BISMark: A Platform for Studying Home Networks

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Understanding home Internet performance requires a vantage point in the home

Our platform: BISMark

- **Instrumented routers in homes**
- **Vantage point behind modem**
- **View into ISP and home network**

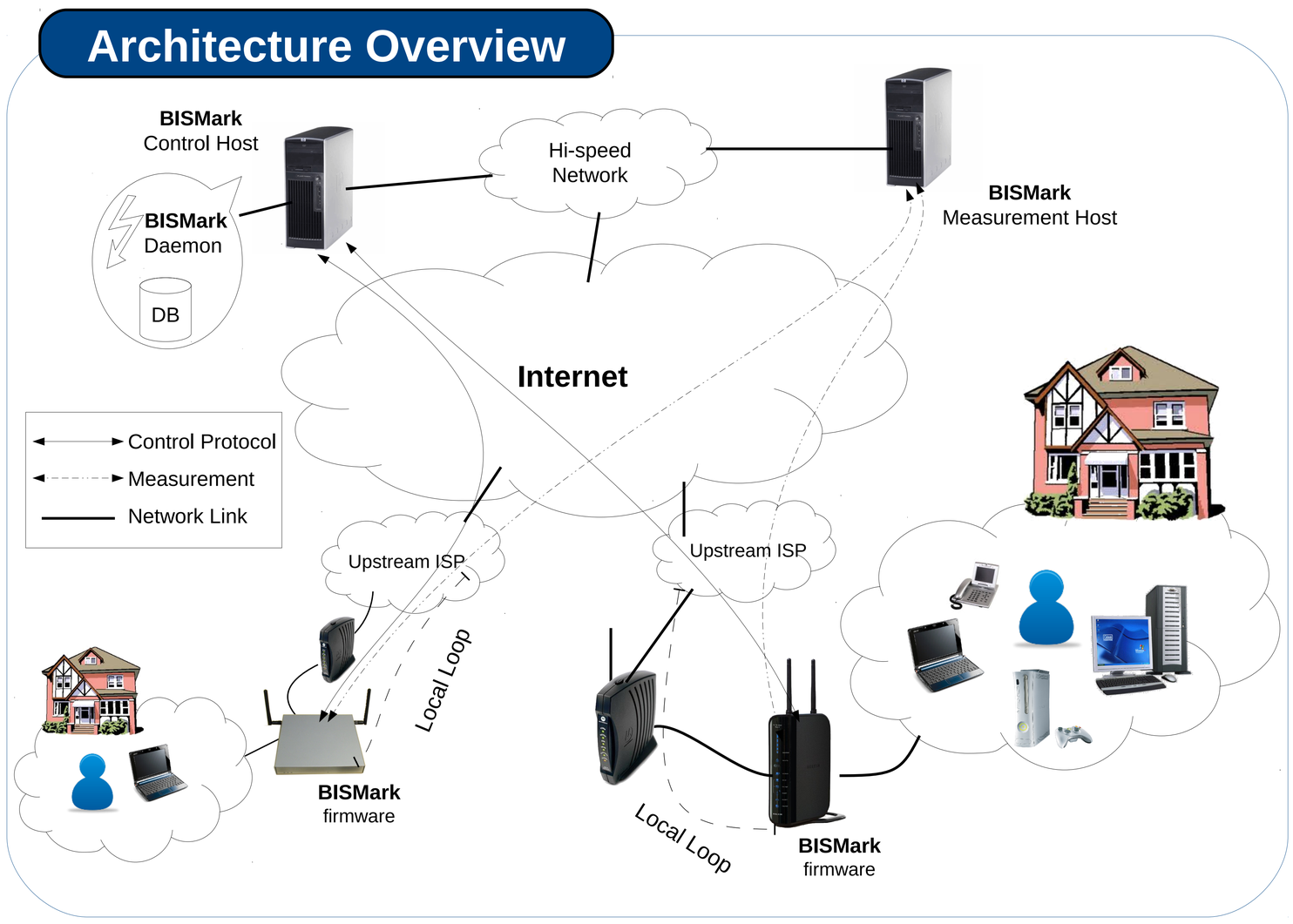
Why?

- **Measurements from the outside or from end hosts are limited**
- **Cannot account for confounding factors**

What can we study?

- **Impact of local loop:** Cable vs. DSL
- **Impact of ISP policy:** traffic shaping
- **Impact of home network:** Wi-Fi
- **Usage profiles:** Gaming vs. Netflix

Architecture Overview



Current devices

NOX Box
500Mhz Geode CPU
256 MB RAM
2GB Flash

Netgear WNDR3700
680Mhz MIPS CPU
64 MB RAM
8MB Flash

Current Measurements

Active

Throughput: TCP/UDP
Latency: Last mile, under load
Jitter: upstream, downstream
Packet loss: UDP/ICMP
DNS: delay, availability

Customized to user profile

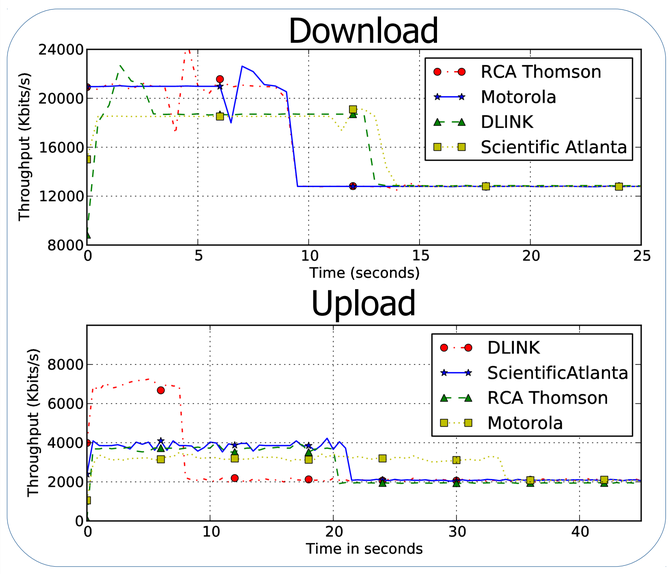
Passive

Throughput: per-application
Packet headers: anonymized
Wireless: accesspoints, clients
DHCP: requests, leases
ARP: associations

Ability to turn off collection

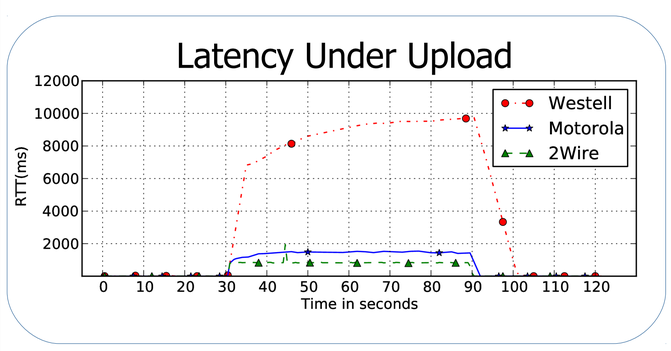
Preliminary Results

ISP Shaping Policies



- **PowerBoost effects**
- **Peak values, duration vary across users**
- **Same sustainable throughput**
- **Significant effect on:**
  - **browsing experience**
  - **speedtests**

Modem Buffering



- **Modem buffers are oversized**
- **Minimum observed buffer ~50KB**
- **Latencies atleast 750ms, upto 10 seconds for DSL**
- **Significant effect on interactive applications**

Main Features

- **Active measurements synchronization**
- **On-demand remote router control/update**

Current Status

- **16 deployments across Atlanta**
- **3 major ISPs, multiple service plans**

Future Work

- **Deploy up to 35 NOX Boxes**
- **Development of OpenWRT images for Netgear platforms**
- **Emulab-like testbed for homes**
- **Implications on privacy**
- **Development of non-intrusive, low-overhead tests**
- **Study of the effect of home network**
- **Study of user profiles**