Workshop on Active Internet Measurements

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Company Background

WAREHOUSE IN 2008

Regulatory work

Since 2008
UK

Since 2010
USA

Since 2011
Europe

Since 2011
Singapore

United Kingdom

United States of America

European Union

Austria

Belgium

Bulgaria

Croatia

Cyprus

Czech Republic

Denmark

Estonia

Finland

France

Germany

Greece

Hungary

Iceland

Ireland

Italy

Latvia

Lithuania

Luxembourg

Malta

Netherlands

Norway

Poland

Portugal

Romania

Slovakia

Slovenia

Spain

Sweden

Singapore

UNDISCLOSED REGULATOR (AMERICAS)

2012

UNDISCLOSED REGULATOR (ASIA)

2012

UNDISCLOSED REGULATOR (AMERICAS)

2012

FCC Recap

FCC Recap (1)

- Studied top 16 fixed-line ISPs in the US, representing 85% of consumers
- First large scale study of its kind in the US to use hardware measurement devices
- Approximately 7000 hardware probes used (aka 'Whiteboxes')
- Data captured from March 2011 and presented in August 2011 FCC report

FCC Recap (2)

- FCC wanted to report on (oversimplified):

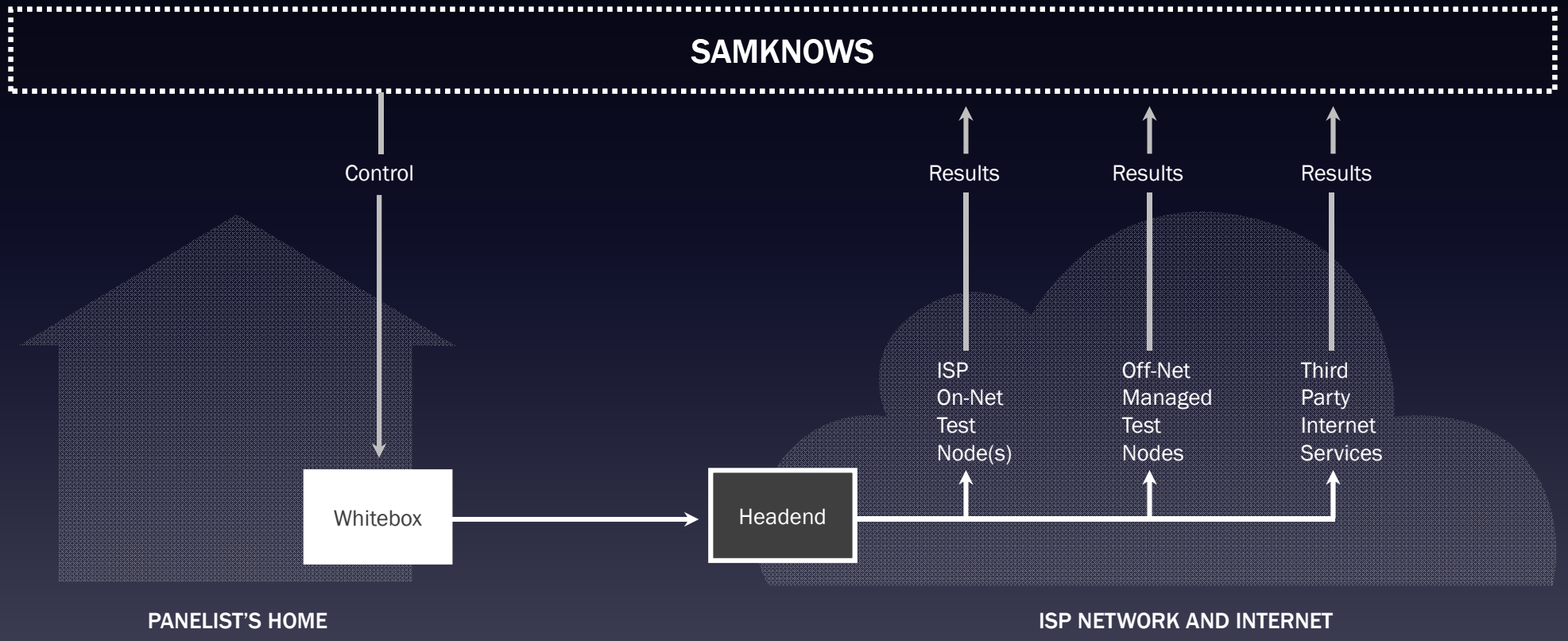
$$\text{Performance}_{\text{(as \% of advertised)}} = \frac{\text{Actual}}{\text{Advertised}}$$

- The problem in previous studies: neither the numerator nor denominator were reliably known!
- Actual speed could be affected by in-home factors or measurement methodology
- Advertised speed relied upon customers supplying this information correctly

Solution for ‘Actual’ (1)

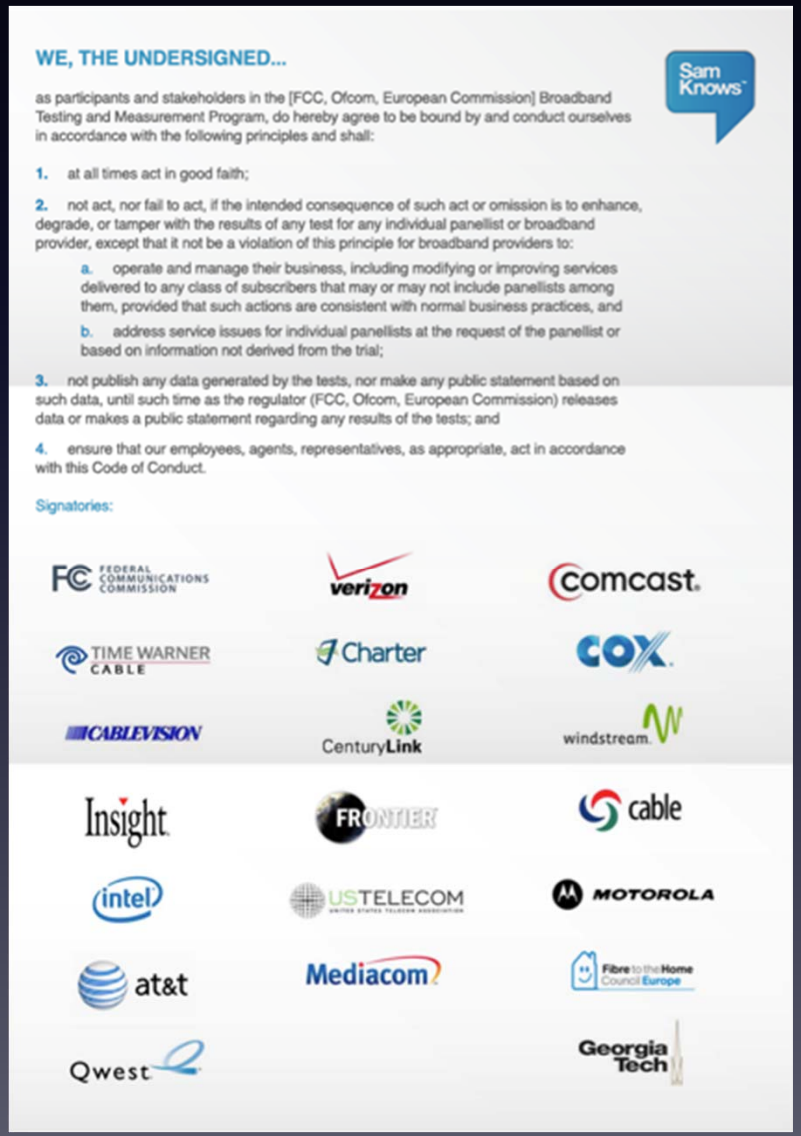
- Hardware probes installed behind ISP CPE
- Runs measurements 24x7, not just when PC is on
- Only runs measurements when home network is idle
- Consistent platform across the panel (not affected by different OS, TCP params, etc)
- All measurements are active (not passive)

Solution for ‘Actual’ (2)



Solution for ‘Advertised’

- Collaboration!
- Regular meetings with ISPs, the regulator (FCC), industry and academics
- Parties signed up to a ‘Code of conduct’
- ISPs blind validated panelist service tiers



WE, THE UNDERSIGNED...

as participants and stakeholders in the [FCC, Ofcom, European Commission] Broadband Testing and Measurement Program, do hereby agree to be bound by and conduct ourselves in accordance with the following principles and shall:

1. at all times act in good faith;
2. not act, nor fail to act, if the intended consequence of such act or omission is to enhance, degrade, or tamper with the results of any test for any individual panellist or broadband provider, except that it not be a violation of this principle for broadband providers to:
   a. operate and manage their business, including modifying or improving services delivered to any class of subscribers that may or may not include panellists among them, provided that such actions are consistent with normal business practices, and
   b. address service issues for individual panellists at the request of the panellist or based on information not derived from the trial;
3. not publish any data generated by the tests, nor make any public statement based on such data, until such time as the regulator (FCC, Ofcom, European Commission) releases data or makes a public statement regarding any results of the tests; and
4. ensure that our employees, agents, representatives, as appropriate, act in accordance with this Code of Conduct.

Signatories:

FCC Federal Communications Commission · verizon · comcast · Time Warner Cable · Charter · COX · CABLEVISION · CenturyLink · windstream · Insight · FRONTIER · cable · intel · USTELECOM · MOTOROLA · at&t · Mediacom · Fibre to the Home Council Europe · Qwest · Georgia Tech

Lessons Learned

Lessons Learned

- "On-net" versus "off-net" measurements
  - M-Lab infrastructure is very good!
  - Difference of 0.4% between M-Lab and ISP measurement servers[1]
- Panelist support
  - Router vs bridge, WiFi setup

1. Sustained downstream throughput results from ~5000 US probes, Feb 1st to Feb 7th 2012, where both M-Lab and ISP results were recorded from the same probes. Summary data available at http://goo.gl/MrBh3

FCC Phase II

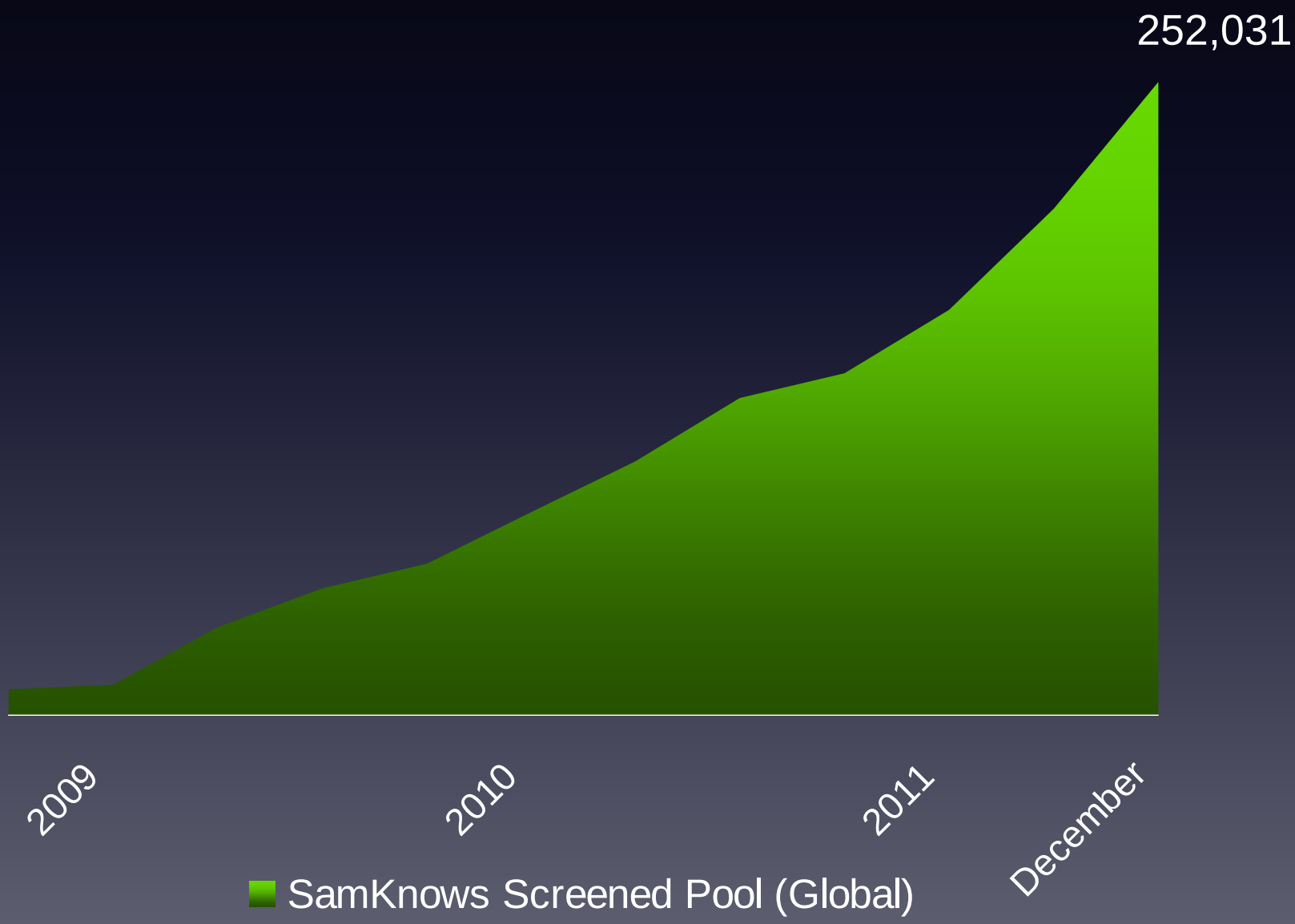
FCC Phase II

- New probes (bridged) – OpenWrt based
  - IPv6 support (devices & measurements)
- Additional tests
  - Refined latency/loss-under-load (credit to MIT)
- Increased sample (Native American Tribal Lands)
- Full IP addresses to be released in raw datasets
- Reports planned for once every six months
- In-home measurement

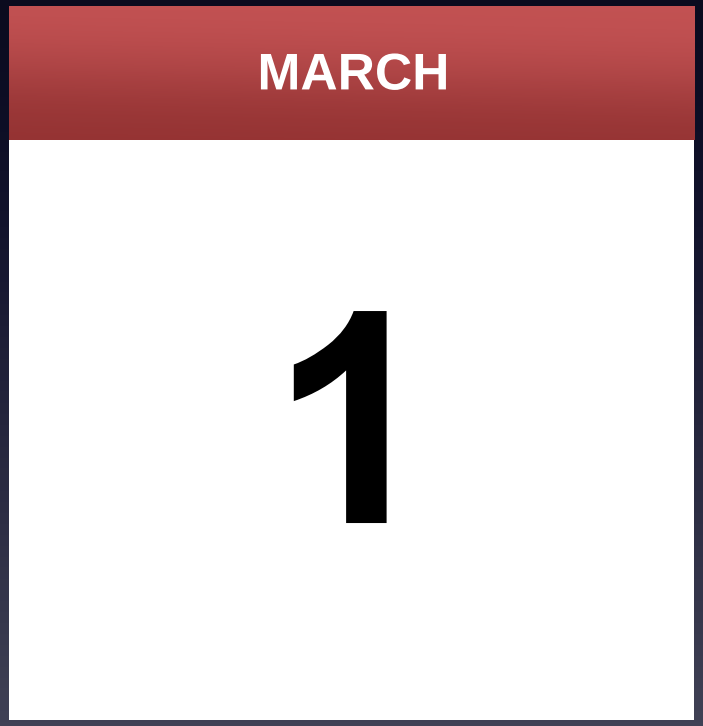
New Whitebox

- All wired devices connect via the probe, wireless unchanged
- The probe runs inline in the home network as a bridge (no NAT)
- Tests only run when the broadband connection is idle
- Wireless activity is passively monitored (encryption is not relevant, just looking at volume)
- Does not look at end user traffic!

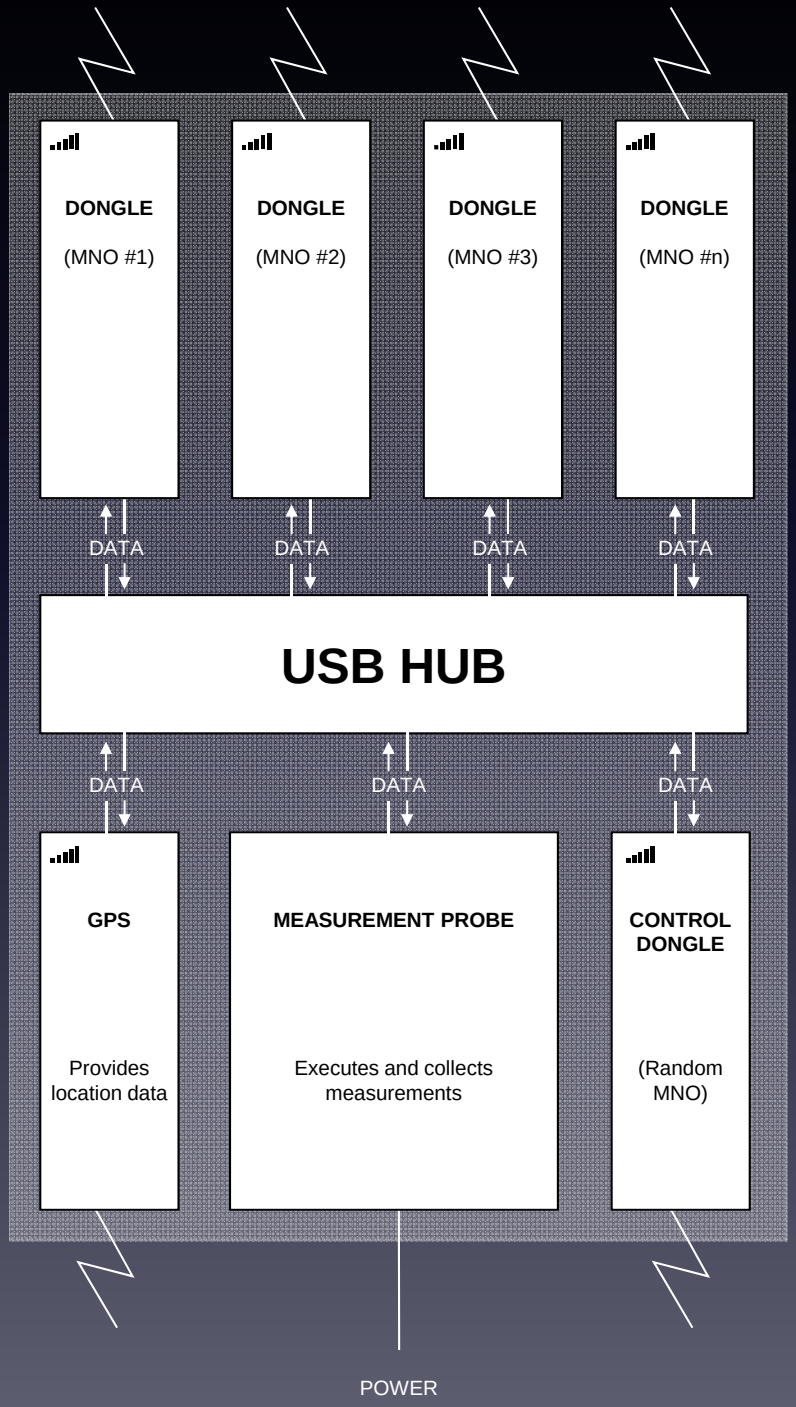
More Volunteers



Next Measurement Period



Mobile Broadband


DONGLE
(MNO #1)
DONGLE
(MNO #2)
DONGLE
(MNO #3)
DONGLE
(MNO #n)
DATA
DATA
DATA
DATA
USB HUB
DATA
DATA
DATA
GPS
Provides location data
MEASUREMENT PROBE
Executes and collects measurements
CONTROL DONGLE
(Random MNO)
POWER

Questions

Please email further questions to
sam@samknows.com