Advocates for Rural Broadband

Broadband Technologies Talking Points

Recognized benefits of fiber for broadband services:

Fiber optic broadband technologies provide the most robust capabilities amongst technologies available today and for the foreseeable future, with the ability to provide multi-gigabit, symmetric service. In the Infrastructure Act, Congress indicated that the BEAD program should prioritize broadband projects based on "the speeds of the proposed broadband services" (Section 60102(h)(1)(A)(iv)(II)), and NTIA in the BEAD NOFO interpreted that as prioritizing projects designed to provide fiber connectivity directly to the end user (BEAD NOFO at pp. 7, 14 and 42). In addition to faster speeds, fiber optic technology provides many "positive externalities" — not only much more robust service to mass market customers, but once deployed in a community, fiber also provides the necessary speeds and capacity to support Community Anchor Institutions; precision agriculture; Telehealth; remote education, etc., all of which enhances the local economy. The relative ease of fiber upgrades through changing out electronics also produces a much longer-term service life for fiber (contrasted with need to replenish satellite constellations every 5 years or so).

WTA recognizes that low-Earth orbit ("LEO") satellite technology has several roles to play in the broadband ecosphere.

For some currently unserved or underserved remote locations, LEO satellite broadband service can provide an interim solution – serving as a bridge – to provide mass-market broadband service until more robust broadband technologies like fiber can be deployed. While inferior to fiber, mass-market LEO satellite broadband service is an improvement over no service, DSL service or GEO satellite broadband,[1] which are the choices available to many remote locations currently.

On a long-term basis, for very remote locations where the cost of deploying fiber would be "extremely high" (BEAD NOFO p. 13), LEO satellite service may be the only economical broadband solution.

Likewise, for mobile broadband needs like airplanes in-flight or ships at sea, where terrestrial 5G services are unavailable, LEO satellite broadband may the best long-term solution. Similarly, LEO satellite broadband may provide temporary relief following natural disasters such as hurricanes, ice storms or earthquakes when terrestrial broadband networks have been damaged and are being repaired.

However, when compared to fiber broadband, LEO satellite broadband is a significantly inferior service.

LEO satellite service offers much lower speeds than the symmetrical, multi-gigabit fiber broadband offerings currently available. For example, the Starlink website includes a map that

[1] While LEO satellite technology may be an element of potential solutions to the mass market broadband divide, because of very high latency issues and relatively slower speeds, Geostationary ("GEO") satellite broadband services are not well suited for supporting applications that require near real time interactivity, such as video-conferencing, remote education and telehealth.

claims their residential service provides a range of download speeds measured on a state-by-state basis, which varies greatly, as a random selection of states illustrates (as of November 1, 2024):

California — 87 Mbps -187 Mbps
Florida — 50 Mbps - 147 Mbps
Idaho — 85 Mbps - 214 Mbps
Iowa — 98 Mbps - 220 Mbps
Michigan — 63 Mbps - 163 Mbps
New York — 73 Mbps - 163 Mbps
South Dakota — 131 Mbps -249 Mbps
Tennessee — 50 Mbps - 132 Mbps
Texas — 53 Mbps - 123 Mbps

In contrast to the Starlink claimed speeds, a neutral third party's (Ookla) assessment of Starlink performance indicates that during the third quarter of 2023 the median download speed in the U.S. was 64.54 Mbps; median upload speed was 10.15 Mbps; and the median multi-server latency was 58 ms.

Moreover, it is not clear whether the Ookla or Starlink website's downlink numbers are based on measurements that were taken during peak periods, which is what the FCC requires when broadband service providers are testing network performance for purposes of complying with speed and latency requirements of broadband subsidy programs.

> "Focusing on peak usage period provides the most useful information because it demonstrates the performance users can expect when the Internet in their local area is experiencing highest demand from users."[2]

Measurements of speed and latency during peak periods are particularly important for LEO satellite technology, because the capacity/bandwidth is shared amongst the service provider's customers, and thus may be constrained when large numbers of customers within the satellite's "footprint" try to access the satellite at the same time.

Another limiting factor is a LEO satellite system does not have exclusive access to the spectrum assigned to LEO satellite systems, because it must be shared with other LEO satellite systems under the FCC's rules, *see* 47 CFR §25.261. For instance, Starlink will need to share the spectrum with other systems, such as Kuiper, when these other systems commence operations, further constraining Starlink's capacity and hence speeds during peak periods. Starlink is already experiencing capacity constraints, even at this early stage when it is just building up its subscriber base and other licensed LEO satellite systems have not yet been deployed.

The FCC examined the capabilities of Starlink's LEO satellite system in great detail with respect to Starlink's RDOF application for funding to provide 120/20 Mbps service, and in upholding the Bureau's rejection of the Starlink long-form RDOF application concluded "***that Starlink is***

[2] *See 2017 Performance Measures Public Notice*, 32 FCC Rcd at 9324-25, para. 9 (citing 2016 MBA Report). A detailed description of the FCC's performance measurement requirements is provided at *Connect America Fund,* DA 18-710, 33 FCC Rcd 6509 (2018).

not reasonably capable of offering the required high-speed, low-latency service throughout the areas where it won auction support."[3]

There are other long-term concerns regarding LEO satellite technology:

Orbital debris mitigation and Space Traffic Management must be addressed on a global basis. Given the global coverage of LEO satellite systems, regulation of LEO satellite systems cannot be addressed unilaterally by the US, but rather requires international spectrum priority and coordination. But there is currently no global Space Traffic Management system, and orbital collisions carry the risk of debris clouds that could lead to further collisions, rendering portions of LEO unusable (the "Kessler effect").

Not clear how LEO satellite systems fit within current broadband subsidy programs:

Because with a LEO satellite system there is no additional deployment of a network to serve a location — just installation of an end-user terminal at a customer premises — subsidy programs focused on network deployment would appear to be inappropriate. And with regard to use of broadband subsidy programs to pay for a reservation of capacity in a LEO satellite system, because capacity/spectrum is shared within and between LEO satellite systems on a dynamic basis as satellites come into view and go out of view, it is not clear how capacity could be "reserved" for the broadband subsidy program's customers.

Under FCC milestone requirements, LEO satellite system licensees are already obligated to deploy their full satellite constellation, so BEAD or other subsidies are not necessary to spur build out of their satellite networks. Moreover, LEO satellite systems have already received a significant subsidy of sorts, insofar as the FCC is barred from auctioning spectrum used for global satellite systems (47 U.S.C. § 765f). In contrast, terrestrial wireless providers have paid over $200 billion dollars for their spectrum.

Finally, the relatively high cost of service (e.g., Starlink rates of $120 per month for standard mass market household service — higher for priority service) would still leave service unaffordable for many households, even with programs like ACP, which provided a $30 per month subsidy.

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[3] *Application for Review of Starlink Services, LLC*, 38 FCC Rcd 12201 (2023) at para. 18 (emphasis added). *See also, Application for Review of Starlink Services, LLC* at paragraph 31:

"Unlike fiber or other technologies currently in use, Starlink did not point to examples where its technology was providing service at the required level in the United States. Starlink only argued that it would be able to meet the RDOF obligations by 2025; evaluating this claim required the Bureau to use the best available data to make a predictive judgment. In addition, there were no other relevant LEO networks offering widespread service in the United States to verify Starlink's claims that it would be able to meet the Commission's requirements. In sum, the Bureau correctly relied upon the most relevant speed test data in its assessment and made appropriate predictive judgments based on the information available at the time of its decision. We agree that such information did not demonstrate that Starlink would be reasonably capable of meeting its RDOF obligations [to deploy 100/20 Mbps low-latency service to 642,925 locations in 35 states]."