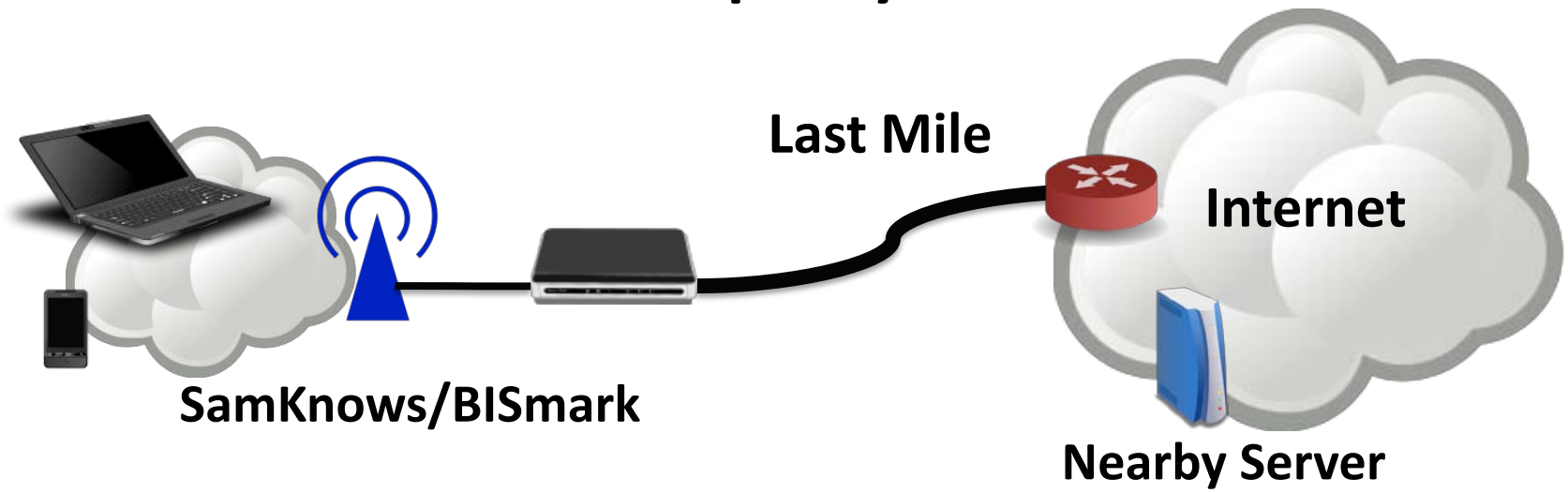
speedtest.net: 4.4 Mbps, 140 Kbps

Netalyzr: 4.8 Mbps, 430 Kbps

Gateway: 5.6 Mbps, 460 Kbps

Gateway enables periodic measurements, and can account for confounding factors

The Deployments



- Breadth: The FCC/SamKnows study
  - 4,000 gateways, 16 ISPs, multiple service plans
- Depth: The BISmark study
  - 16 gateways in Atlanta, on-demand measurements
- Duration: Dec 2010 – Jan 2011

Results: Overview

- Throughput measurement technique depends on usage scenario
- Traffic shaping is highly variable across users
- Access link characteristics affect performance
- Modem buffers induce high latency

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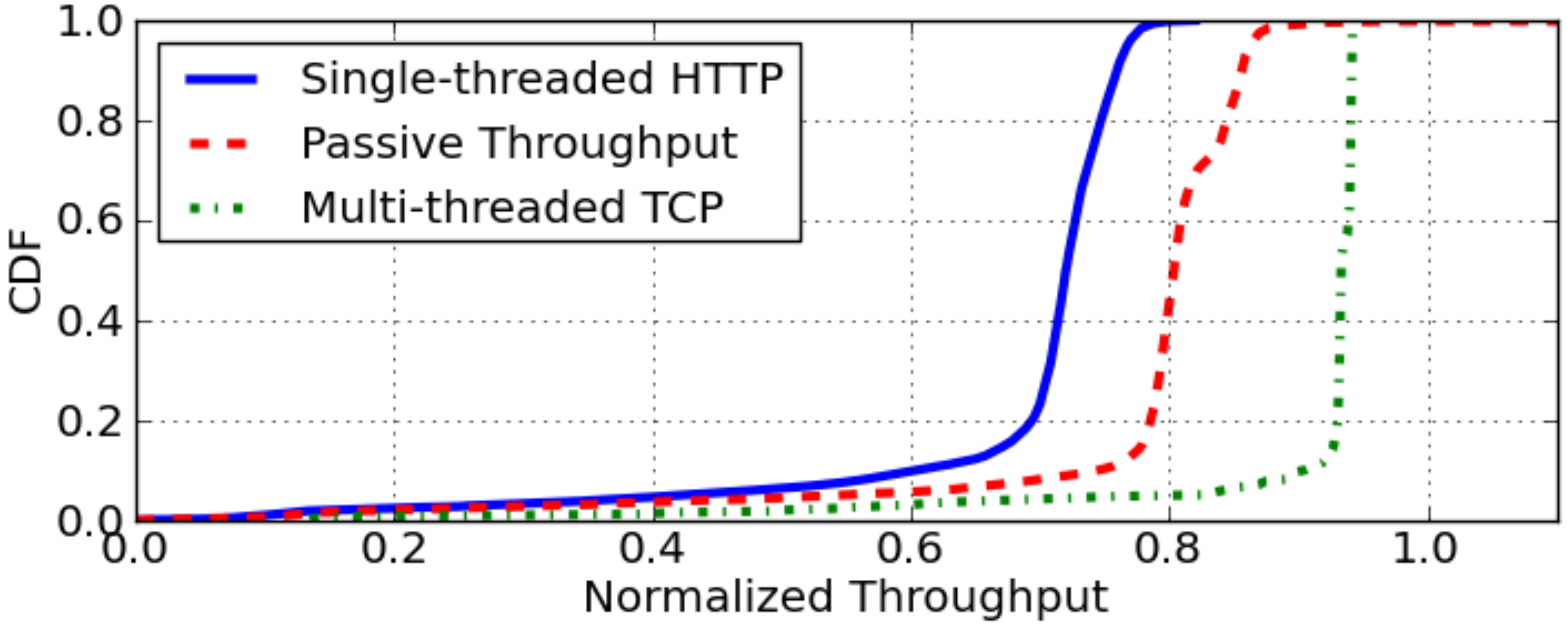
Interpreting Throughput Results



Different techniques measure different aspects of throughput

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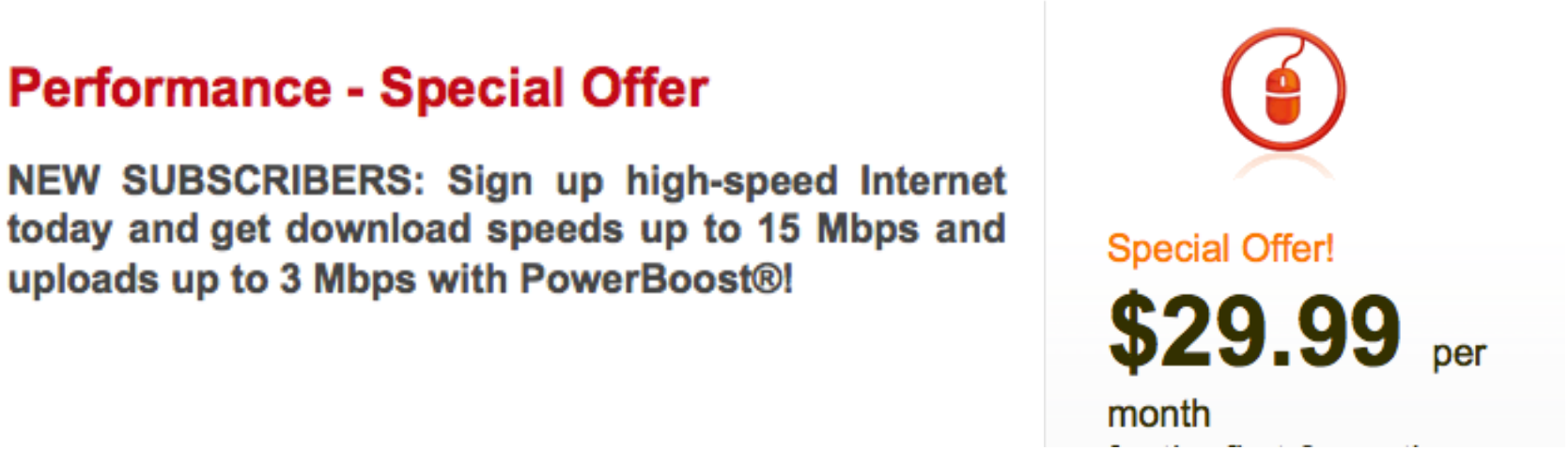
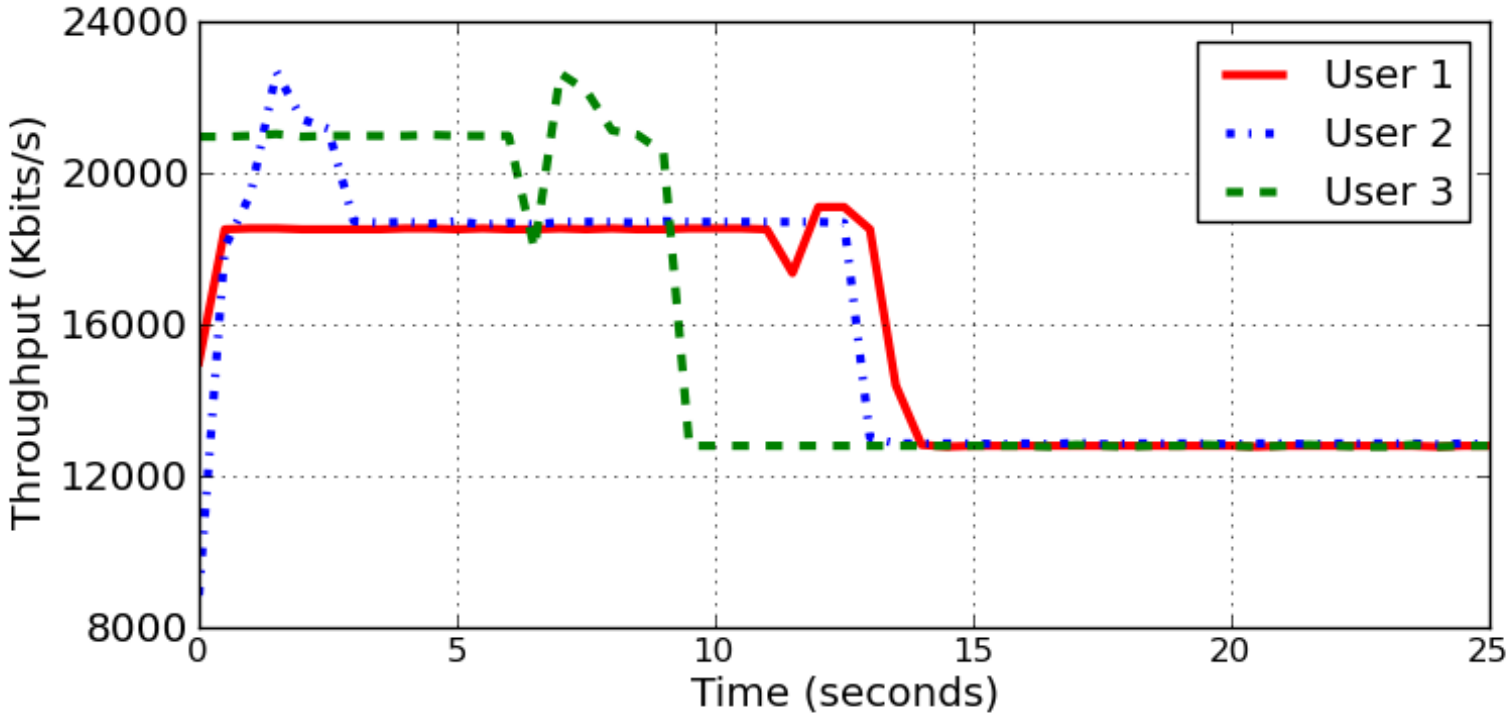
Traffic Shaping: PowerBoost



- Cable companies advertise “PowerBoost”
  - Short bursts of high bandwidth
- Non-existent in DSL

Traffic Shaping Varies Across Users



Short-term throughput significantly different from sustainable throughput

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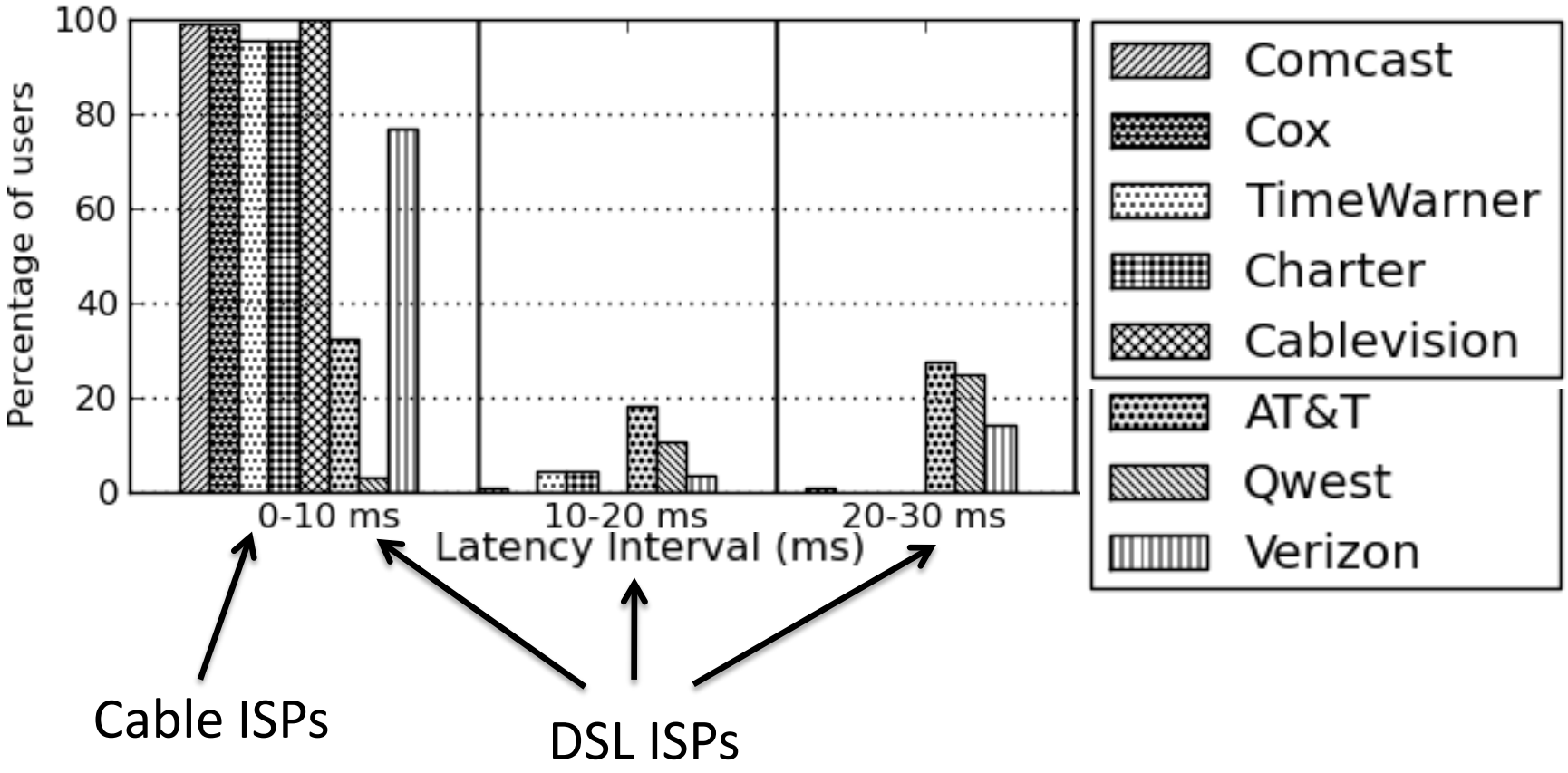
Latency Measurements

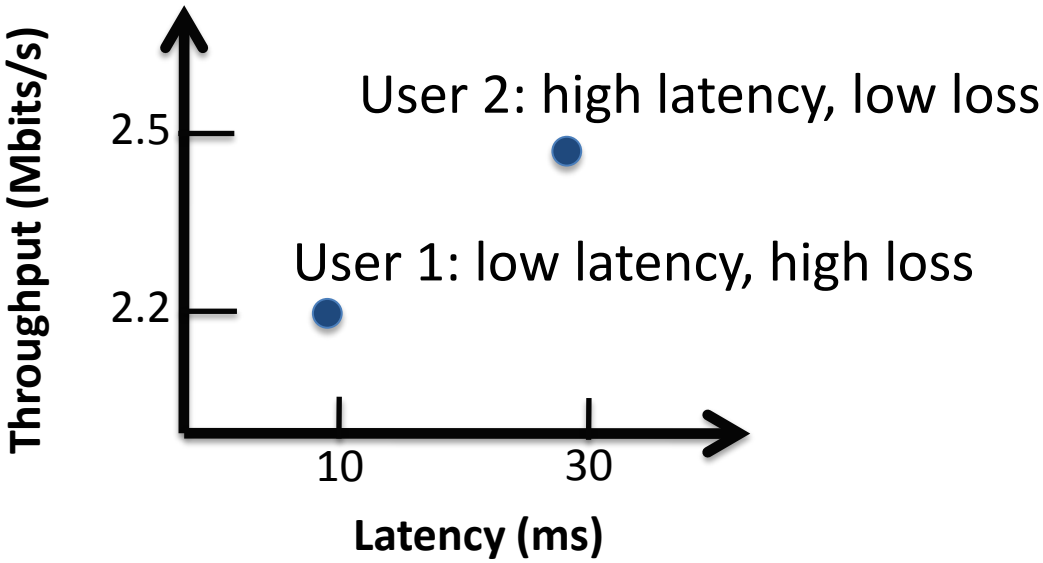
Parameter	What it captures
End-to-end	Latency to nearby server
Last-mile	Latency to edge of ISP network
Under Load	Buffer delays due to cross traffic

Impact of Last-mile on Latency



DSL last-mile latencies can be very high

Example: Latency-Throughput Tradeoff



Both users have same service plan

Interleaving decreases loss, increases latency, improves throughput

Interleaving creates a trade-off between latency and throughput

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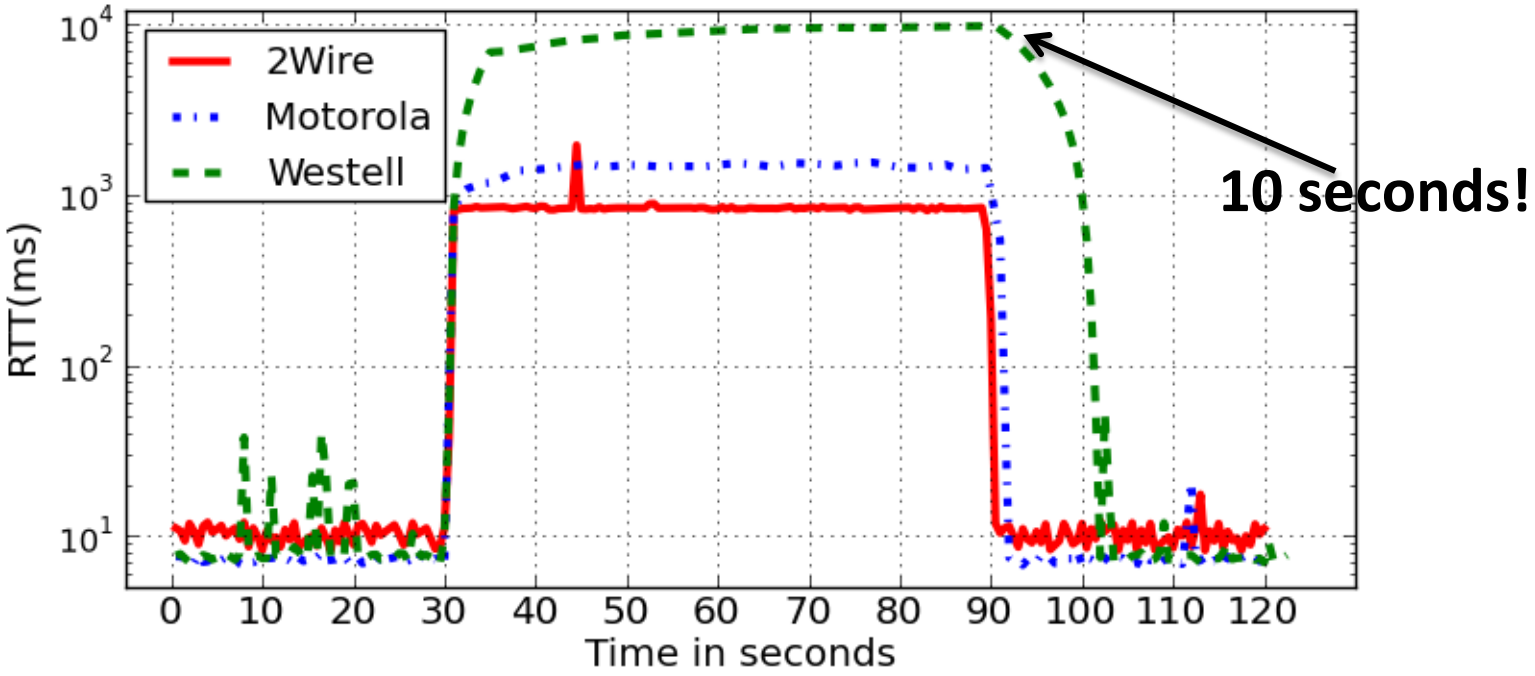
Modem Buffers are Too Large



Service plans can interact badly with modem buffers

Conclusion

- The gateway provides unique insight into home network
- Throughput measurements are affected by measurement technique, shaping
- Latency is affected by last-mile, buffering

Discussion

- Limitation and Weakness
  - ❖Evolution (Change in performance over time)
  - ❖One server for US
  - ❖They did not talk about the wire part of the path (routing), as different ISPs have different policy, topology, and peering point
- Very interesting data set and measurement deployment
  - ❖Openflow Programmable Gateway