

The Impact of COVID-19 on Last-mile Latency

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Last-mile is the centerpiece of broadband connectivity, as poor last-mile performance generally translates to poor quality of experience. In our recent research (to appear in IMC'20, <https://last-mile-congestion.github.io/last-mile-imc20-CR.pdf>) we investigate last-mile latency using traceroute data from RIPE Atlas probes located in 646 ASes and focus on recurrent performance degradation. We find that in normal times probes in only 10% ASes experience persistent last-mile congestion but we recorded 55% more congested ASes during the COVID-19 outbreak.

With the help of CDN access log data, we dissect results for major ISPs in Japan, the most severely affected country in our study. Our comparison between different access technologies in Japan narrows down the problem to the extensive use of the shared legacy infrastructure over PPPoE and shows that wired broadband throughput for some ISPs is consistently lower than LTE during peak hours.

This work provides valuable insights to the operational community with the following research contributions:

- We report last-mile conditions in 2018 and 2019 for Atlas probes located in 646 ASes and 98 countries, and we estimate the impact of COVID-19 on last-mile latencies. These surveys are available on a public server (<https://last-mile-congestion.github.io/>).
- The case study in Japan illustrates how a nation-wide infrastructure, which had successfully opened the telecommunication market to competition, is now failing to cope with the increasing demand. Given the extent of this proprietary infrastructure and the difficulties to upgrade it, we reiterate the importance of scaling and upgradability in these deployments.
- Finally, we give recommendations to handle persistent last-mile congestion in delay measurements with RIPE Atlas, and discuss the adverse consequences of BBR in this context.