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State of Montana
Public Service Commission
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In the Matter of the Investigation into Improving	)	
Transparency, Fostering Accountability, and	)	Regulatory Division
Maintaining Quality Services for High Cost	)	Docket No. N2017.10.82
Support and Lifeline Services in Montana	)	

Comments of the Competitive Enterprise Institute

The Competitive Enterprise Institute (CEI) respectfully submits these comments regarding the Montana Public Service Commission's Notice of Investigation in the matter of "improving transparency, fostering accountability, and maintaining quality services for high cost support and lifeline services in Montana."[1] CEI is a nonprofit, nonpartisan public interest organization dedicated to the principles of limited constitutional government and free enterprise.[2] We frequently participate in regulatory proceedings before agencies such as the Federal Communications Commission (FCC) regarding Internet regulation,[3] conduct litigation and file amicus briefs in regulatory cases,[4] and publish policy analyses addressing telecommunications policy topics, including universal service.[5]

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1. Investigation into Improving Transparency, Fostering Accountability, and Maintaining Quality Services for High Cost Support and Lifeline Services in Montana, *Notice of Investigation and Opportunity for Comments*, Docket No. N2017.10.82 (Nov. 9, 2017), *available at* http://psc.mt.gov/Docs/ElectronicDocuments/pdfFiles/N20171082NOI.pdf ("NOI").
2. For more information about CEI, *see* https://cei.org/about-cei.
3. *See, e.g.*, Comments of CEI, Restoring Internet Freedom, *Notice of Proposed Rulemaking*, 32 FCC Rcd 4434 (2017) *available at* https://ecfsapi.fcc.gov/file/10718307454684/CEI%20Comments%20-%20Restoring%20Internet%20Freedom.pdf.
4. *See, e.g.*, *Free Enter. Fund v. Pub. Co. Accounting Oversight Bd.*, 561 U.S. 477 (2010) (counsel for petitioners); *State Nat. Bank of Big Spring v. Lew*, 795 F.3d 48, 52 (D.C. Cir. 2015) (counsel for private appellants); Petition for a Writ of Mandamus, *In re Competitive Enter. Inst.*, no. 17-1261 (D.C. Cir. Dec. 12, 2017) (counsel for petitioners).
5. *See, e.g.*, Braden Cox & Clyde Wayne Crews, Jr., *Communications Without Commissions: A National Plan for Reforming Telecom Regulation*, COMPETITIVE ENTERPRISE INSTITUTE, 2005 ISSUE ANALYSIS NO. 9 (2005), *available at* https://cei.org/pdf/4911.pdf.

In this proceeding, the Commission asks if there are "market-based alternatives, or technologies other than fiber-based broadband, that more effectively accomplish the goals of ETC Programs as stated in 47 U.S.C. § 254(b)?"[6] Market-based alternatives to subsidized services indeed exist and will likely continue to evolve in ways that fulfill Montanans' broadband needs, mitigating or even obviating the need for government subsidies of eligible telecommunications carriers (ETCs).[7]

Home broadband connections have traditionally piggybacked on existing wireline infrastructure, such as cable television systems or telephone lines. But as consumer demand for broadband Internet access has increased, a growing number of firms have begun to offer broadband access that does not require a wired connection to each subscriber's household. Some of these providers offer last-mile access using terrestrial wireless towers, which may sit several miles from a typical subscriber's home.[8] Other providers, such as Hughes Network Systems and Viasat, offer broadband connectivity using geostationary satellites that orbit the Earth at about 20,000 miles above sea level.[9]

Satellite broadband is an increasingly viable substitute for traditional terrestrial access

Satellite broadband providers have invested heavily in recent years, launching or planning to launch high-capacity broadband satellites capable of enabling virtually every residential dwelling in the continental United States to access the Internet at speeds comparable to traditional terrestrial broadband. In March 2017, for instance, Hughes Network Systems began offering its HughesNet Gen5 service, offering plans with up to 25 Mbps downstream and 3 Mbps upstream starting at $50 per month.[10] In June 2017, another satellite provider, Viasat, spent $625 million to launch its ViaSat-2 satellite.[11] When this satellite becomes operational in early 2018, it will offer downstream bandwidth of up to 100 Mbps per subscriber—and will, like HughesNet Gen5, offer coverage throughout the continental United States.[12]

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6. NOI, *supra* note 1, at 3.
7. Federal regulations define the term "eligible telecommunications carrier" at 47 C.F.R. § 54.201.
8. *See, e.g.*, Mike Dano, Editor's Corner—*The Economics of Fixed Wireless, From LTE to 5G, and What it Means for Verizon*, FIERCEWIRELESS (July 27, 2017, 9:00 AM), https://www.fiercewireless.com/5g/economics-fixed-wireless-from-lte-to-5g-and-what-it-means-for-verizon.
9. *See* VantagePoint, *Analysis of Satellite-Based Telecommunications and Broadband Services*, at 3 (2013), *available at* https://ecfsapi.fcc.gov/file/7520956711.pdf.
10. David Carnoy, *Satellite Internet Finally Offers True Broadband Speeds*, CNET (Mar. 7, 2017, 8:30 AM), https://www.cnet.com/news/satellite-internet-finally-brings-true-broadband-speed/.
11. *See* Mike Freeman, *Viasat Posts Solid Results While Awaiting New Satellite Launch*, SAN DIEGO UNION-TRIBUNE, May 23, 2017, *available at* http://www.sandiegouniontribune.com/business/technology/sd-fi-viasat-quarterfour-20170523-story.html.
12. Jeff Baumgartner, *ViaSat 2 Launches With Big Broadband Potential*, MULTICHANNEL NEWS (June 2, 2017, 6:04 AM), http://www.multichannel.com/news/distribution/viasat-2-launches-big-broadband-potential/413196. ViaSat-1 offers limited coverage in most of the western United States, except in states that border the Pacific Ocean. *See* VantagePoint, *Analysis of Satellite-Based Telecommunications and Broadband Services*, at 5 (2013), *available at* https://ecfsapi.fcc.gov/file/7520956711.pdf.

To be sure, existing satellite broadband services are not *perfect* substitutes for wireline broadband.[13] But for many U.S. consumers—especially residents of rural areas where wireline service may be unavailable or prohibitively expensive—satellite service is a reasonable alternative that is well-equipped to satisfy most typical home Internet use scenarios. A satellite broadband subscriber can send and receive emails (including large attachments), backup and sync data with cloud storage providers, listen to streaming music, watch video on-demand, and simply browse the Web. Satellite broadband suffers from two primary drawbacks compared to terrestrial broadband service: more restrictive usage limits and higher latency. These drawbacks, however, do not necessarily render satellite broadband an unacceptable substitute for traditional broadband service.

First, as satellite providers have improved their networks over time, they have adopted much more generous usage policies, including service tiers that come with data allowances that are sufficient to accommodate the most subscribers' demands. Two major satellite providers also offer uncapped access during off-peak hours to users of certain plans, enabling subscribers that need to transfer unusually large files to schedule such transfers for times when network congestion is relatively minimal. And many satellite broadband plans allow subscribers to keep using their broadband connection even after they have exceeded their monthly data allowance for no additional fee, albeit with throttled speeds or reduced network priority relative to other users in certain circumstances.

For example, on September 28, 2017, Viasat began offering data plans with up to 30 Mbps downstream bandwidth.[14] Some of these plans plan include "unlimited" data usage, although subscribers that exceed 150 GB of usage in one monthly billing cycle may see the priority of their Internet traffic reduced during periods of network congestion.[15] Similarly, HughesNet offers plans ranging between 10 GB and 50 GB of monthly usage at up to 25 Mbps downstream, but subscribers who reach their monthly cap may continue using the service at reduced speeds (typically in the range of 1 Mbps to 3 Mbps downstream).[16]

For casual broadband subscribers who use their connection to browse the Web, send email, share photos, use social media platforms, and occasionally watch YouTube clips, exceeding their satellite provider's usage limits is relatively unlikely. Given that HughesNet and Viasat offer plans that, respectively, allow up to 50 GB and 150 GB of monthly usage, each subscriber can select from a

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13. For example, the FCC concluded in early 2016—before the launch of the Gen5 or ViaSat-2 satellites, that satellite broadband did not meet the definition of "advanced telecommunications capability" for purposes of Section 706 of the Telecommunications Act of 1996. *See* Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in A Reasonable & Timely Fashion, & 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, 720–721, para. 48 (2016).

14. Viasat Exede, *Introducing Unlimited Plans*, https://www.exede.com/unlimited/ [last visited Jan. 16, 2018].

15. *Id.* ("[I]f you use more than 150 GB of data and the network is congested, Viasat may prioritize your data behind other customers.").

16. *See* HughesNet, *HughesNet Gen4 Fair Access Policy*, http://legal.hughesnet.com/FairAccessPolicyGen4.cfm [last visited Jan. 20, 2018] ("If your data usage exceeds the allowance for your plan, the throughput (speed) of your service will be reduced.").

range of plans to suit his or her needs.[17] The following chart depicts an approximate estimation of how much data is used by various typical Internet activities:

Activity	**Typical usage**
Web browsing	300 graphic-intensive websites per GB[18]
Social media	10 hours per GB[19]
E-mail	3,000 emails per GB[20]
Streaming video (standard definition)	75 minutes per GB[21]
Streaming video (high definition)	30 minutes per GB[22]

In one month, a satellite broadband subscriber could visit up to 600 websites, spend 20 hours on social media, send and receive 6,000 emails, watch 2.5 hours of standard-definition video, and watch one hour of high-definition video—without transmitting more than the 10 GB of data offered by a typical satellite provider's "base plan." For household with, say, five broadband users, purchasing a more expensive plan could enable each resident to engage in this sort of usage. In fact, over the course of a year, a household with a 50 GB per month satellite subscription could stream every single original program Netflix offered in 2017—roughly 1,000 hours of video—in *high definition*, and still have data left over for modest social media activity and Web browsing.[23]

Second, although existing satellite broadband service typically suffers from high latency[24]—that is, the round-trip time it takes a packet of Internet traffic to travel between its origin and destination—latency is not a major impediment to many of the most popular broadband use scenarios. Delaying the receipt of an email by roughly half a second, for instance, is barely noticeable from a typical

17. *See, e.g.*, Kevin Fitchard, *As Satellite Internet Technology Improves, Exede Starts Boosting Its Broadband Caps*, GIGAOM, (Aug. 13, 2014, 12:14 PM), https://gigaom.com/2014/08/13/as-satellite-internet-technology-improves-exede-starts-boosting-its-broadband-caps/.

18. *See* Cox, *Data Usage Calculator*, http://www.cox.com/myconnection/learn/data-usage/data-usage-calculator.cox [last visited Jan. 18, 2018].

19. Antonio Villas-Boas, *How to Tell Which of Your Apps are Using up the Most Data*, BUSINESS INSIDER (Jun. 27, 2015, 10:10 AM), http://www.businessinsider.com/social-media-uses-up-a-lot-of-your-data-2015-6.

20. *See, e.g.*, Andrew Moore, *How Many Megabytes Are in a Gig? Understanding Mobile Data*, TING (June 21, 2017), https://ting.com/blog/understanding-mobile-data.

21. *See* Cameron Summerson, *How Much Data Does Netflix Use?*, HOW-TO GEEK (Jan. 15, 2018), https://www.howtogeek.com/338983/how-much-data-does-netflix-use/.

22. *See id.*

23. Chris O'Brien, *Netflix Announces 1,000 Hours of New Original Content For 2017*, VENTUREBEAT (Feb. 8, 2017, 9:20 AM), https://venturebeat.com/2017/02/08/netflix-announces-1000-hours-of-new-original-content-for-2017/. Other popular video services, such as YouTube and HBO Now, stream content at similar bitrates. Michael Gowan, *The Need For Speed: How Much Bandwidth Do You Need For Optimal Streaming?*, DECIDER (Sept. 1, 2015, 4:00 PM), https://decider.com/2015/09/01/the-need-for-speed-how-much-bandwidth-do-you-need-for-optimal-streaming/.

24. Alex Miller, *Satellite Internet Latency: What's the Big Deal?*, INSIDE VIASAT (Sept. 6, 2017), https://corpblog.viasat.com/satellite-internet-latency-whats-the-big-deal/.

user's perspective. Similarly, latency is not a major disruption when streaming pre-recorded audio or video; bandwidth, not latency, is typically what determines whether a user experiences noticeable buffering. As for Web browsing, latency is likely to manifest as a minor inconvenience, especially to the extent that providers employ methods such as caching or pre-fetching websites.[25] By contrast, consumers that use their Internet connection to engage in real-time, interactive activities—such as certain online games, videoconferencing, or connecting to a remote desktop—may notice significant degradation due to the latency inherent in geostationary satellite access.[26]

Unsurprisingly, consumers tend to care about all the aforementioned aspects of broadband service—usage limits, bandwidth, and latency—but they do not seem to value each aspect of service to the same extent. According to nationwide surveys administered in 2017 by the Technology Policy Institute, the typical broadband consumer is willing to pay $24 per month for an increase in downstream bandwidth from 10 Mbps to 25 Mbps.[27] Yet the typical consumer is willing to pay just $8 per month to reduce latency from satellite broadband levels to that of a traditional wireline connection.[28] These preferences are consistent with consumers' overall usage preferences, which tend to emphasize activities that are not especially sensitive to latency.[29]

Given the increasing popularity of interactive, real-time Internet applications—such as video chat and online gaming—some providers are working to deploy satellite networks that offer significantly lower latency than existing satellite services. For instance, SpaceX has announced it plans to deploy 4,425 broadband satellites beginning in 2019, offering latency as low as 25 milliseconds—comparable to a traditional wireline connection.[30] The company filed an application with the FCC in 2016 for a license to begin deploying these satellites.[31] Unlike geostationary satellites used by HughesNet and Viasat, SpaceX plans to deploy its satellites into low-Earth orbit, ranging from 1,110

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25. For a discussion of caching, pre-fetching, and other methods to accelerate Web browsing over satellite connections, see Greg Berlocher, *Minimizing Latency in Satellite Networks*, VIA SATELLITE (Sept. 1, 2009), http://www.satellitetoday.com/telecom/2009/09/01/minimizing-latency-in-satellite-networks/.

26. *See, e.g.*, Pete Masitn, *How Latency Is Killing Online Gaming*, VENTUREBEAT (Apr. 17, 2016, 5:00 PM), https://venturebeat.com/2016/04/17/how-latency-is-killing-online-gaming/.

27. Yu-Hsin Liu, Jeffrey Prince & Scott Wallsten, *Distinguishing Bandwidth and Latency in Households' Willingness-to-Pay for Broadband Internet Speed*, at 5, TECHNOLOGY POLICY INSTITUTE (Aug. 2017), *available at* https://techpolicyinstitute.org/wp-content/uploads/2017/08/Distinguishing-Bandwidth-and-Latency-in-Households-Willingness-to-Pay-for.pdf.

28. *Id.* at 6.

29. *See supra* notes 24 to 26 and accompanying text.

30. Jon Brodkin, *With Latency as low as 25ms, SpaceX to Launch Broadband Satellites in 2019*, ARSTECHNICA (May 3, 2017, 12:33 PM), https://arstechnica.com/information-technology/2017/05/spacexs-falcon-9-rocket-will-launch-thousands-of-broadband-satellites/.

31. *See* Investing in America's Broadband Infrastructure: Exploring Ways to Reduce Barriers to Deployment, Hearing before the S. Comm. on Commerce, Science, and Transportation, 115th Cong. 1 (statement of Patricia Cooper, Vice President, Satellite Government Affairs, Space Exploration Technologies Corp.), *available at* https://www.commerce.senate.gov/public/_cache/files/6c08b6c2-fe74-4500-ae1d-a801f53fd279/655C5CBED75A50881172C1E9069D91E6.testimony-patricia-cooper---broadband-infrastructure-hearing.pdf.

km to 1,325 km above sea level.[32] SpaceX has identified the 23 million Americans who live in rural areas as the core of its prospective customer base, as these consumers often lack access to affordable broadband service with low latency.[33] And SpaceX has pointed to growing consumer demand for broadband speed and capacity as a key rationale for the firm's decision to pursue the deployment of an unprecedented network of satellites.[34]

Subsidizing ETCs distorts innovation and investment in rural broadband deployment

In this proceeding, the Commission asks whether "ETC Program subsidies, by reducing incentives to innovate and economize, actually inhibit effective buildout of rural, insular, or high-cost areas."[35] The advances in satellite broadband connectivity discussed above have generally occurred *without* government subsidies under High Cost Support and Lifeline Services, as no satellite carrier has been awarded an ETC designation by the FCC.[36] Although FCC staffers have, according to the agency, "devoted substantial time" to ensuring that satellite operators are eligible to participate in universal service fund programs,[37] the satellite industry has pointed out that universal service programs fail to "adhere to the long-standing [FCC] principle of technology neutrality."[38]

Still, satellite providers have made significant—and risky—investments in building capital-intensive networks based on market demand, rather than relying primarily on generous government subsidies.[39] Many of their rivals, however, qualify as ETCs and thus receive significant support from High Cost Support and Lifeline Services. For example, as Commissioner Koopman has observed, Commnet, a terrestrial wireless provider, receives a subsidy of $34.25 per customer to provide service on the Northern Cheyenne Reservation in southeast Montana.[40] As the Commission

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32. *Id.* at 5.

33. *Id.* at 3.

34. *Id.* at 4.

35. NOI, *supra* note 1, at 3.

36. Comments of Satellite Industry Association at 2, Assessment and Collection of Regulatory Fees for Fiscal Year 2017, *Notice of Proposed Rulemaking*, FCC 17-62, MD Docket No. 17-134 (June 22, 2017), *available at* https://ecfsapi.fcc.gov/file/106221395403604/SIA_Regulatory%20Fees%20FY2017_06222017_Final.pdf.

37. Assessment and Collection of Regulatory Fees for Fiscal Year 2017, *Report and Order and Further Notice of Proposed Rulemaking*, 32 FCC Rcd 7057, 7063, para. 12 (rel. Sept. 5, 2017), *available at* https://apps.fcc.gov/edocs_public/attachmatch/FCC-17-111A1_Rcd.pdf.

38. *See, e.g.*, Comments of Satellite Industry Association at 2 & n.6, *supra* note 36.

39. Although the FCC recently issued an order classifying broadband Internet access service providers as information services, rather than telecommunications services, under Title I of the Communications Act, at least one federal court of appeals has held that the agency may expend USF funds for non-telecommunications services. section 254 does not limit the use of USF funds to "telecommunications services." *In re FCC 11-161*, 753 F.3d 1015, 1054 (10th Cir. 2014) ("section 254 does not limit the use of USF funds to 'telecommunications services.'").

40. Hon. Roger Koopman, *High Speed Broadband Is Not a Human Right*, FOUNDATION FOR ECONOMIC EDUCATION (Dec. 31, 2017), https://fee.org/articles/high-speed-broadband-is-not-a-human-right/.

observed in its NOI, funding for the ETC program in Montana will total "over $100 million this year alone."[41]

These subsidies may well alter the behavior of some Montanans by reducing the price or increasing the supply of broadband service, at least in the short run. But the long-run implications of subsidizing particular types of broadband service in particular geographic areas are troubling. To the extent that subsidies are granted to ETCs that fulfill consumer demand, but do so imperfectly, subsidized carriers may invest in broadband networks that are not only less robust but also costlier than the alternatives the marketplace would provide were it not for the subsidies. Innovating around the challenges inherent in serving consumers who live in rural areas will require experimentation and risk-taking. All things equal, however, a disruptive firm that is ineligible for subsidies is less likely to enter a market in which incumbent firms receive subsidies than a market in which subsidies are unavailable to any participants.

Determining which providers of Internet access are eligible to receive funding necessarily entails the FCC establishing some criteria as to what constitutes broadband service.[42] Given the many service dimensions that matter to broadband subscribers—including bandwidth, latency, and usage limits[43]—defining the services a firm must offer to qualify as an ETC is likely to result in substantial distortions. If, for example, the definition of broadband is based on how much bandwidth is offered, providers may design networks that emphasize bandwidth over latency. Marginal decisions about network architecture should turn on consumer preferences—as revealed by their purchasing choices—rather than meeting bureaucratic definitions.

Subsidizing ETCs that offer broadband service may also discourage the engineers and technologists who design Internet applications aimed at U.S. consumers from accommodating users whose connections offer low bandwidth or high latency. In developing areas of the world, such as South Asia and Sub-Saharan Africa, engineers often design technologies to "make more efficient use of bandwidth than do engineers in economies where bandwidth is cheaper and greater economize bandwidth."[44] Governmental efforts to induce broadband providers to offer subscribers more and more bandwidth may reduce the efficiency of network applications, much like how recent trends in the bandwidth offered by traditional broadband services has occurred just as websites have grown larger.

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41. NOI, *supra* note 1, at 1.

42. *See, e.g.*, Connect America Fund, ETC Annual Reports and Certifications, Developing a Unified Intercarrier Compensation Regime, *Report and Order, Order and Order on Reconsideration, and Further Notice of Proposed Rulemaking*, 31 FCC Rcd. 3087, 3096, para. 20 (2016), *available at* https://apps.fcc.gov/edocs_public/attachmatch/FCC-16-33A1_Rcd.pdf (discussing FCC rules setting minimum bandwidth thresholds for ETCs).

43. *See supra* notes 27 to 28 and accompanying text.

44. *See* Justin (Gus) Hurwitz & Roslyn Layton, *Debatable Premises in Telecom Policy*, 31 J. MARSHALL J. INFO. TECH. & PRIVACY L. 453, 460 (2015), *available at* https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2418733 (citing N. Narendra et al., *MobiCoStream: Real-Time Collaborative Video Upstream for Mobile Augmented Reality Applications*, IEEE Int'l Conf. on Advanced Networks & Telecomm. Sys. 6 (Dec. 14, 2014); D. Chattopadhyay et al., *Adaptive Rate Control for H.264 Based Video Conferencing over a Low Bandwidth Wired and Wireless Channel*, IEEE Int'l Symp. on Broadband Multimedia Sys. & Broadcasting 6 (May 13, 2009)).

Respectfully submitted,

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