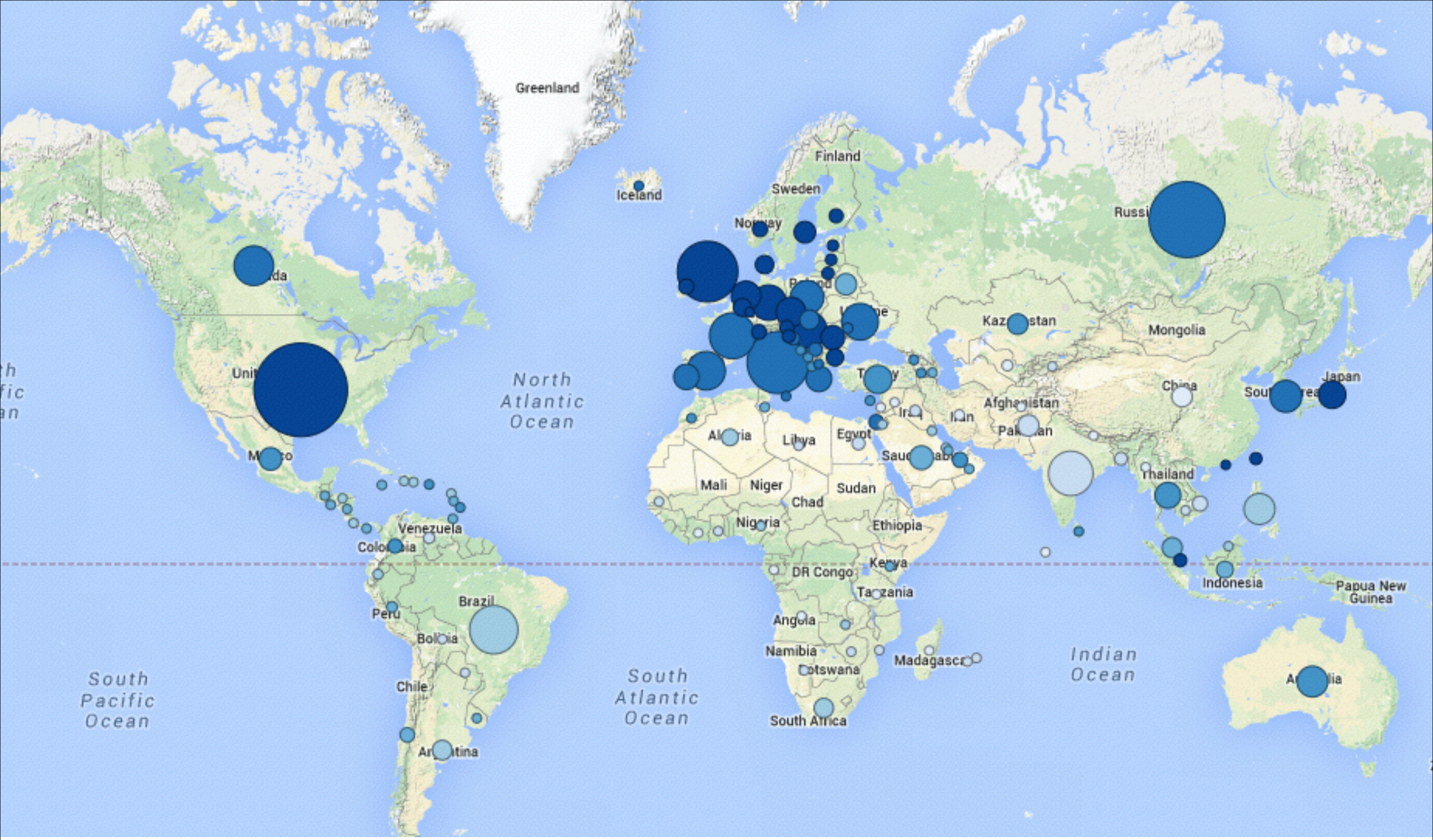
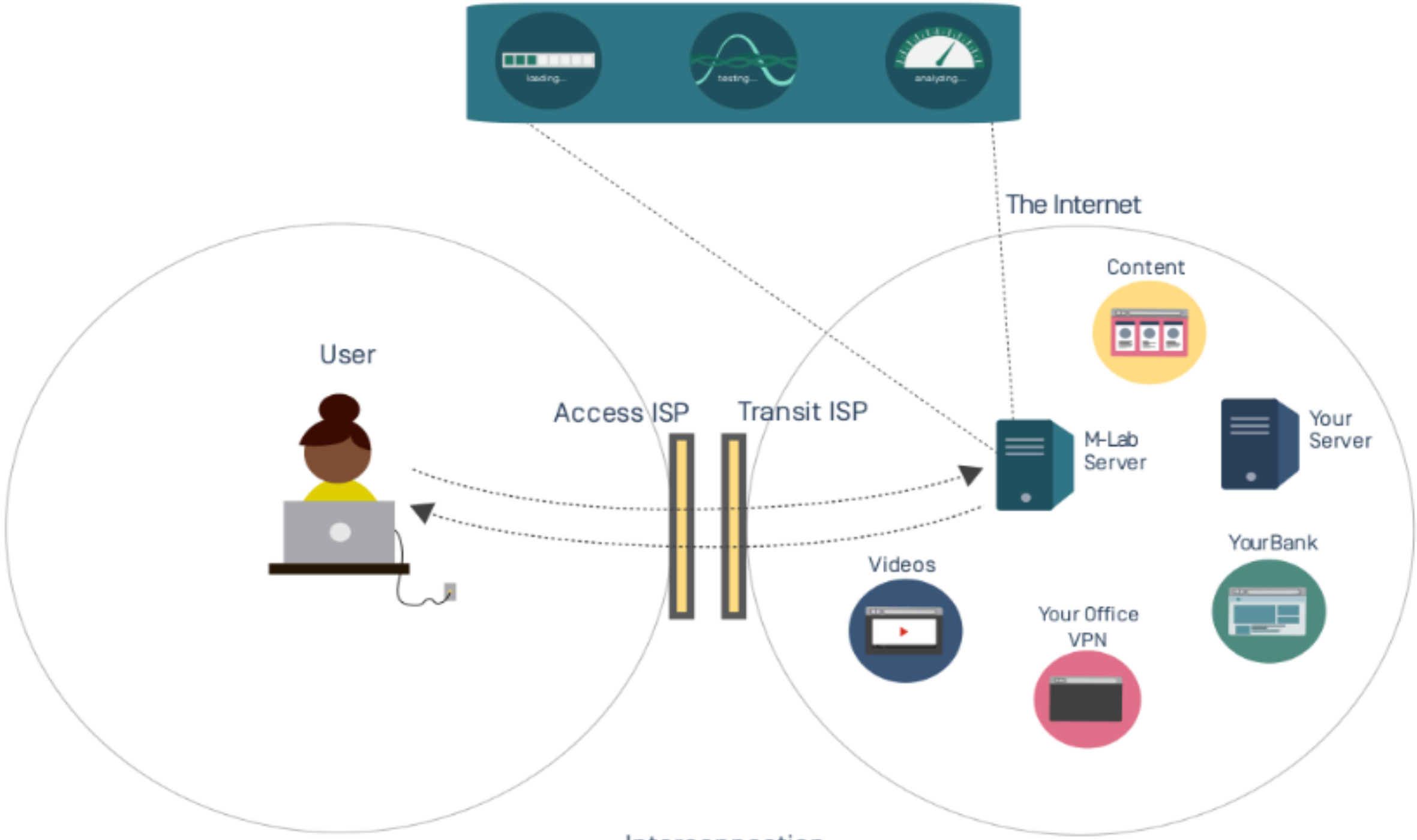
ISP Interconnection and its Impact on Consumer Internet Performance

Measurement Lab



How Measurement Lab Collects Information

About 200,000 Test Per Day



How Measurement Lab Collects Information

Measurements From Everyone

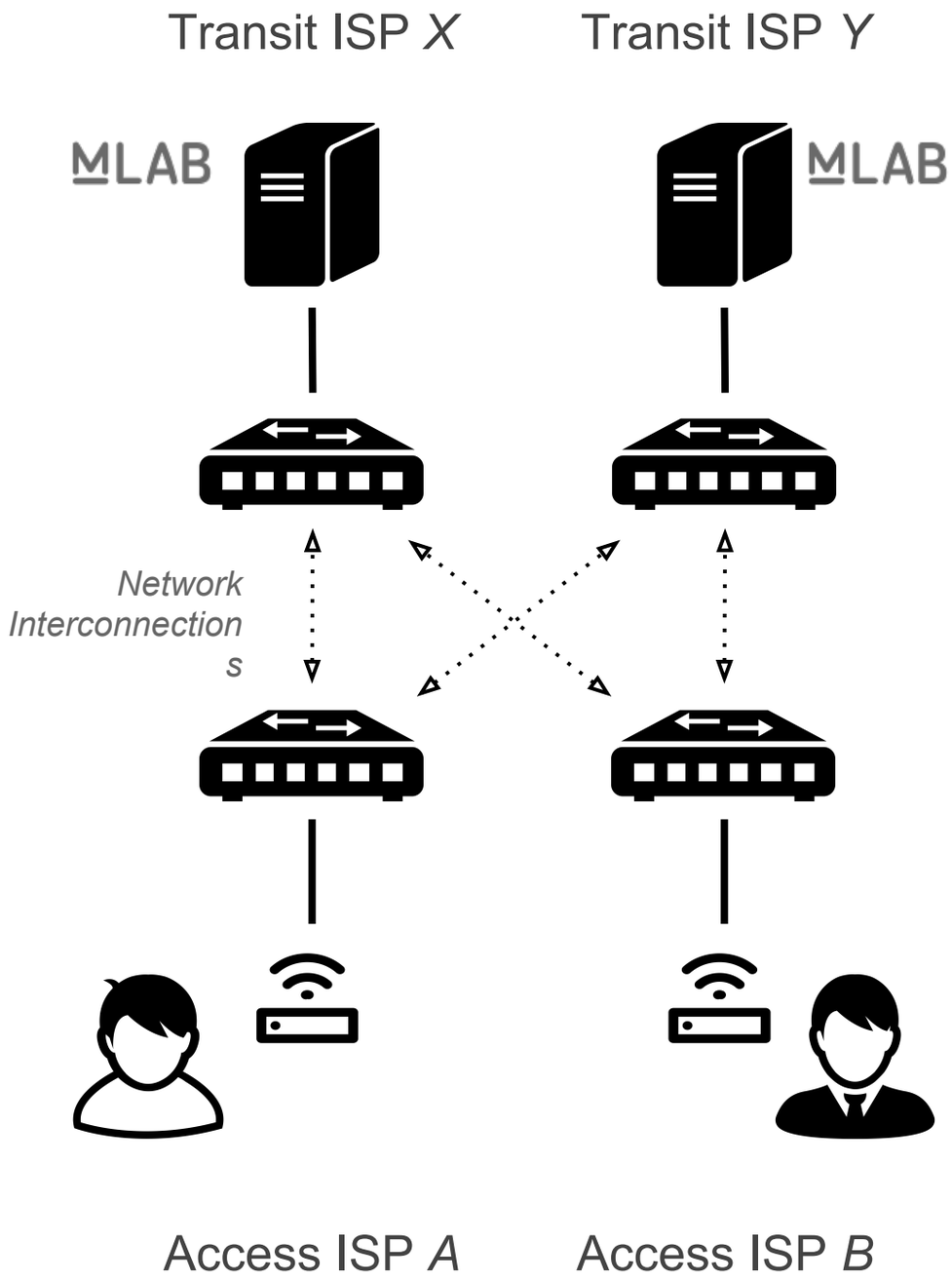
FCC to probe interconnection deals between Internet providers, websites

Measurement has a Place in Policy

We can measure this!

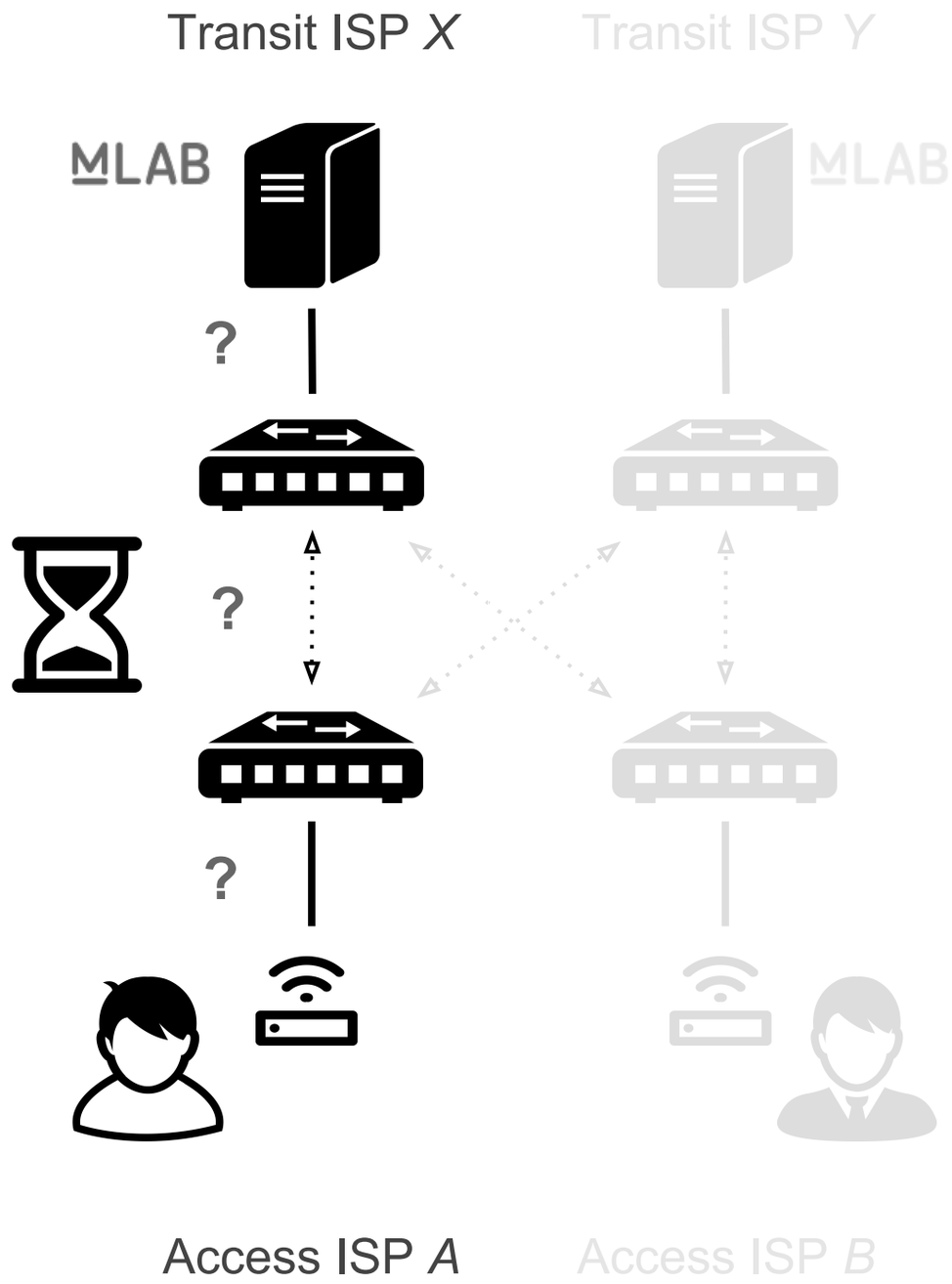
Methodology

Inferring the Source of Congestion



Methodology

Inferring the Source of Congestion



Methodology

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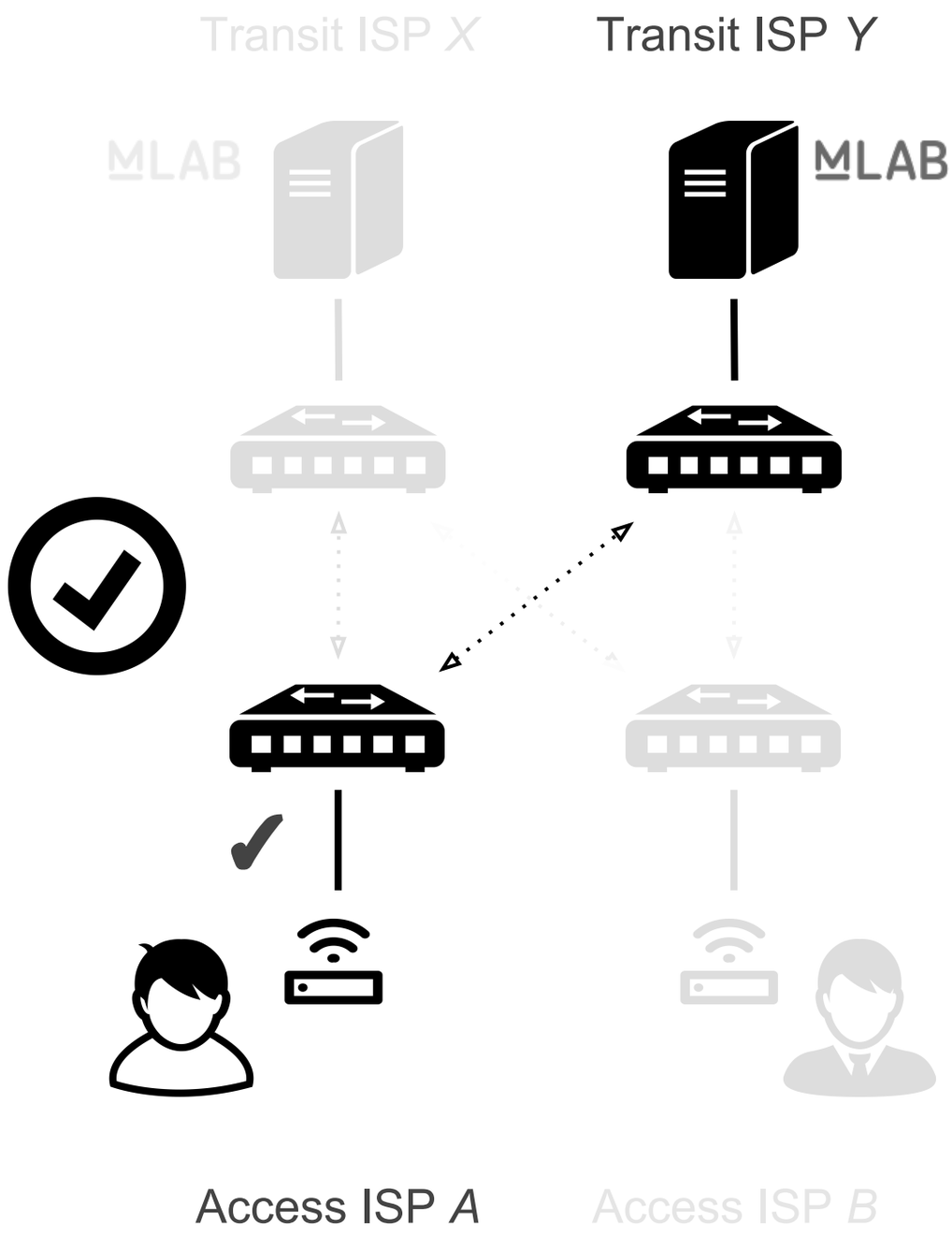
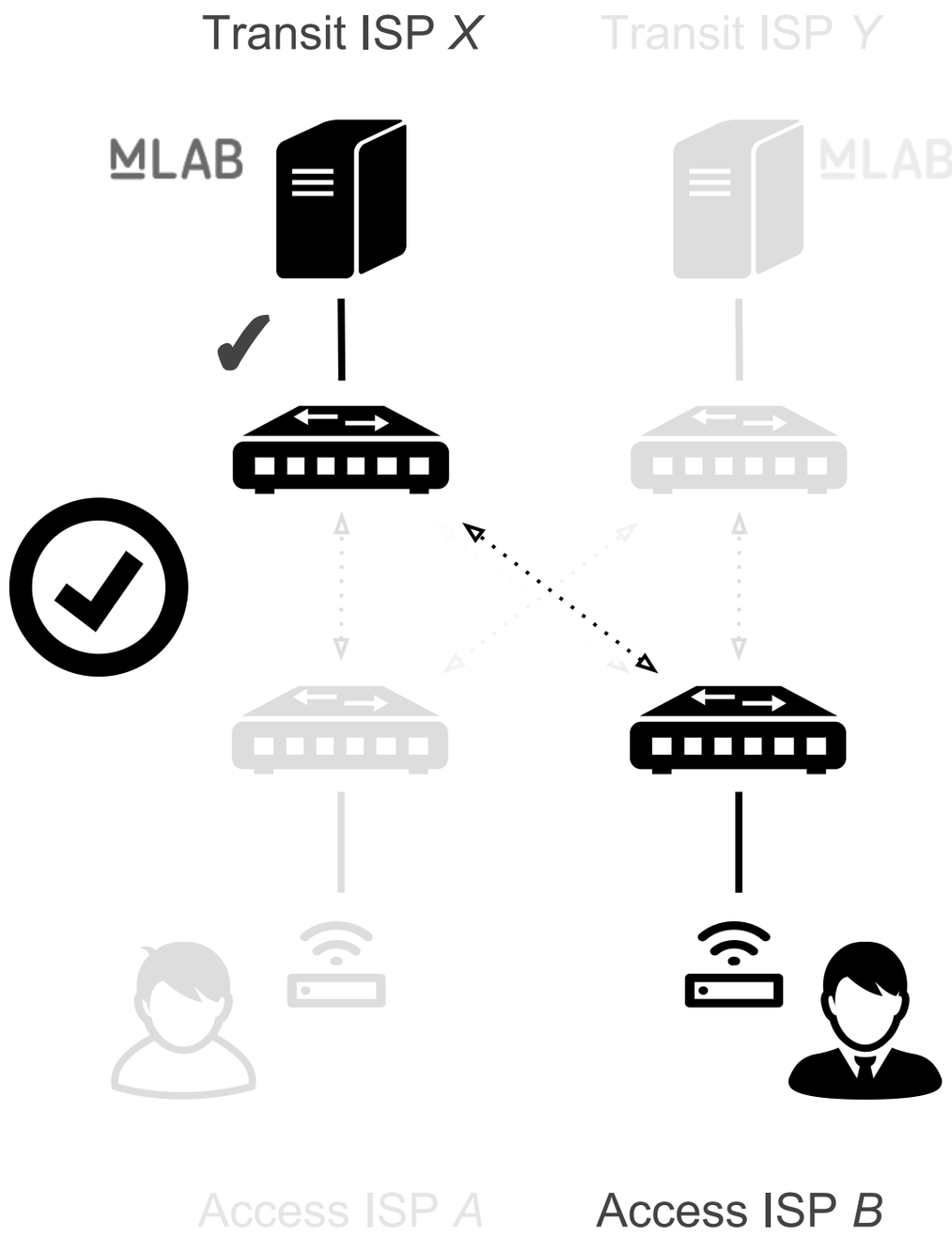


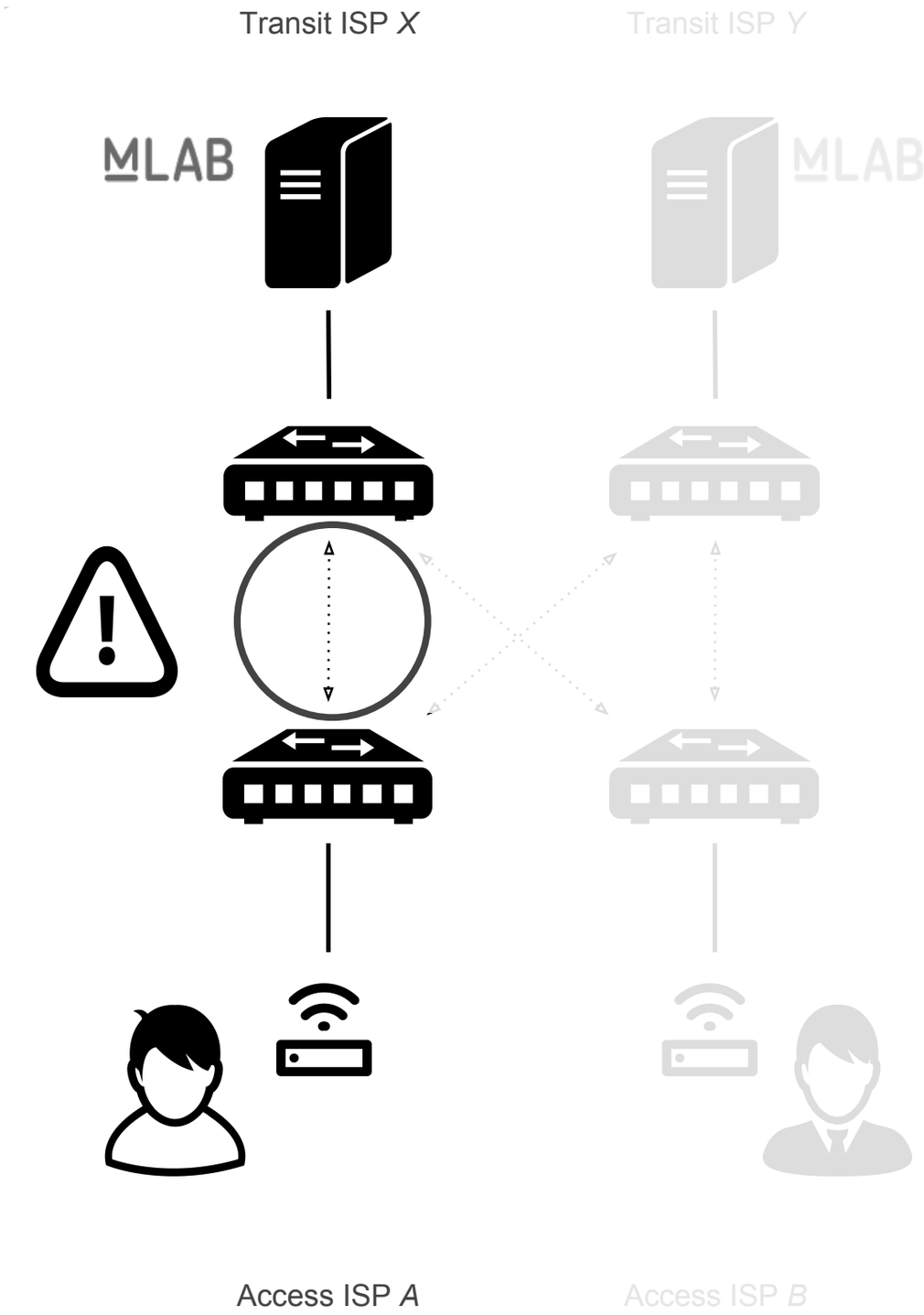
Methodology

Inferring the Source of Congestion



Methodology

Inferring the Source of Congestion



ptseng
New Member

Posts: 2
Registered: 02-25-2014

VPN speed issues

02-25-2014 01:07 PM

Hello,

I am a Comcast Business user with a 50/10 connection in Charlottesville, Virginia.

My needs are simple - I work in a local university hospital, and sometimes need to connect from h overnight or on weekends for urgent patient cases. So when I'm not using the connection as a ho internet connection, I primarily connect to a VPN with a Citrix server, which hosts some proprietary software that displays certain patient data and relevant video. Video is vital to what I do, so I requ reasonable speed.

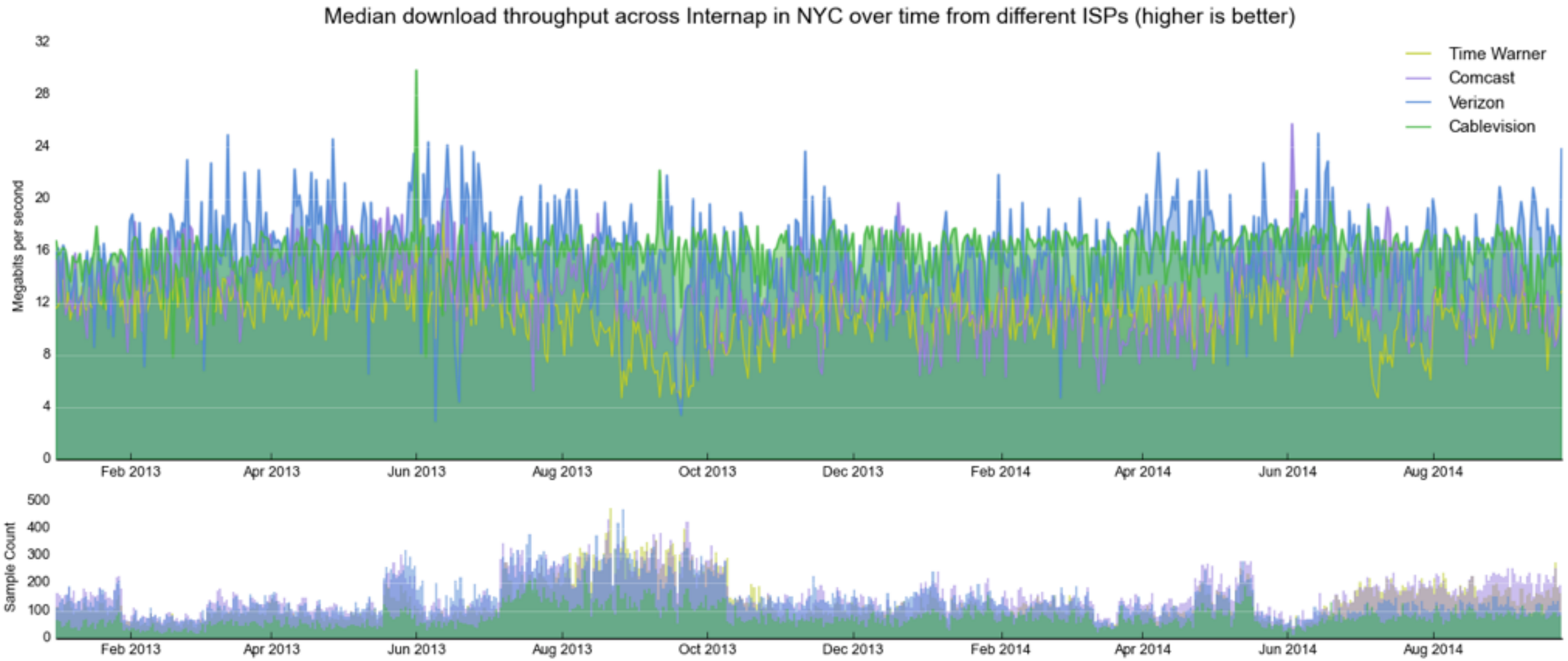
At certain times of the day I've managed to get 15mbit/s down, and video runs at a decent speed. peak times, however, I rarely see speeds upward of 700kbit/s down from the VPN, and the video i slow as to be unusable, I might as well hop in my car and drive to work.

I don't know that I'm checking the appropriate servers, but I ran a tracert to comcast.net from my w computer. I see 9 hops within the intranet, and 6 hops through different Cogent servers, then final multiple Comcast servers across the country. Granted, I'm aware that (1) my work computer is no Citrix server, and (2) comcast.net probably isn't the correct server to be pinging. Nevertheless, I th questions are as follows:

1. How can I fix this?
2. How can I fix this?
3. How can I fix this?

Inferring Sources of Congestion in Practice

US Access ISPs and Cogent (2013-2014)



Inferring Sources of Congestion in Practice

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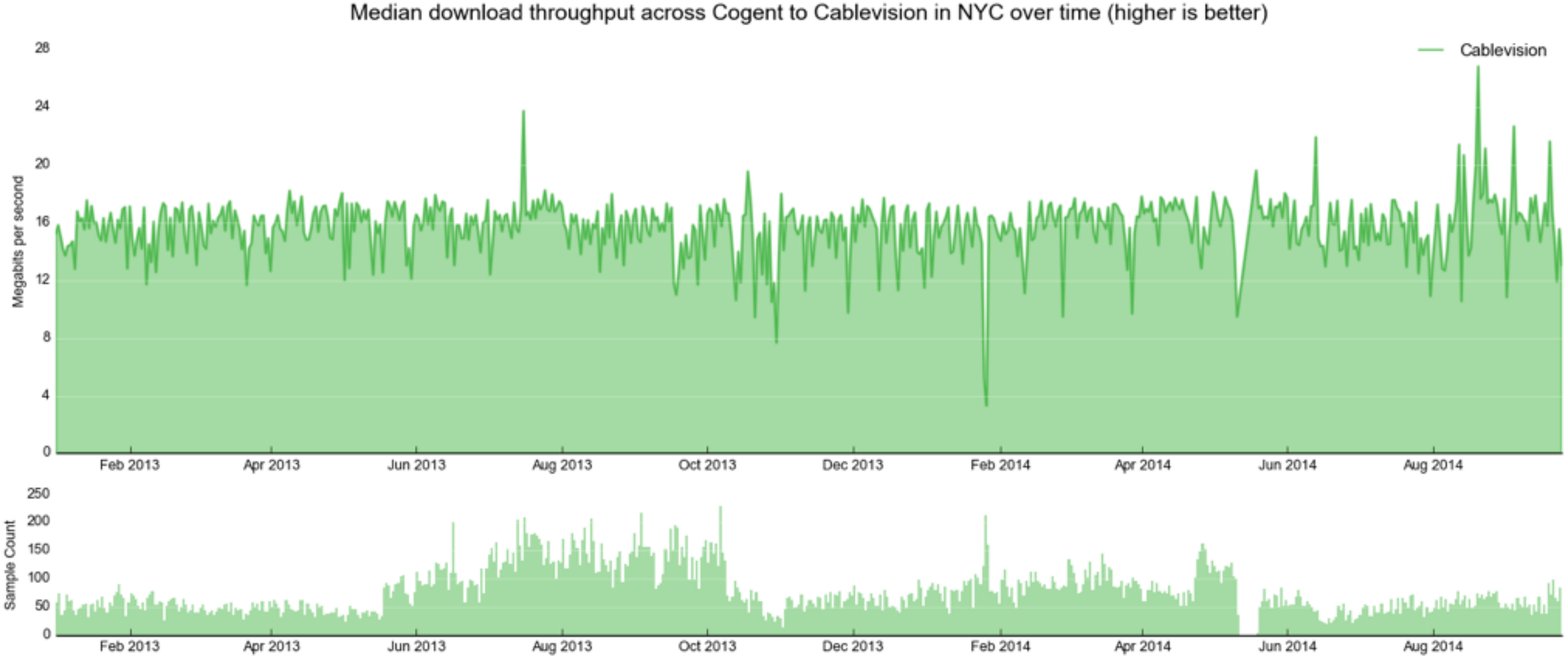

Inferring Sources of Congestion in Practice

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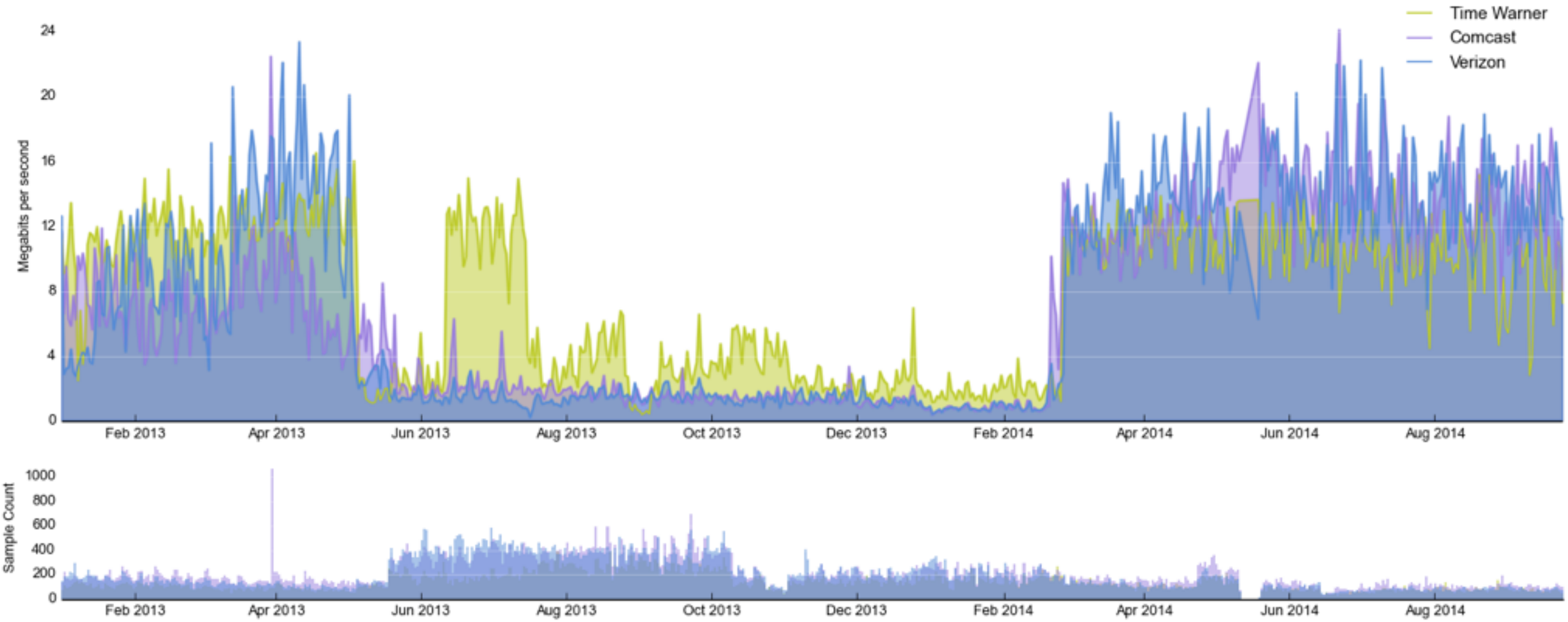
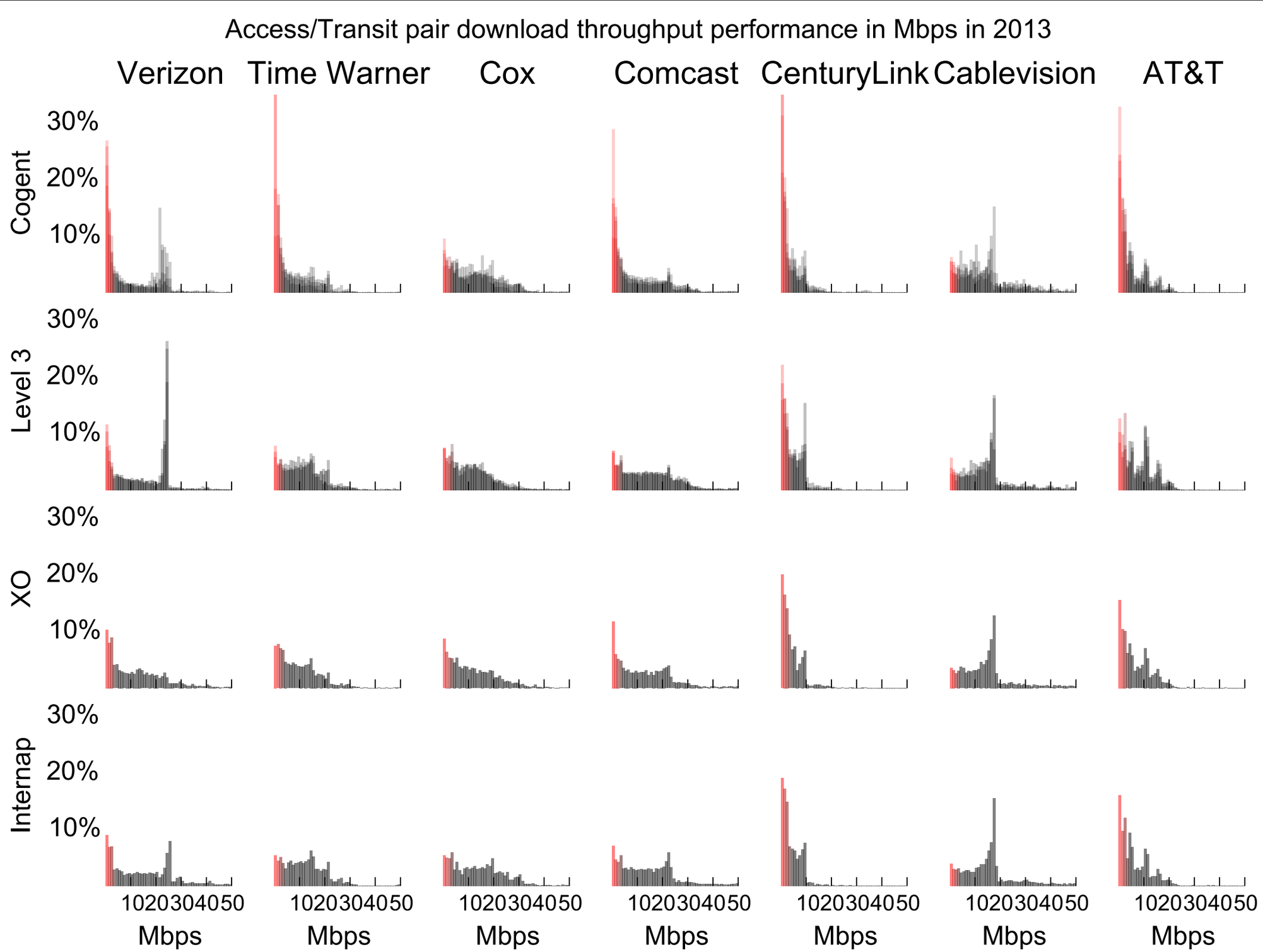


Inferring Sources of Congestion in Practice

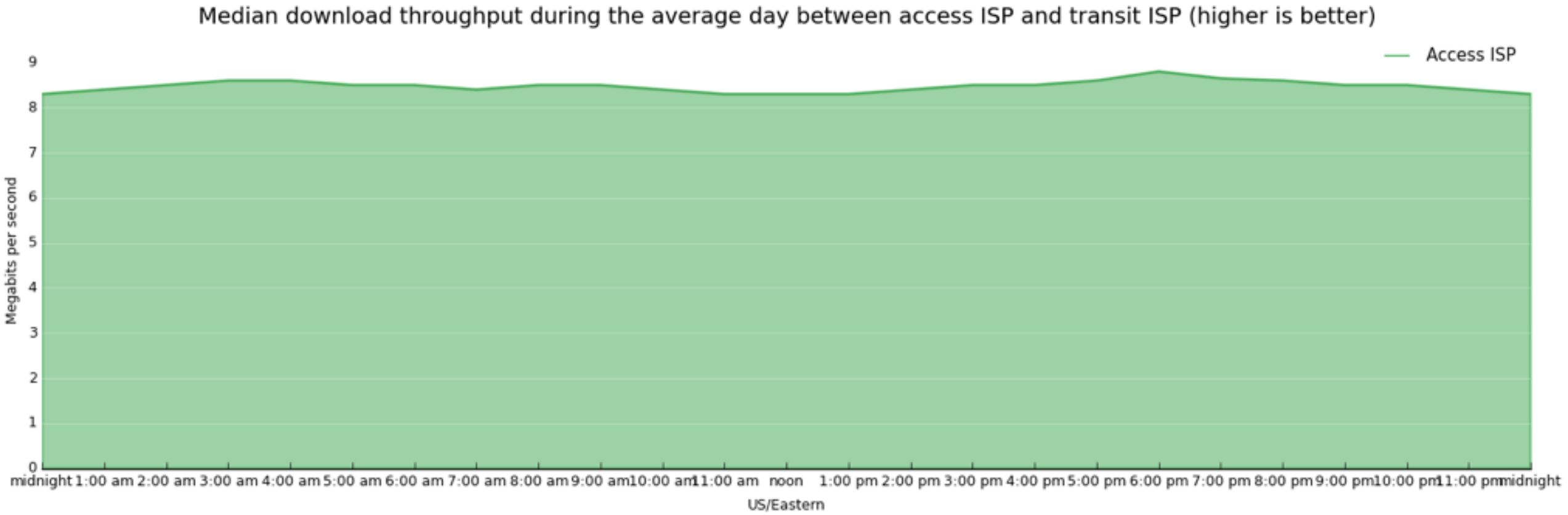
US Access ISPs and Cogent (2013-2014)



Comparative Performance across ISPs

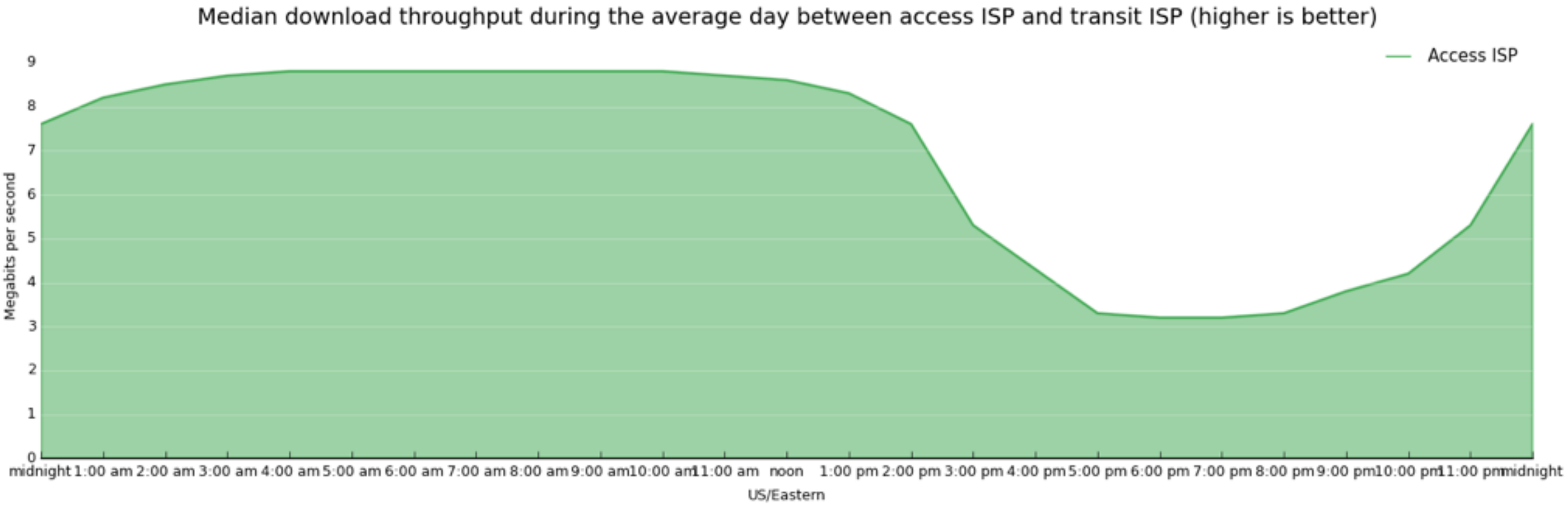
No Access ISPs or Transit ISPs Universally Underperforming

Diurnal Trends Matter



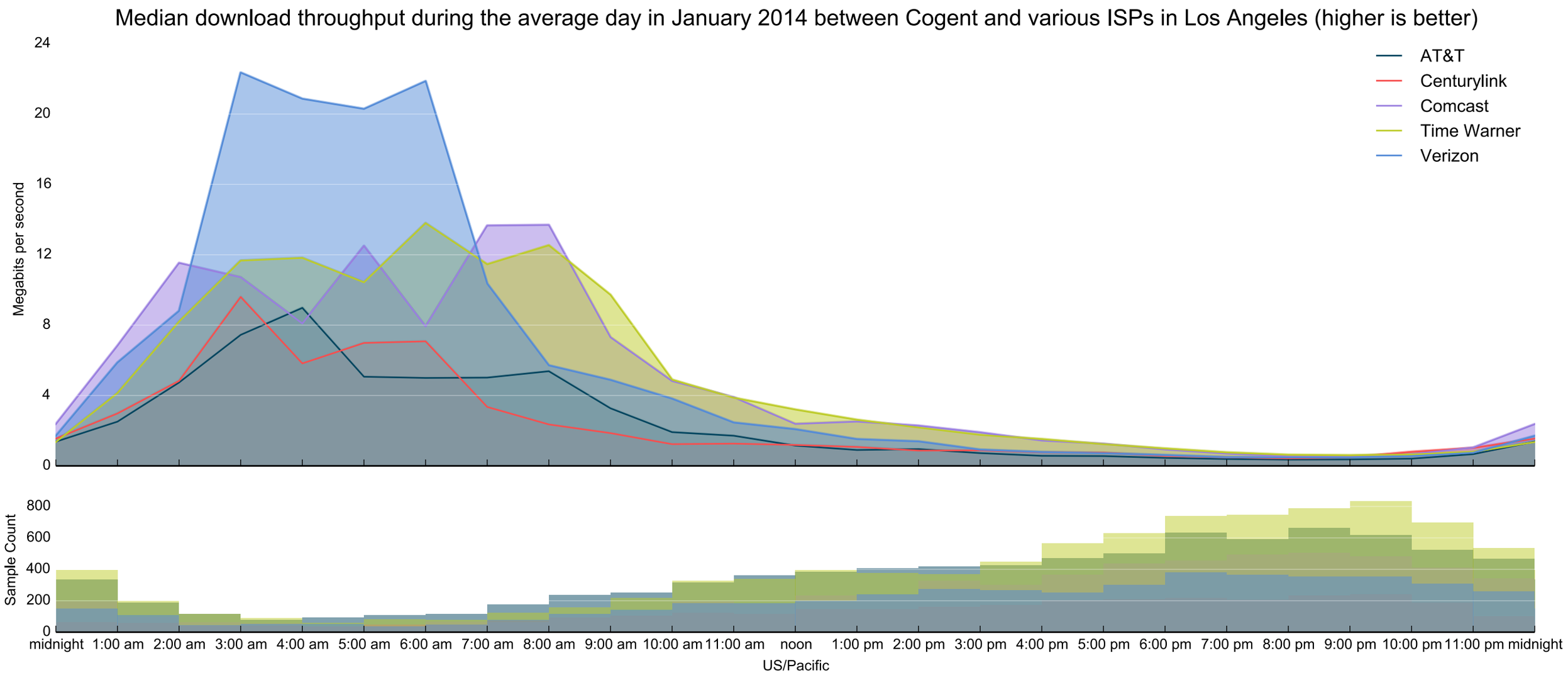
Diurnal Patterns Are Instructive

Expectations of Normal Performance

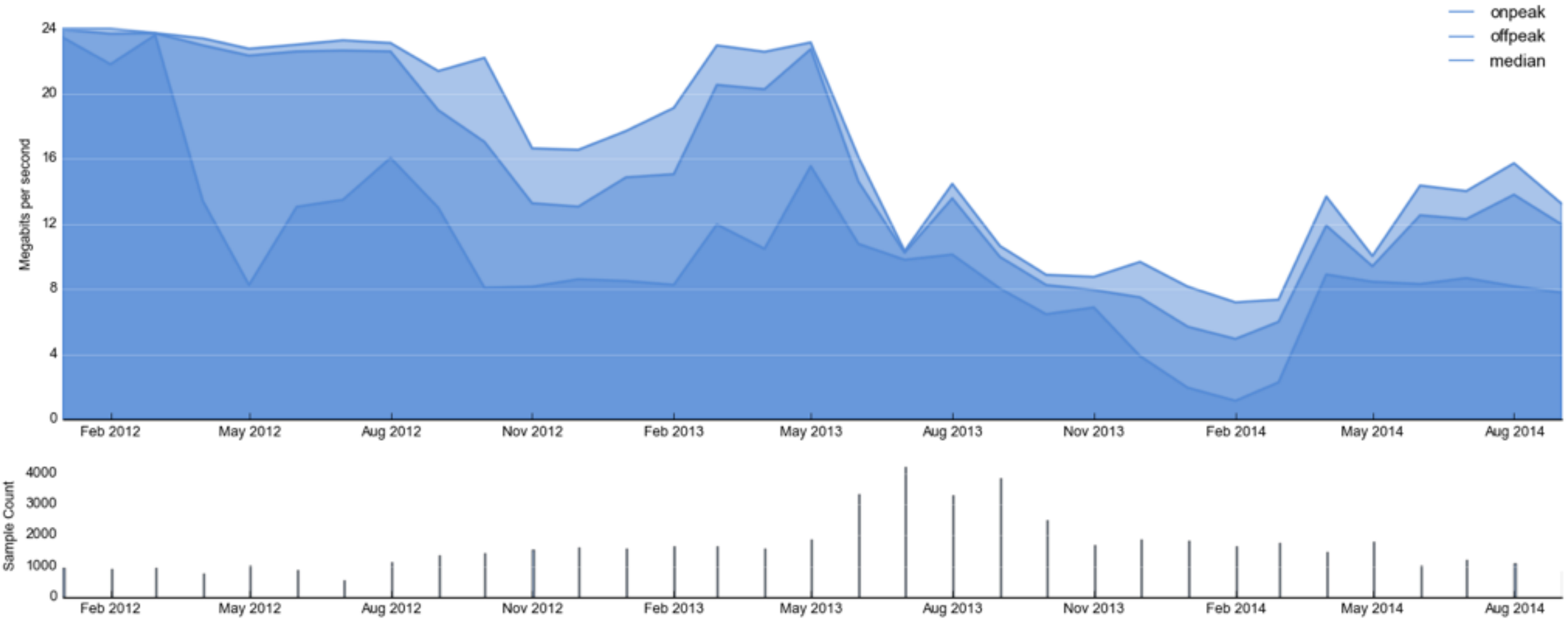


Diurnal Patterns Are Instructive

Expectations of Congested Performance



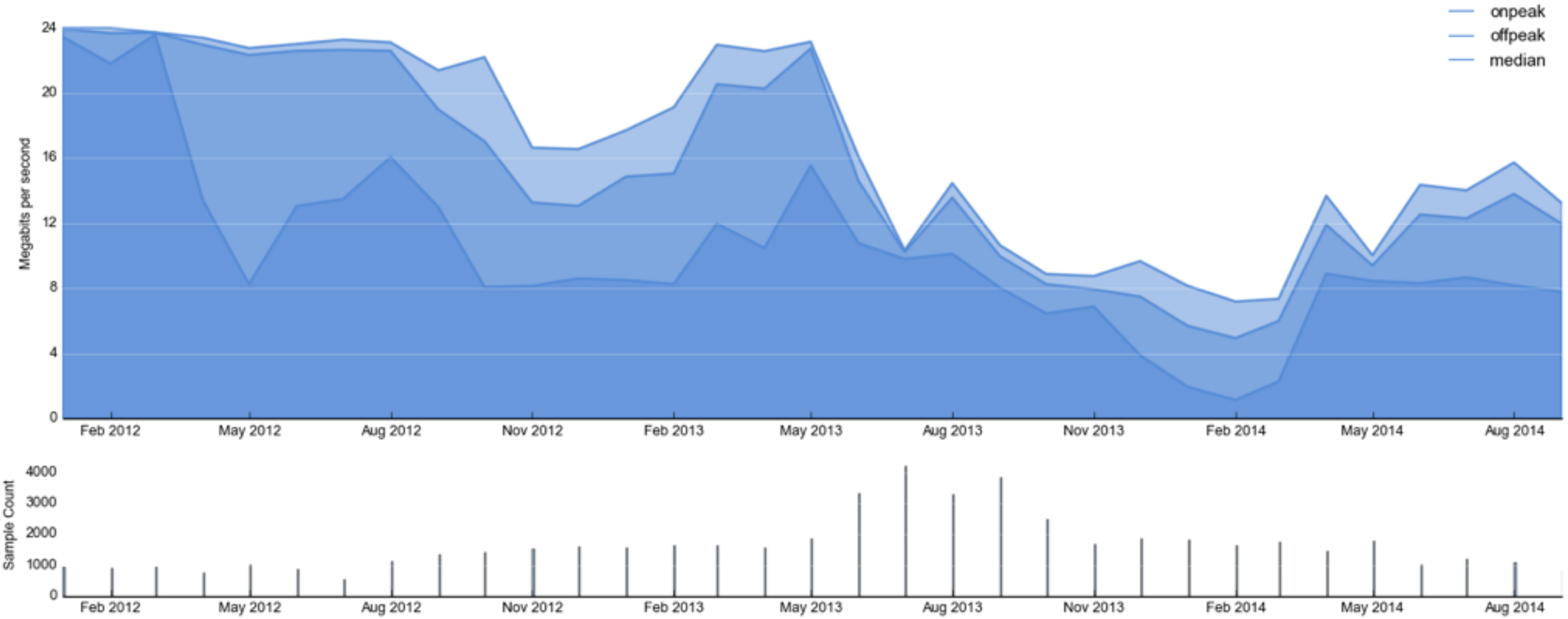
Diurnal Cycles In Practice



Diurnal Patterns Are Instructive

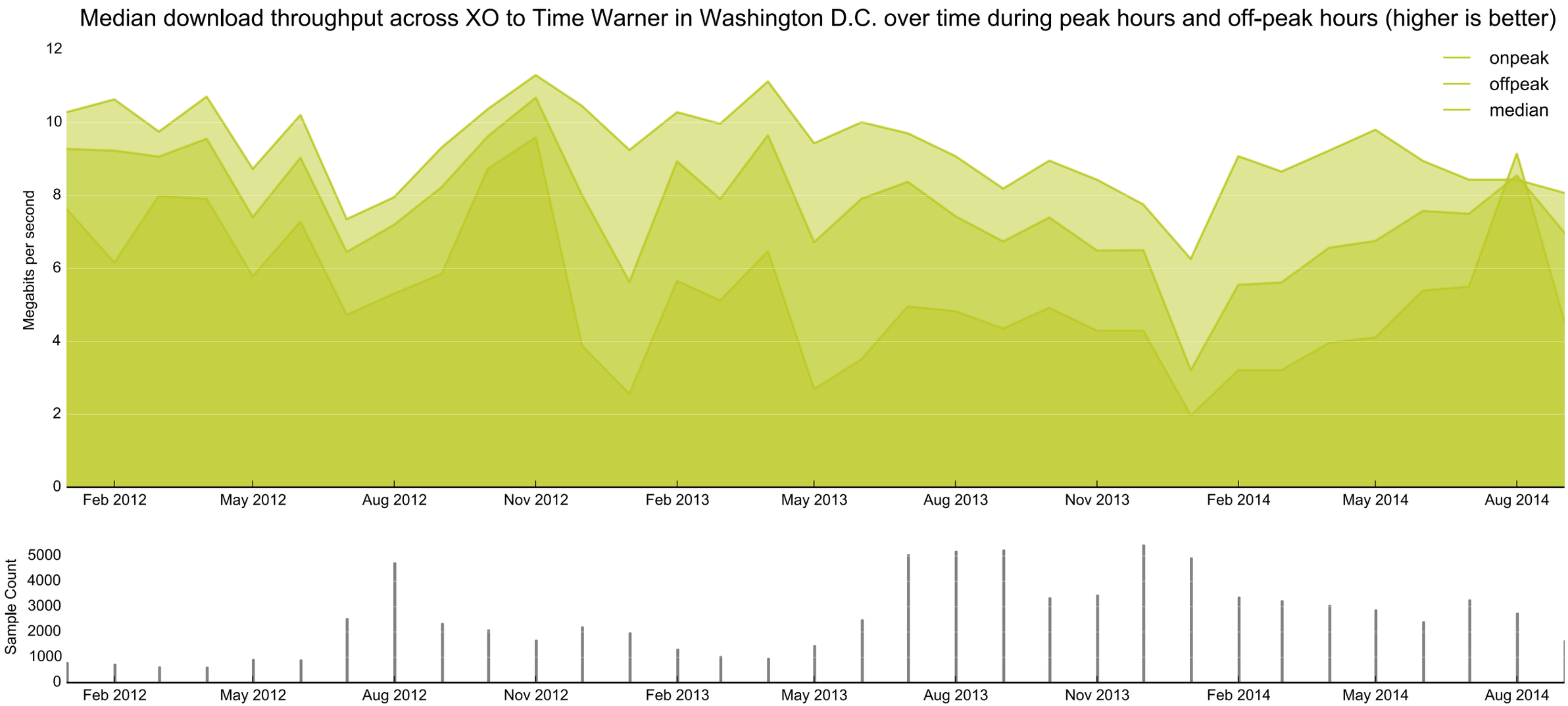
Peak Congestion Can Augur Future Degradation

Congestion affecting consumers has not been limited to interconnections with Cogent



Level 3 and Verizon

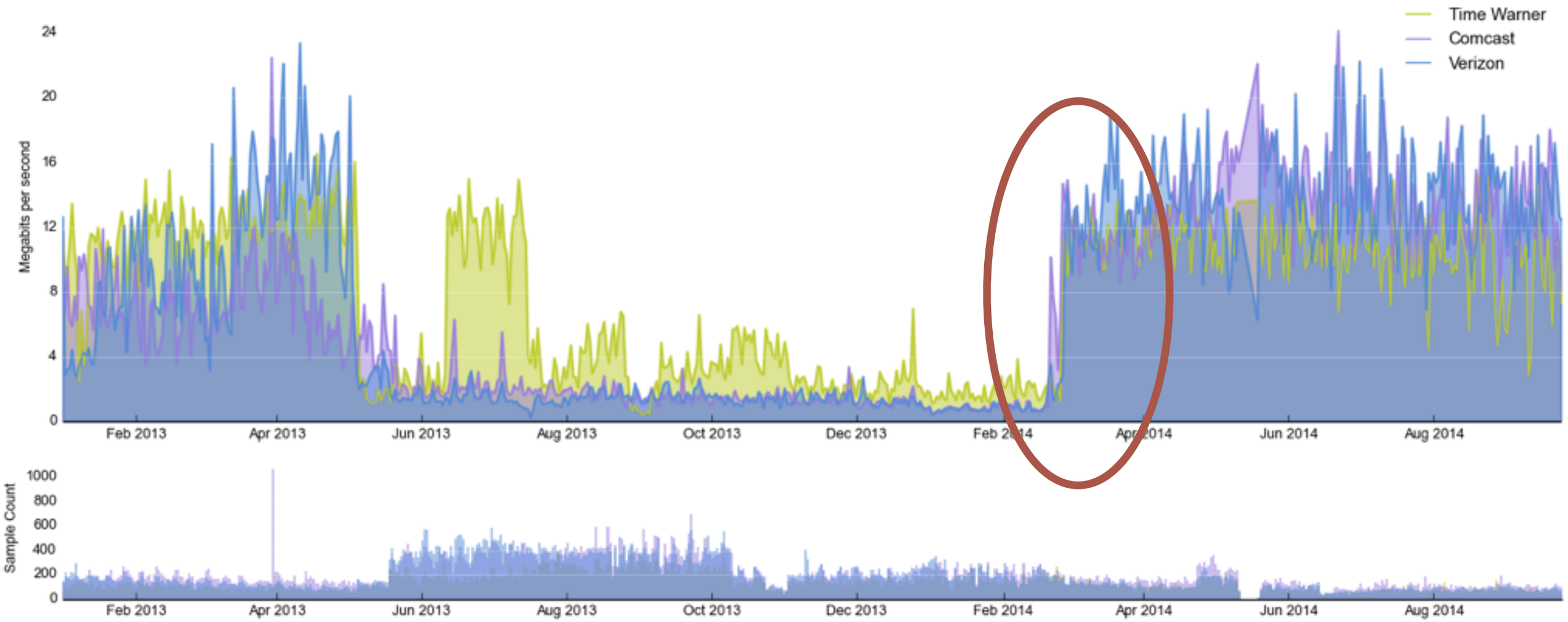
Ongoing



XO and Time Warner Cable

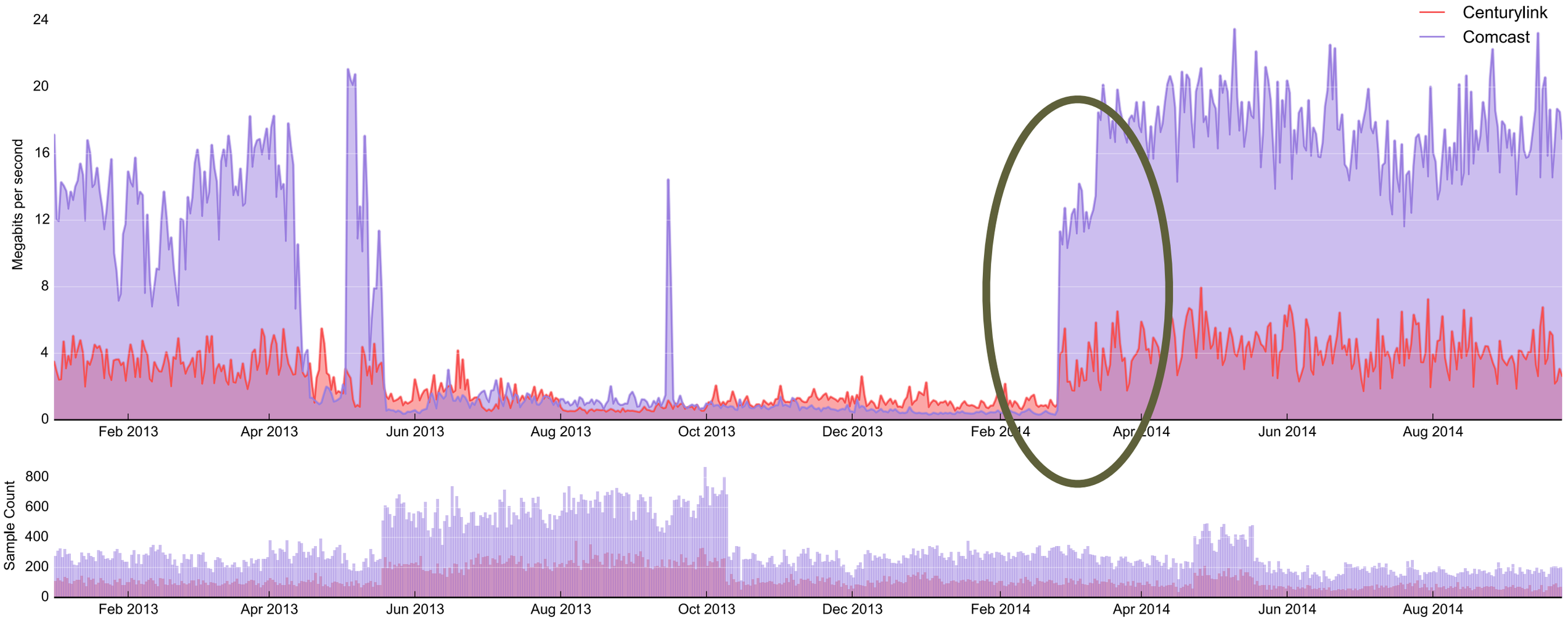
Ongoing

Serendipitous Discovery



What Happened in Late February?

Cross the Board Increases



What Happened in Late February?

Cross the Board Increases

```
    pool-108-41-239-212.nycmny.fios.verizon.net.49998 > 38.106.70.147.51494: Flags [.], seq 49358745:49360193,
in 8235, options [nop,nop,TS[|tcp]>
14:49:05.790410 IP (tos 0x0, ttl 64, id 996, offset 0, flags [DF], proto TCP (6), length 52)
    38.106.70.147.51494 > pool-108-41-239-212.nycmny.fios.verizon.net.49998: Flags [.], seq 0, ack 49361641, wi
options [nop,nop,TS[|tcp]>
14:49:05.790400 IP (tos 0x48, ttl 55, id 38409, offset 0, flags [DF], proto TCP (6), length 1500)
    pool-108-41-239-212.nycmny.fios.verizon.net.49998 > 38.106.70.147.51494: Flags [.], seq 49360193:49361641,
in 8235, options [nop,nop,TS[|tcp]>
14:49:05.790603 IP (tos 0x48, ttl 55, id 62276, offset 0, flags [DF], proto TCP (6), length 1500)
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in 8235, options [nop,nop,TS[|tcp]>
14:49:05.791508 IP (tos 0x0, ttl 64, id 998, offset 0, flags [DF], proto TCP (6), length 52)
    38.106.70.147.51494 > pool-108-41-239-212.nycmny.fios.verizon.net.49998: Flags [.], seq 0, ack 49367433, wi
options [nop,nop,TS[|tcp]>
14:49:05.791497 IP (tos 0x48, ttl 55, id 42646, offset 0, flags [DF], proto TCP (6), length 1500)
    pool-108-41-239-212.nycmny.fios.verizon.net.49998 > 38.106.70.147.51494: Flags [.], seq 49365985:49367433,
in 8235, options [nop,nop,TS[|tcp]>
14:49:05.791634 IP (tos 0x48, ttl 55, id 34115, offset 0, flags [DF], proto TCP (6), length 1500)
    pool-108-41-239-212.nycmny.fios.verizon.net.49998 > 38.106.70.147.51494: Flags [.], seq 49367433:49368881,
in 8235, options [nop,nop,TS[|tcp]>
^C14:49:05.791884 IP (tos 0x0, ttl 64, id 999, offset 0, flags [DF], proto TCP (6), length 52)
    38.106.70.147.51494 > pool-108-41-239-212.nycmny.fios.verizon.net.49998: Flags [.], seq 0, ack 49370329, wi
options [nop,nop,TS[|tcp]>
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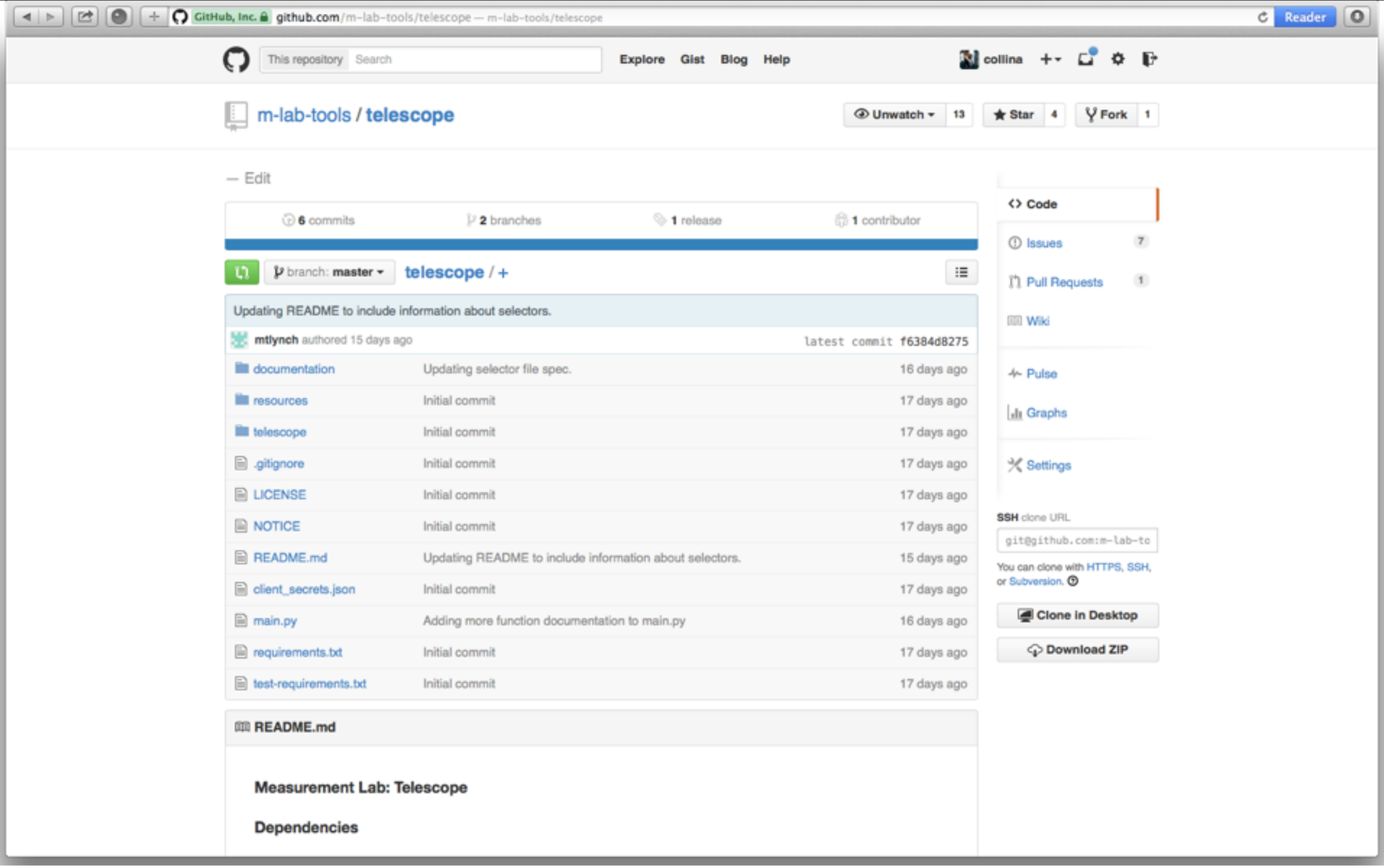
DSCP Changes!

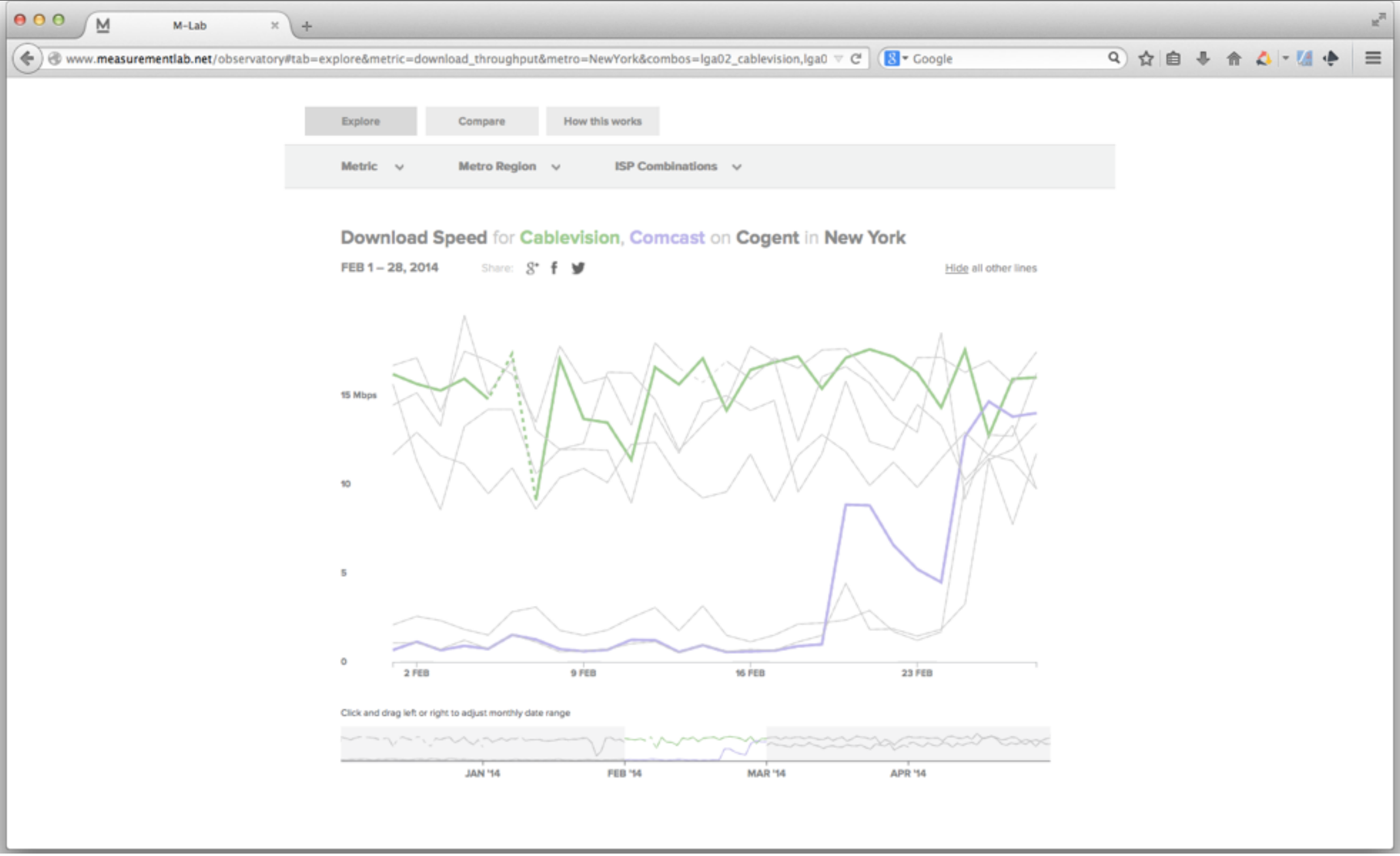
Cross the Board Increases

Extending the Interconnection Study



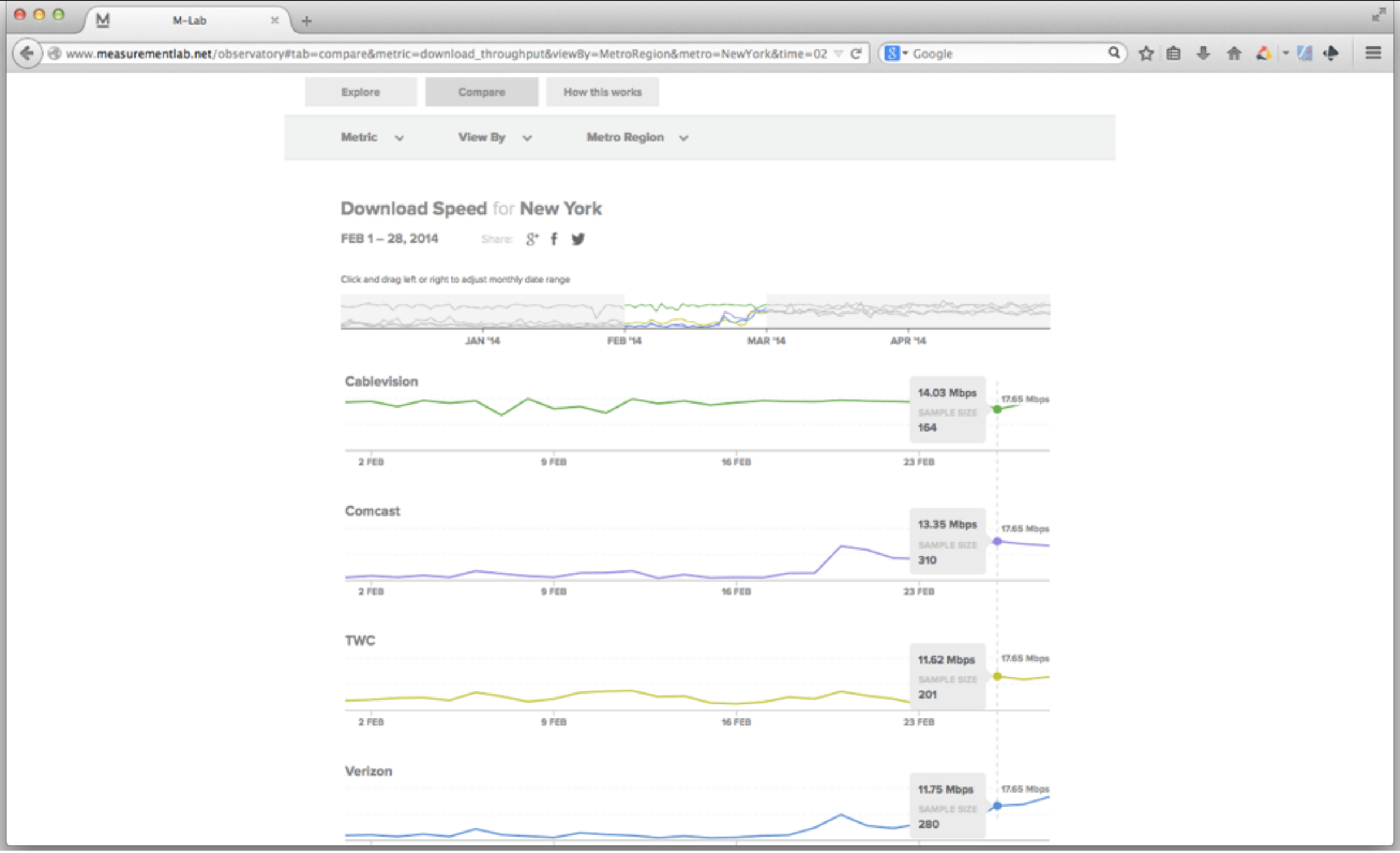
Measurement Lab Telescope

Python to extract M-Lab data



Measurement Lab Observatory

Currently US Only



Measurement Lab Observatory

Currently US Only

Review, Clarifications and Conclusions

Our data shows that traffic from specific Access ISP customers across interconnections with specific Transit ISPs experienced degraded performance, and that this degradation forms a pattern wherever specific Access ISPs and Transit ISPs exchange traffic.

“This is a measurement study, not an answer study.”

–Randy Bush

Study: Comcast and Verizon connections to Cogent dropped below 0.5Mbps

Measurements show how bad it got before Netflix money disputes were resolved.

by **Jon Brodkin** - Oct 28 2014, 10:45pm GMT

Plenty of Comcast and Verizon customers know just how bad Internet service was on major ISPs during the months-long battle over who should pay to deliver Netflix traffic.

But now we have more numbers on the performance declines, thanks to a new report from the Measurement Lab Consortium (M-Lab). M-Lab hosts measuring equipment at Internet exchange points to analyze connections between network operators and has more than five years' worth of measurements. A report released today examines connections between consumer Internet service providers ("Access ISPs" in M-Lab parlance) and backbone operators ("Transit ISPs"), including the ones that sent traffic from Netflix to ISPs while the money fights were still going on.

FURTHER READING

HOW COMCAST BECAME A POWERFUL—AND CONTROVERSIAL—PART OF THE INTERNET BACKBONE

Comcast tells Ars why it's not to blame in Netflix fight—it was only business.

Netflix eventually agreed to pay Comcast, Verizon, Time Warner Cable, and AT&T for direct connections to their networks, but until that happened there was severe degradation in links carrying traffic from Netflix and many other Web services to consumers. Connections were particularly bad between ISPs and Cogent, one of the backbone operators that Netflix paid to carry its traffic.

LATEST FEATURE STORY

FEATURE STORY (2 PAGES)

The other Ebola fear: Your civil liberties

The power to quarantine is as "American as apple pie."

Although, Measurement Matters to the Public

People Need Information

Research Limitations

- We cannot determine which actors or actions are “responsible” for observed degradation.

- Path data is not included in the scope of this report (but it is collected and consulted by M-Lab).

- We cannot identify the precise cause of performance problems (e.g. a broken router) in a path between a client.

Criticisms and Contributions

- Host a Measurement Lab site.
- Review *Telescope*, and extend it for your own purposes.
- Access our data and review our measurement methodology.
- Discuss this research on the discuss@measurementlab.net list.

There is still much more in Measurement Lab's dataset. Please explore.

measurementlab.net