

**NetForecast<sup>®</sup>**



**REPORT ON  
COMCAST'S  
NETWORK  
PERFORMANCE  
MEASUREMENT  
SYSTEM DATA -  
PRE & POST  
COVID-19  
STAY-AT-HOME  
MEASURES**

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# Report on Comcast's Network Performance Measurement System Data—Pre & Post COVID-19 Stay-at-Home Measures

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## EXECUTIVE SUMMARY

NetForecast assessed the effect of COVID-19 stay-at-home changes in Internet usage on the Comcast network, based on speed test results from Comcast's network performance measurement system. We analyzed Comcast speed data<sup>1</sup> from January through April of 2020. We found that despite extraordinary increases in Internet usage that have been widely reported [1, 2, 3], **Comcast continued to deliver uniformly above-advertised download and upload speeds.**

The Comcast network performance measurement system speed test data are accurate, and the system provides statistically representative coverage of the Comcast network. Our analysis of national and local data confirms that the measurement approach is valid, the test selections are unbiased, and the sampling scope is statistically valid.

This report is the second NetForecast assessment of Comcast's network performance measurement system. In April of this year, Comcast engaged NetForecast to audit the design of the network performance measurement system that monitors the performance of Comcast's network between its in-home gateways and servers within its network. The first report is available [here](#). Continuing that assessment, Comcast engaged NetForecast to review hourly summaries of measurements generated by the system to verify the collection methodology and system accuracy and to examine the impact of COVID-19 stay-at-home measures on the speed test results.

## ANALYSIS

At NetForecast's request, Comcast provided data that included average and median speeds, variance, and local and national sample counts. Speed test results were further broken down by advertised speed and data direction (i.e., download and upload). As requested by NetForecast, data were made available in the form of summary reports.

NetForecast examined downstream and upstream speed test results for the most widely used speed tiers on the national network as well as in major metropolitan areas.

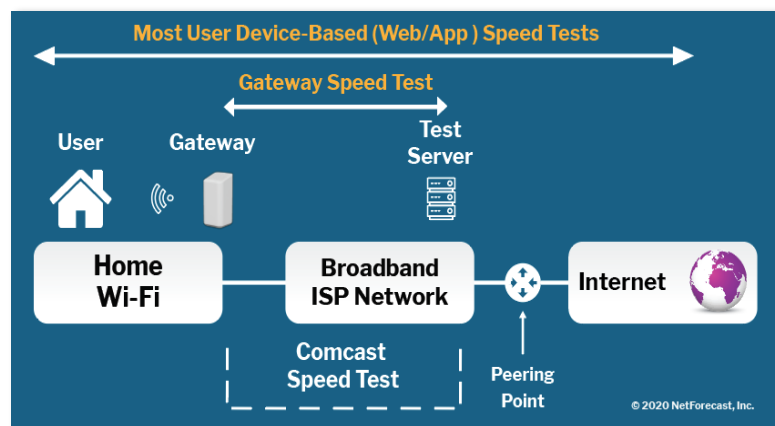


Figure 1 - Network Assessed

<sup>1</sup> The data that was shared by Comcast did not include any personal, sensitive, or customer-identifiable data.

Based on Comcast's national per-hour averages shown in **Figure 2**, the increased network usage due to COVID-19 stay-at-home measures [4, 5] minimally affected download speeds. Upload speeds were affected more than download speeds.

Linearly fitted trend lines are shown as dashed lines in the following figures. Both data sets show that download and upload speeds remained 15% above advertised values throughout Comcast's nationwide footprint, but there was a downward trend in speeds through the end of April.

Download speed data show mixed trending results among speed tiers. All tiers remained above-advertised speeds, and most tiers reflected little COVID-19 related impact. Some legacy speed tiers had small sample sizes and were thus excluded.

**Figures 2 and 3** show speed tiers that experienced an initial degradation of both download and upload speeds in March (though still above advertised speeds), but recovered in April.

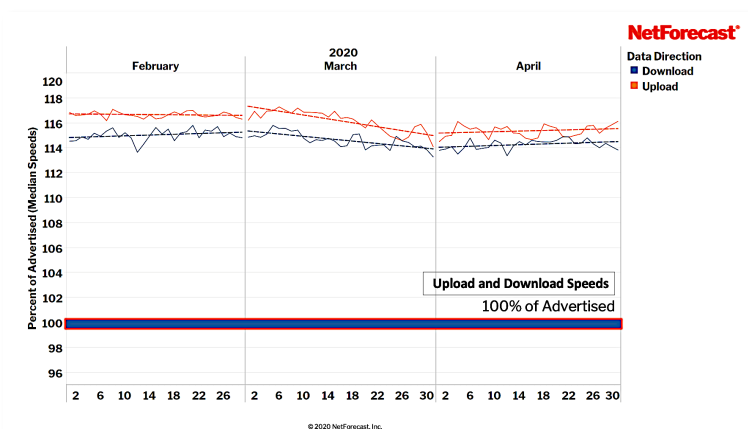


Figure 2 - Download & Upload Speeds

**Note on Figures:** While January data was also studied, for purposes of clarity, those results are not displayed as they mimic the February results.

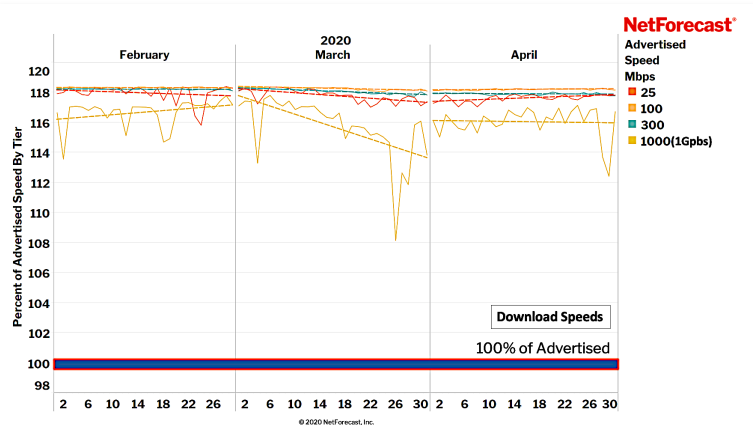


Figure 3 - Download & Upload - Popular Products

### Network Investment

According to Comcast, in March and April 2020, it increased the number of weekly capacity augments by 50% nationally and in certain places has doubled or tripled the usual pace. Comcast also reported that in most areas it has added one to two additional upstream DOCSIS channels, increasing upstream capacity by a third or more.

COVID-19 upload related impact trends correlate to upload speed, with higher speed tiers showing a greater effect.

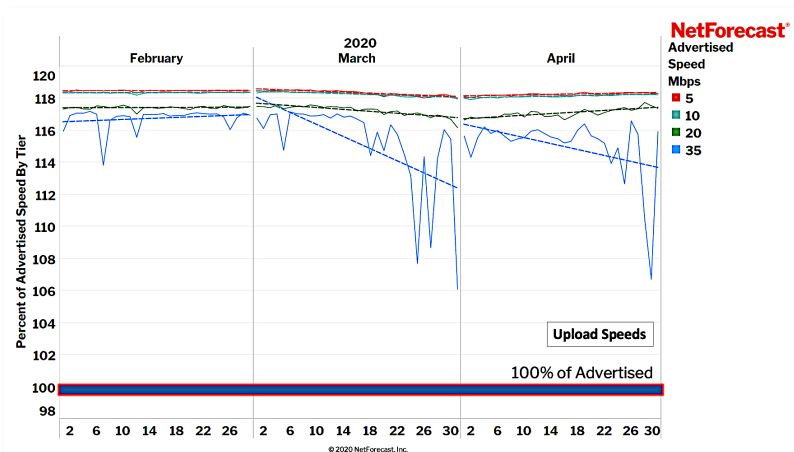


Figure 4 – Upload Speeds - Popular products

Upload speed trends similarly remained above-advertised speeds although they exhibited more significant **COVID-19** related effects, as shown in the national average trend in **Figure 4**.

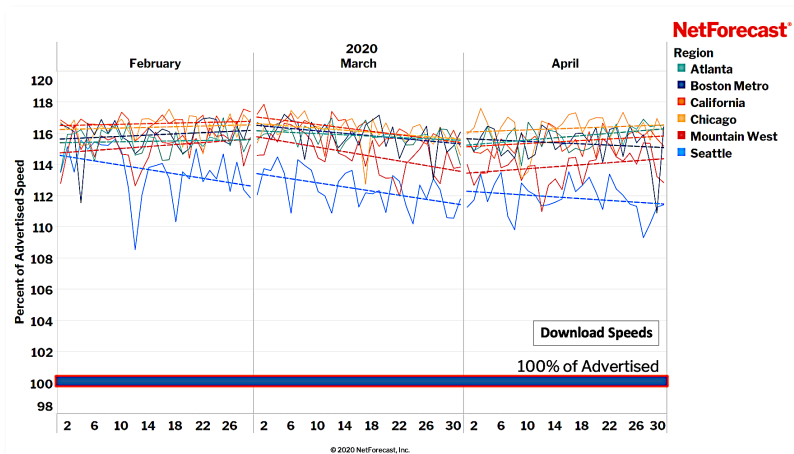


Figure 5 - Geographic Analysis

NetForecast also examined the data based on the geographic area. **Figure 5** shows download performance trends of interest for several locations.

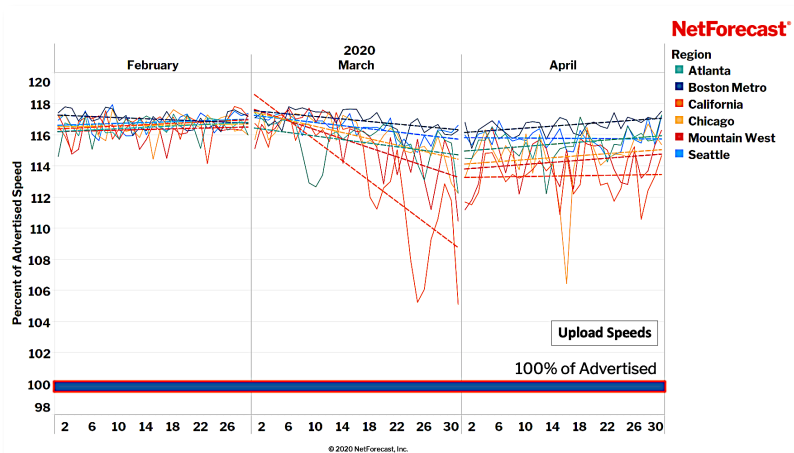


Figure 6 – Geographic Analysis

The upload trends in **Figure – 6** show across the board that speeds delivered remain above advertised speeds for all regions. The worst performing region remained above 104% above advertised speed.

NetForecast verified that there were a sufficient number of samples to give us confidence in the statistical validity of the data. Using the per-hour sample count, average speed, and standard deviation for each speed tier and direction (downstream and upstream), a 95% confidence interval showed a span of less than 1% of the advertised speed. This result establishes that the number of samples related to the speed variance provides reliable results<sup>2</sup>.

NetForecast confirms that based on the number of distinct modems tested by area and the number of tests conducted, the sampling was random and diverse. About 4% of Comcast's tests ended without completing. Conditions designed to ensure tests are performed correctly align with the goals described in the design review. We also concluded that gateway selection diversity provides unbiased sampling.

## CONCLUSIONS

NetForecast found that national and local data reflected that Comcast's network experienced only a minor impact from COVID-19 stay-at-home measures implemented in March 2020. Comcast's network, as measured by its internal network performance measurement system, delivered above-advertised speeds for the entire period analyzed. Upload speeds were affected more than download speeds but still delivered above-advertised speeds for the entire period analyzed in the face of high usage increase as reported [here](#).

The Comcast-supplied data NetForecast analyzed reflect speeds inside Comcast's network. Some recent studies [1] indicate more significant COVID-19 related effects on Internet performance, while others [2,3] show only minor impacts due to stay-at-home measures. Based on our analysis, we expect that studies showing significant adverse performance effects likely reflect conditions **outside** of Comcast's network, including inside the home Wi-Fi network, or they may reflect measurement methodology differences.

In conclusion, NetForecast confirms that the design goals of the Comcast network performance measurement system were met for monitoring speed under all network operating conditions. NetForecast also confirms that the breadth of tests by geography, by time, and by individual speed tier derived from the actual results data accurately reflect the performance of Comcast's internal network.

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<sup>2</sup> Ongoing speed tests are performed on random subsets of subscribers, generating approximately 700,000 measurements per day.

1. Lai Yi Ohlsen, "[Changes Related to COVID-19](https://www.measurementlab.net/blog/covid19-test-rates-increase/#changes-related-to-covid-19)", Measurement Lab, April 1, 2020, <https://www.measurementlab.net/blog/covid19-test-rates-increase/#changes-related-to-covid-19>.
2. "COVID-19: How Cable's Internet Networks Are Performing METRICS, TRENDS & OBSERVATIONS", NCTA, <https://www.ncta.com/COVIDdashboard>
3. "Tracking COVID-19's Impact on Global Internet Performance", Ookla, March 13, 2020 (Updated May 4, 2020), <https://www.speedtest.net/insights/blog/tracking-covid-19-impact-global-internet-performance/#/>
4. "COVID-19 / Coronavirus State "Shelter-in-Place" and "Stay-at-Home" Orders," [FINRA](https://www.finra.org/rules-guidance/key-topics/covid-19/shelter-in-place), <https://www.finra.org/rules-guidance/key-topics/covid-19/shelter-in-place>
5. "COVID-19 Network Update", Comcast, Last Update April 29, 2020, <https://corporate.comcast.com/covid-19/network>.

## ABOUT THE AUTHORS

**Alan Jones** is NetForecast's Director of Software Development. He has lead teams in developing products and internal infrastructure for some of the largest telecom companies in the world. After eight years in cellular handset design and testing, he spent over a decade working on test systems for mobile networks. He currently works with mobile and cloud-based product development.

**Peter Sevcik** is the founder and CTO of NetForecast and is a leading network performance expert. An Internet pioneer, Peter was among the first to measure and develop Internet performance improvement techniques. He helped design more than 100 corporate and commercial networks. In addition, Peter invented the Apdex performance reporting methodology and has co-patented application response-time prediction and network congestion management algorithms.

**Andrew Lacy** is NetForecast's director of analytics and has a 30-year track record delivering solutions to complex business and technical requirements. He has extensive experience as a development leader designing, building, and deploying products. He has a strong technical background in data communications, game software, server-based gaming, embedded systems, server software, web, and database design.

## GLOSSARY OF TERMS USED IN THIS REPORT

**Speed:** For the purposes of this report, speed is equivalent to Effective Bandwidth.