

Internet Architecture Board

COVID-19 Network Impacts Workshop

Interconnection Changes in the United States
Presented by Nick Feamster & Jason Livingood
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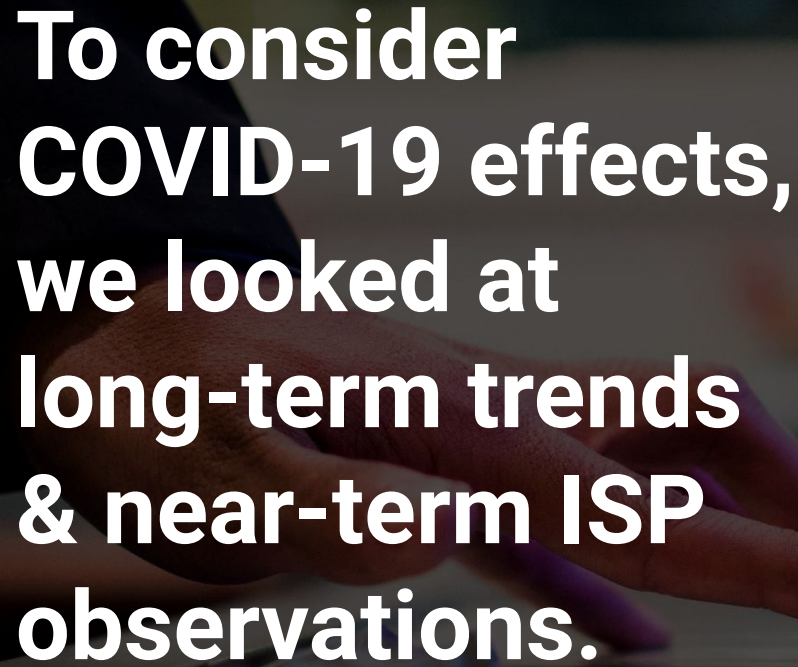
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**To consider
COVID-19 effects,
we looked at
long-term trends
& near-term ISP
observations.**

Data from the
Interconnection
Measurement Program:

- *2016 to 2020*
- *Sampled IPFIX data on all interconnect interfaces*
- *Multiple ISPs*

- * Timestamp
- * Region (LAG)
- * Anonymous Peer ID
- * Access ISP
- * Ingress & Egress Bytes
- * Capacity

Key findings

Significant new capacity was added in a short period of time across multiple network partners.

Capacity across network partners during COVID-19 continues to look good.

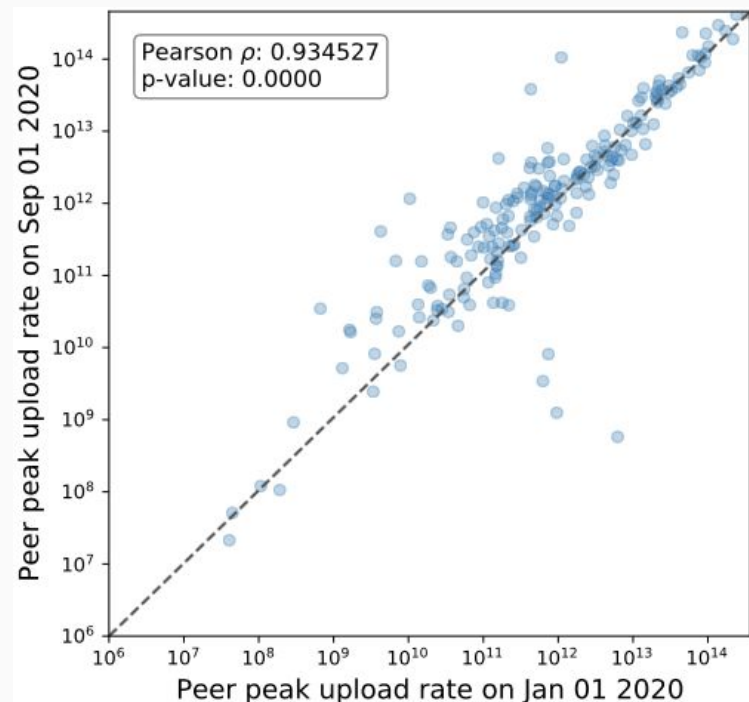
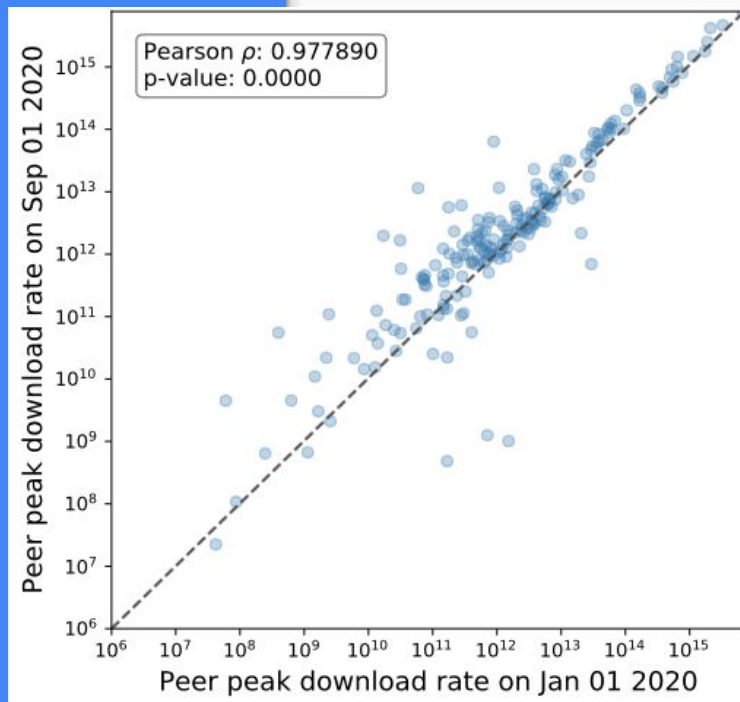
Observations from IMP data - Comcast deep dive

- Steadily trend of increasing capacity from mid-2018.
- Significant increase in capacity additions at onset of COVID.
 - Nearly TWICE the rate of 2019 additions --
- Continued strong growth in 2Q & 3Q2020
- Peak utilization of the *busiest links* peaks at 90% in 2016-2020
- During late March to early April 2020 surge, busiest links peaked briefly at 97%
- In a matter of weeks, by end of April, rapidly returned to normal due to quick reaction capacity additions

Peer Link Utilization Comparison

Analyzed

- Traffic volume changes
- Ratio changes
- How specific partners varied from baseline



Greater deviations in upstream traffic

Peer link utilization comparison between January 1, 2020 and September 1, 2020

Comcast Data Sources & Observations

Annual growth occurred in a matter of weeks, changes in diurnal patterns, mass adoption of video conferencing, significant capacity addition activities in a short period

- 33% growth in usage during initial March-April 2020 surge
- Downstream +13% & Upstream +36%
- Significant increase in access network augments (2x-4x)
- Significant increase in core network augments (500+)
- 700,000 automated speed tests/day to validate QoE, augmenting traditional capacity metrics. (110-115%oA)
- Much more video conferencing (200-300%)
- Added 37% to SFI capacity YTD vs. 15% in 2019.
- Observed strong individual per-partner growth - e.g. 115%, 245%, 3,900%



Thank you!

More info:

<https://datatracker.ietf.org/doc/draft-feamster-livingood-iab-covid19-workshop/>