

Starlink Beta Internet Performance

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SUMMARY

We were excited to start measuring the performance of Starlink’s Low Earth Orbit (LEO) internet service currently in beta test. We deployed Starlink’s service in our Charlottesville VA office, and have begun to assess how its performance compares to other networks whose performance we measure. In a head-to-head comparison with a cable ISP also in central Virginia to a target server in Washington DC, Starlink’s latency averaged 22 milliseconds longer than the cable ISP.

Not bad for a satellite connection! Starlink’s latency was, however, much more variable than the cable service—and Starlink suffered frequent drops.

WHAT WE DID

NetForecast performed a head-to-head latency comparison between our Starlink connection in Charlottesville, VA and a cable connection in Lynchburg, VA with advertised speeds of 50Mbps downstream and 10Mbps upstream. In both cases we used test probes connected directly to routers to avoid Wi-Fi performance issues.

THE RESULTS

Figure 1 shows a comparison of the cable (blue) and Starlink (orange) results. The chart shows response time differences for the cable and Starlink services to a collection of target servers.

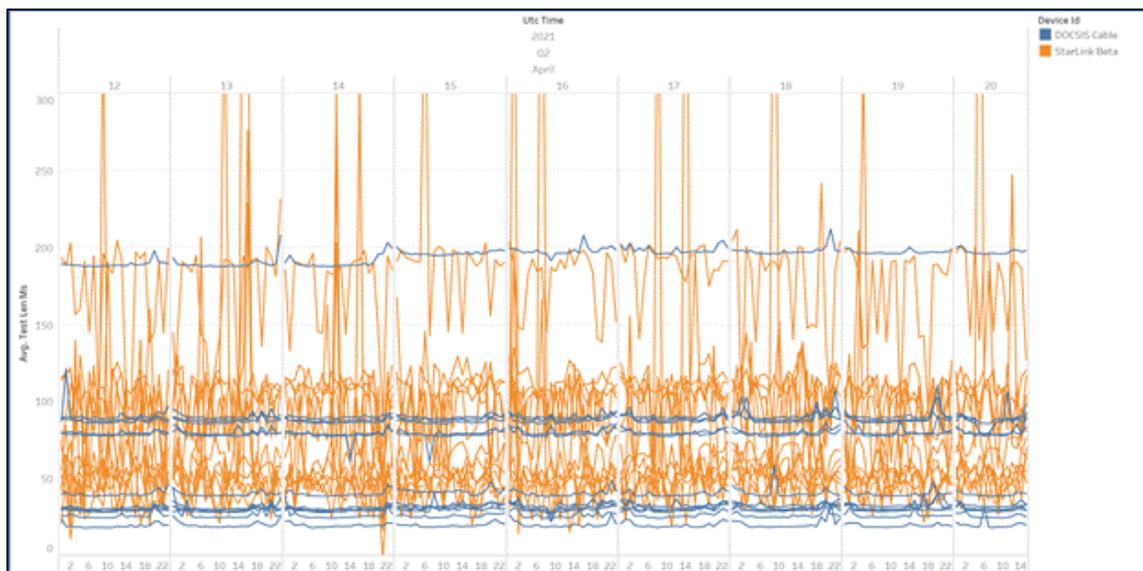


Figure 1 – Latency Comparison for Cable Service and Starlink

The chart in Figure 2 zeroes in on ping measurement results to a single target server in the Washington DC area. Starlink’s latency for this path averaged about 22ms longer than the cable ISP, and Starlink’s latency was far more variable than the cable ISP.

Even with longer average latency and greater latency variability, however, Starlink’s performance is impressive for a satellite system. Geosynchronous satellite systems are plagued by very long latencies due to their high orbits, whereas distances to LEO satellites are more comparable to terrestrial distances.

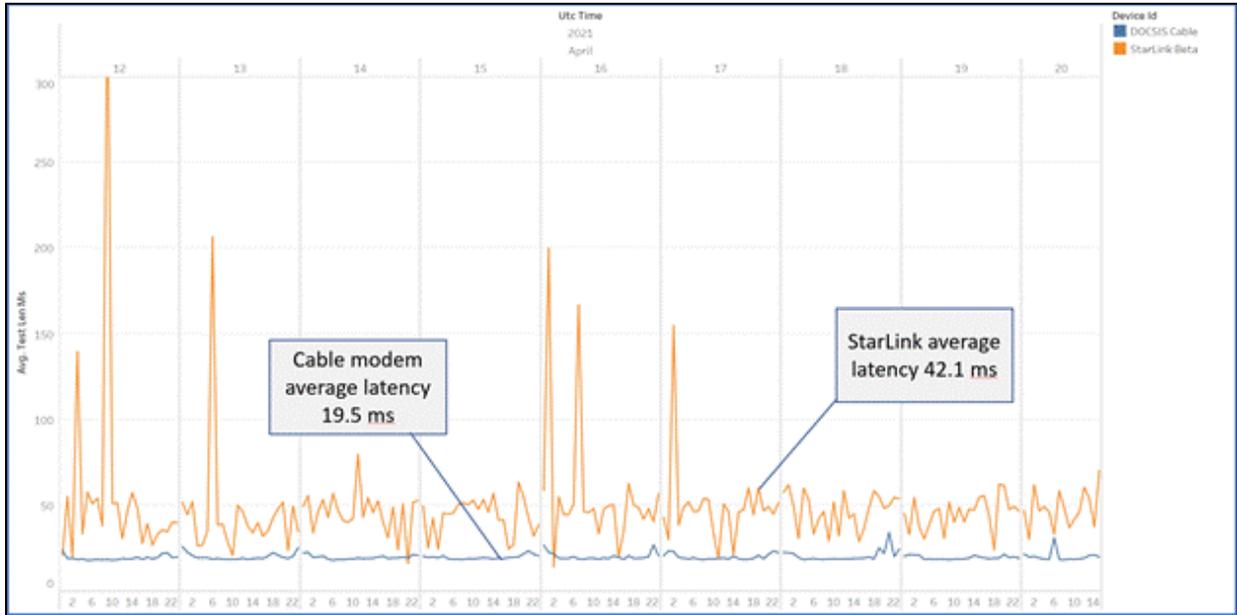


Figure 2 – Latency to a Single Target in the Metro DC area

NetForecast measures internet response times from a user’s perspective by selecting targets that are near (within the same metropolitan area) and far (across the country). Figure 3 shows the average latency for near and far target servers for the cable and the Starlink service. We tested to ten targets in the Washington DC metropolitan area and nine on the West coast (Los Angeles, San Francisco, and Seattle). For more information on near and far analysis of internet latency performance see our [“2020 Internet Latency Benchmark Report”](#).

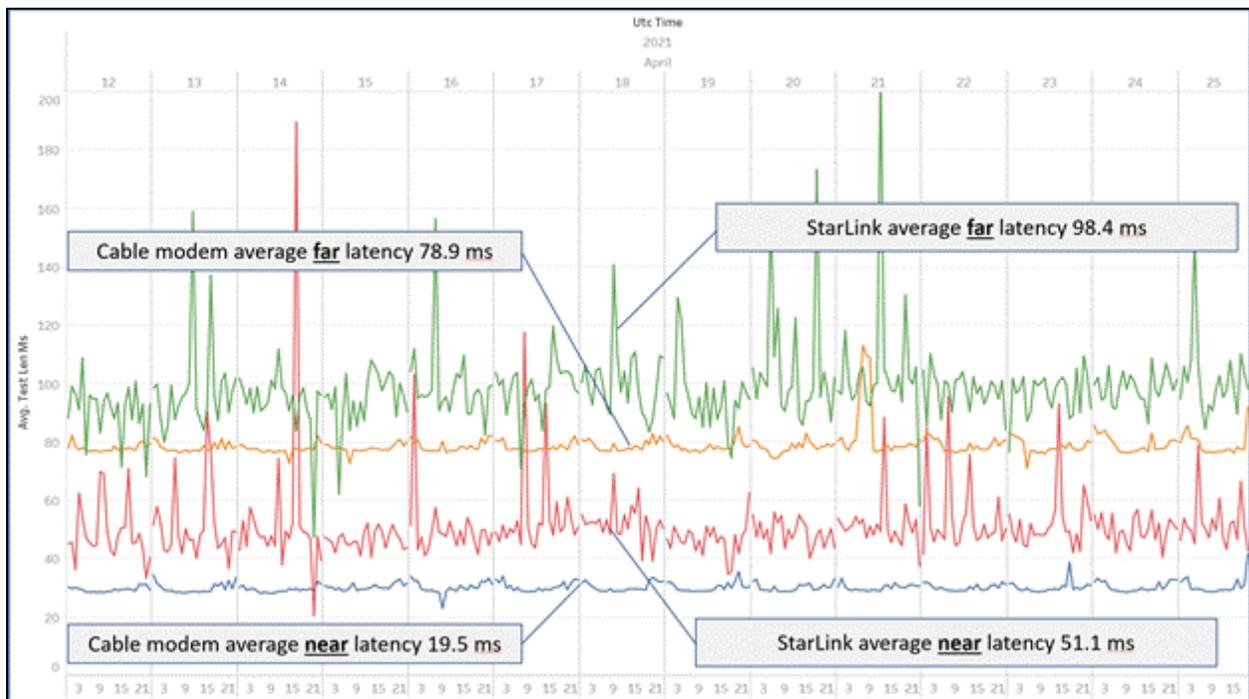


Figure 3 – Near and Far Latency for the Cable and Starlink Services

Consistent with test results to the single near server the Washington DC area, both near and far latency overall was about 20ms higher for Starlink than for the cable service. In all cases the variability of latency for Starlink was much greater than the cable service.

Lower near versus far latency in the Starlink system indicates that Starlink users will see the same performance advantage from Content Delivery Networks (CDNs) as other internet connections. Low latency to CDN servers enables improved performance for applications like streaming services and cloud-based office products.

Table 1 compares the average and standard deviation of the latency experience for the two systems. The standard deviation of the Starlink measurements is significantly greater than that of the cable service. This will adversely affect the quality of the Starlink user experience, but we expect it to improve as the Starlink service nears general release.

Service	Distance	Average Latency (in ms)	Standard Deviation
Cable	Near	19.5	6.5
Starlink	Near	51.1	68.7
Cable	Far	78.9	17.3
Starlink	Far	98.4	73.4

Table 1 – Average and Standard Deviation of Cable Service versus Starlink

CONCLUSIONS

The Starlink LEO network shows great potential to provide internet coverage comparable to terrestrial ISPs. The Starlink system’s similar latency profile for near and far distances indicates users will experience the full advantage of CDN-provided content. In its current beta release, the system suffers from connection and variability issues—but as more satellites are added, availability and connection stability should improve.

The Starlink LEO network shows great potential to provide internet coverage comparable to terrestrial ISPs.

Stay tuned for NetForecast’s latency performance benchmark reporting updates for Starlink and other new offerings, and follow our [Daily Internet Latency Performance Tracker](#).

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.

Rebecca Wetzel is the President of NetForecast, and an internet industry veteran. She helped realize the commercialization of the internet in its early days, and worked to design and market some of the internet’s first value-added services. She has spent much of her career launching and guiding network technology startups and working as an internet industry analyst.