Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
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Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996, as Amended by the Broadband Data Improvement Act	)	GN Docket No. 16-245

COMMENTS OF VIASAT, INC.

ViaSat, Inc. submits these comments in response to the *Twelfth Broadband Progress Notice of Inquiry* adopted by the Commission on August 2, 2016 in this proceeding (the "*NOI*"). The *NOI* initiates the Commission's annual assessment of the "availability of advanced telecommunications capability to all Americans" pursuant to Section 706 of the Telecommunications Act of 1996.[1] Among other things, the *NOI* seeks comment on "the appropriate criteria and benchmarks" by which to measure whether fixed and mobile broadband services provide access to "advanced telecommunications capability."[2] In doing so, the *NOI* is careful to note that Section 706 defines that term without regard to any transmission media or technology.[3]

As the leading provider of satellite-based broadband services throughout the United States, ViaSat welcomes the opportunity to provide its perspectives with respect to the issues raised in the *NOI*. In particular, ViaSat welcomes the opportunity to update the Commission with respect to the company's ongoing efforts to deploy high-quality satellite

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1 *NOI* ¶ 1.

2 *Id.* ¶ 4.

3 *Id.* ¶ 5.

broadband solutions throughout the United States—including services currently achieving the 25/3 Mbps speed threshold and expected to reach 100-plus Mbps and higher with the launch of new spacecraft—and otherwise offer "advanced telecommunications capability" to consumers. In light of this progress, both current and imminent satellite deployment should be considered fully by the Commission as it prepares the *2017 Broadband Progress Report*.

ViaSat also welcomes the opportunity to address whether factors other than speed should be considered by the Commission in preparing that report. As a general matter, ViaSat continues to support an approach to evaluating broadband "availability" that reflects that: (i) multiple performance characteristics impact the end-user experience and (ii) there are multiple ways for operators to design their networks to deliver a high-quality experience to consumers. Consistent with this approach, ViaSat opposes the adoption of the latency threshold proposed in the *NOI*—particularly given that: (i) a very small, and ever-decreasing, percentage of Internet traffic is at all latency-sensitive and (ii) the impact of latency, if any, can be offset through appropriate network design.

I. AMPLE EVIDENCE EXISTS THAT SATELLITE BROADBAND PROVIDERS ARE MAKING "ADVANCED TELECOMMUNICATIONS CAPABILITY" AVAILABLE TO CONSUMERS IN AREAS ACROSS THE COUNTRY

A. Satellite Broadband Providers Are Meeting the 25/3 Mbps Speed Threshold and Otherwise Providing High-Quality "Advanced Telecommunications Capability" to Consumers

The *2016 Broadband Progress Report* found that it would be appropriate to apply the 25/3 Mbps speed threshold applicable to fixed terrestrial services to fixed satellite services, but concluded that no fixed satellite broadband services had met this threshold as of the relevant

reporting period.[4] To the extent that this was ever an accurate characterization of the state of satellite broadband deployment prior to the issuance of the *2016 Broadband Progress Report*, this is not the case today. ViaSat currently offers 25/3 Mbps speeds in many areas of the country,[5] and will be expanding its 25/3 Mbps coverage—and offering even higher speeds throughout its service footprint—following the launch of ViaSat-2 in 2017 and ViaSat-3 in 2019. Indeed: (i) ViaSat-2, which is scheduled to enter into service in 2017, will support peak speeds of 100-plus Mbps; and (ii) ViaSat-3, which is scheduled to be deployed in 2019, will provide over one terabit per second (1,000 Gbps) of throughput and burst in the 1 Gbps range.[6]

Satellite broadband services are not only high-speed, but also high-quality. This is reflected in widespread consumer acceptance of satellite broadband services as viable options that compare favorably to terrestrial alternatives. ViaSat's satellite broadband service now has an overall user satisfaction rating that is on par with that of many broadband service providers. Notably, the reported level of satisfaction has been rising, and is considerably higher, since ViaSat brought its current-generation broadband service into operation four years ago. It therefore is unsurprising that about one-third of ViaSat's broadband customers have switched to satellite from terrestrial broadband alternatives.

In short, satellite broadband solutions today meet the threshold reflected in the

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4 *Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996, as Amended by the Broadband Data Improvement Act*, 2016 Broadband Progress Report, 31 FCC Rcd 699, at ¶ 3 (2016).

5 *See ViaSat Unveils Fastest Home Satellite Internet Service in the U.S. with the New Exede WiFi Modem and a 25 Mbps Plan* (Nov. 18, 2015), *available at* http://investors.viasat.com/releasedetail.cfm?ReleaseID=943346.

6 *See, e.g., ViaSat Announces Third Quarter Fiscal Year 2016 Results* (Feb. 9, 2016), *available at* http://investors.viasat.com/releasedetail.cfm?ReleaseID=954130.

2016 Broadband Progress Report and should be considered fully by the Commission as it prepares the *2017 Broadband Progress Report*.

B. Satellite Deployment Data Should Be Evaluated in the Same Manner as Terrestrial Deployment Data

Notwithstanding the high and increasing speeds offered by satellite broadband providers, and favorable consumer perceptions of satellite broadband, the *NOI* suggests that satellite deployment data should be viewed differently than terrestrial deployment data. Specifically, the *NOI* seeks comment on how to evaluate satellite deployment data based on the assertion that satellite providers "cannot provide services to all consumers simultaneously as a practical matter due to satellite space station capacity constraints."[7]

Any suggestion that satellite networks are capacity-constrained in ways that other networks are not is incorrect. *All* networks, regardless of technology (*e.g.*, wireline, terrestrial wireless, cable, satellite) are capacity-constrained to some degree and lack the ability to simultaneously serve all potential users at particular levels of service. Just like terrestrial networks, satellite networks scale over time to serve a growing customer base through investments that conceptually are no different than those needed to scale terrestrial networks. In fact, in many contexts satellite networks can scale more quickly and efficiently—particularly given dramatic improvements in satellite capacity and capabilities in recent years that have significantly outpaced improvements in terrestrial networks.

The relevant question is not the amount of theoretical capacity on a network, but whether and how the network operator manages its network to minimize congestion and provide a high-quality experience to consumers. The networks that ViaSat is deploying allocate adequate

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[7] *NOI* ¶ 60.

per-subscriber bandwidth and otherwise ensure that consumers have that high-quality experience. In contrast, many networks that are nominally "capacity-rich" (including fiber-to-the-node networks) can experience significant congestion issues and "bottlenecks," which can significantly limit the speed and other benefits supposedly available over those networks (notably, ViaSat is able to bypass many of these congestion issues by delivering traffic directly from the end user to the satellite and from the satellite to an earth station that efficiently connects to the rest of the Internet, and *vice versa*).[8]

II. THE COMMISSION SHOULD ENSURE THAT ITS "AVAILABILITY" CRITERIA ACCOUNT FOR DIFFERENT TECHNOLOGICAL PLATFORMS—INCLUDING THE USE OF SATELLITES

A. The Commission Should Examine Multiple Performance Characteristics in Evaluating the Availability of "Advanced Telecommunications Capability"

The *NOI* seeks comment on whether it would be appropriate to consider factors other than speed in determining whether advanced telecommunications capability is available in a given area. ViaSat continues to believe that while speed is often the single best predictor of broadband service quality, no single performance criterion adequately measures such quality or, in and of itself, predicts consumer satisfaction with respect to broadband performance.[9] Accordingly, ViaSat continues to support an approach that would examine multiple factors in determining whether broadband is "available" in a given area for Section 706 purposes, and account for the many different platforms that are and may be used to provide broadband services

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8 *See generally* Letter from ViaSat to FCC, WC Docket No. 10-90 (May 19, 2016).

9 *See generally* Mark D. Dankberg, Thomas E. Moore, and Girish Chandran, *Toward a National Broadband Plan: Ensuring a Meaningful Understanding of Broadband Capabilities and Facilitating Competitive Choices* (Aug. 31, 2009), attached to Letter from ViaSat to FCC, GN Docket No. 09-51 (Aug. 31, 2009) (discussing the multiple dimensions of "broadband" service and cautioning against the adoption of overly restrictive performance standards that could artificially constrain its evolution).

and other advanced telecommunications capability to consumers.[10]

That said, in evaluating any given service offering for this purpose, the primary question should be whether that offering provides a quality end-user experience—and not whether the underlying network satisfies technical criteria that may or may not have any impact on that experience. As ViaSat has noted previously, in designing and implementing their networks, operators make trade-offs between different performance characteristics. Different network technologies and architectures offer comparative advantages in some areas but not others. For example, some terrestrial networks offer lower-latency service but at relatively low speeds. In contrast, geostationary satellite networks tend to provide relatively high speeds on a consistent basis with moderate levels of latency. The specific network designs implemented by satellite and other network operators—and the specific trade-offs reflected in those designs—should not matter as long as end users enjoy a quality broadband experience. Correspondingly, the Commission should be careful not to adopt "availability" criteria that unnecessarily (and unreasonably) exclude technologies and services that *are* providing consumers with a high-quality broadband experience, based solely on the fact that the design of the underlying network is inconsistent with the Commission's design expectations.

B. The Commission Should Not Adopt Any Latency Threshold in the Section 706 Context

Although latency is one factor among many that may have some impact on perceived broadband quality, there is no basis for adopting a latency threshold in the Section 706 context—particularly where doing so would result in the Commission not "counting" satellite broadband services that are delivering high-quality, 25/3 Mbps, "advanced telecommunications

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[10] *See, e.g.,* Comments of ViaSat, Inc., GN Docket No. 16-191, at 2-6 (Sep. 15, 2015).

capability" to consumers. As the *NOI* notes, the Commission declined to adopt a latency threshold in the *2016 Broadband Progress Report* due to a "lack [of] sufficiently comprehensive data on latency."[11] ViaSat respectfully submits that the Commission still lacks any empirical basis for concluding that latency above 100 ms has an adverse impact on the end-user experience that is more significant than any of a half-dozen other performance characteristics that can affect the end-user experience (*e.g.*, high packet loss, high jitter, long page load times, etc.). If anything, recent developments have further eroded the already suspect link between latency and service quality suggested in the *2016 Broadband Progress Report*, and demonstrated that latency thresholds simply do not serve as effective proxies for broadband service quality.

First, recent data on broadband usage patterns underscore the fact that the vast majority of broadband traffic is *not* latency-sensitive.[12] Specifically, Sandvine's *2016 Global Internet Phenomena Report*, published in June 2016, estimates that, in North America, approximately: (i) 67.4 percent of peak period Internet traffic is attributable to streaming video and audio; (ii) 7.2 percent of peak period Internet traffic is attributable to media-related e-commerce; (iii) 5 percent of peak period Internet traffic is attributable to web browsing; and (iv) 3.9 percent of peak period Internet traffic is attributable to social networking. In other words, Sandvine estimates that a minimum of about 83.5 percent of peak period Internet traffic can be tied to applications that are in no way latency-sensitive. But the actual percentage of non-latency-sensitive traffic is even higher; notably, the 83.5 percent figure does not account for the over 12 percent of aggregate traffic that was classified in categories outside of the "Top Five"—

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11 *NOI* ¶ 27.

12 *See* https://www.sandvine.com/downloads/general/global-internet-phenomena/2016/global-internet-phenomena-report-latin-america-and-north-america.pdf.

including other non-latency-sensitive categories (*e.g.*, file sharing and storage). Notably, "communications" traffic—*i.e.*, applications, services and protocols that allow email, chat, voice, and video communications (not all of which are latency-sensitive)—also did not crack the "Top Five," suggesting such traffic accounted for less than 3.9 percent of aggregate traffic (and, perhaps, much less).

In other words, the data show that an exceedingly small portion of Internet traffic even conceivably could be impacted by latency. This is consistent with the *NOI*'s suggestion that: (i) many applications do not require low latency; (ii) hybrid solutions could allow traffic that is "not latency sensitive" to be routed via satellite; and (iii) voice service would be the principal type of service requiring a low-latency connection.[13] Of course, this does not mean that this traffic *would* be impacted by latency; that would depend on whether the relevant network is properly designed to mitigate the impact (if any) of latency, as is the case with newer satellite networks.

Second, in the past year the Commission has acknowledged that the impact of latency can be mitigated through appropriate network design. Specifically, in the recent *CAF II Report and Order*, the Commission explained that even where a service has latency in excess of 100 ms, ensuring that the service could meet a Mean Opinion Score ("MOS") of four or better would "help ensure quality voice service performance . . . ."[14] This makes sense, as: (i) the MOS metric is evaluated based on the quality of the user's experience, and thus accounts for non-latency-based service characteristics that can have a dramatic impact on that experience; and (ii) a MOS of four indicates "High" speech transmission quality that the vast majority of users

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13 *NOI* ¶ 34.

14 *Connect America Fund*, Report and Order, 31 FCC Rcd 5949, at ¶ 33 (2016).

classify as "Good or Better."[15]

Third, the International Telecommunication Union ("ITU") has revised critical elements of the recommendations underlying the Commission's adoption of the 100 ms latency requirement in 2013 in the context of the Connect America Fund ("CAF").[16] That requirement was based on ITU-T Recommendation G.114 (the latest version of which was adopted in 2003), which in turn relied upon ITU-T Recommendation G.107. That ITU-T Recommendation G.107 established the "E-Model" for use in predicting transmission quality for purposes of network planning, and ITU-T Recommendation G.114 used this "E-Model" to derive a curve showing the predicted effects of "pure delay"—*i.e.*, latency—on transmission quality. The Commission then used this curve to develop the 100 ms latency requirement in the CAF context. However, subsequent versions of ITU-T Recommendation G.107 acknowledged that the version used to develop ITU-T Recommendation G.114 may have significantly overstated the impact of latency on predicted service quality. Specifically, the updated 2015 version of ITU-T Recommendation G.107 notes that "[b]ased on several conversation tests, it has been shown that even long delay values may not affect the perceived speech quality . . . [such that] the predictions by previous versions of the E-model may be more pessimistic than actual user opinion."[17]

Thus, the factual underpinnings for the adoption of the 100 ms latency threshold in the CAF context no longer apply. And there is even less of a basis for adopting a latency threshold today in the Section 706 context than there was last year.

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15 *See* ITU-T Rec. G.107, Annex B, Table B.1.

16 *See Connect America Fund*, Report and Order, 28 FCC Rcd 15060 (2013).

17 ITU-T Rec. G.107, at 20 (2015).

CONCLUSION

For the reasons provided above, ViaSat urges the Commission to fully consider satellite broadband deployment in preparing its *2017 Broadband Progress Report*, particularly in light of the 25/3 Mbps speeds that ViaSat is now providing. ViaSat also opposes the adoption of any latency benchmark in the Section 706 context given that (i) the vast majority of Internet traffic is not latency-sensitive; (ii) the Commission has acknowledged that the impact of latency can be mitigated through appropriate network design; and (iii) the ITU has confirmed that the technical model underlying the 100 ms latency standard adopted in the CAF context likely overstates the impact of latency on service quality.

Respectfully submitted,

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