

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC**

In the Matter of)	
)	
Rural Digital Opportunity Fund)	WC Docket No. 19-126
)	
Connect America Fund)	WC Docket No. 10-90

REPLY COMMENTS OF THE FIBER BROADBAND ASSOCIATION

Lisa R. Youngers
President and CEO
Fiber Broadband Association
Suite 800
2025 M Street NW
Washington, DC 20036
Telephone: (202) 367-1236

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TABLE OF CONTENTS

INTRODUCTION AND SUMMARY1

I. THE COMMISSION SHOULD ADOPT FBA’S PROPOSED WEIGHTING
METHODOLOGY, WHICH AWARDS WEIGHTS FOR PERFORMANCE TIERS
BASED ON A SOUND AND TRANSPARENT METHODOLOGY THAT REFLECTS
THE BENEFITS OF EACH TIER FOR CONSUMERS AND WILL MAXIMIZE
PARTICIPATION IN THE RDOF AUCTION.....2

II. THE COMMISSION SHOULD IGNORE VIASAT’S WEIGHTING PROPOSAL,
WHICH WOULD ONLY BENEFIT HIGH LATENCY PROVIDERS AT THE
EXPENSE OF AUCTION PARTICIPATION BY PROVIDERS IN OTHER
PERFORMANCE TIERS5

III. A NEWLY DEVELOPED BROADBAND CONSUMER EXPERIENCE METRIC,
BASED ON A TRANSPARENT AND WELL-DEVELOPED METHODOLOGY,
FURTHER SUPPORTS THE ADOPTION OF FBA’S WEIGHTING
METHODOLOGY11

CONCLUSION.....16

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INTRODUCTION AND SUMMARY

The Fiber Broadband Association (“FBA”)¹ hereby submits these reply comments to the Federal Communications Commission’s (“FCC” or “Commission”) Notice of Proposed Rulemaking (“NPRM”) in the above-captioned proceeding concerning the proposed framework for the Rural Digital Opportunity Fund (“RDOF”).² As with its initial comments, FBA focuses its reply comments solely on the issue of developing a methodology to weight the various performance tiers that would best serve the public interest. While a number of commenters offered opinions on alternative performance tier weights, FBA submitted a detailed methodology supporting its proposed weights,³ which “reflect [the Commission’s] preference for higher

¹ FBA is a not for profit trade association with more than 250 members, including telecommunications, computing, networking, system integration, engineering, and content-provider companies, as well as traditional service providers, utilities, and municipalities. Its mission is to accelerate deployment of all-fiber access networks by demonstrating how fiber-enabled applications and solutions create value for service providers and their customers, promote economic development, and enhance quality of life. A complete list of FBA members can be found on the organization’s website: <https://www.fiberbroadband.org/>.

² *Rural Digital Opportunity Fund; Connect America Fund*, WC Dkts. 19-126, 10-90, Notice of Proposed Rulemaking, FCC 19-77 (rel. Aug. 2, 2019) (“NPRM”).

³ Comments of the Fiber Broadband Association, WC Docket Nos. 19-126, 10-90 (Sep. 20, 2019) (“FBA Comments”).

speeds, higher usage allowances, and low latency” and explained how its weights “maximiz[e the Commission’s] limited budget and guard[] against widening the digital divide.”⁴ FBA submits these reply comments to: (1) urge the Commission to adopt FBA’s proposed methodology that applies a 70-point discount for baseline low latency services and a 85-point discount for baseline high latency services, which will capture the benefits of each performance tier and maximize participation in the auction, thereby driving the most cost-effective results to achieve the Commission’s stated goals; (2) caution the Commission against relying on Viasat’s weighting proposal, which would only serve to benefit satellite providers at the expense of other providers; and (3) provide and include as part of these reply comments a just-developed broadband performance experience index, which is designed to capture how consumers view differences in performance among various network technologies and which further supports FBA’s proposed weighting methodology.

I. THE COMMISSION SHOULD ADOPT FBA’S PROPOSED WEIGHTING METHODOLOGY, WHICH AWARDS WEIGHTS FOR PERFORMANCE TIERS BASED ON A SOUND AND TRANSPARENT METHODOLOGY THAT REFLECTS THE BENEFITS OF EACH TIER FOR CONSUMERS AND WILL MAXIMIZE PARTICIPATION IN THE RDOF AUCTION

The record is clear: the Commission should increase the baseline performance tier discounts from those proposed in the NPRM to (1) reflect the Commission’s and consumers’ preference for higher speed, higher usage allowance, and lower latency services, (2) guard against widening the digital divide, (3) capture the benefits of each performance tier for consumers as set forth by FBA, and (4) maximize participation and competition in the RDOF auction. While many stakeholders provided their opinions on the weighting methodology, FBA followed the Commission’s admonition that commenters proposing alternative methodologies

⁴ NPRM at ¶¶ 25, 27.

“explain how their proposal will balance the objectives of maximizing [the FCC’s] limited budget and guard[] against widening the digital divide by ensuring that rural Americans do not fall further behind those living in urban areas.”⁵ But even for those that did not, the majority argued that the discounts for baseline tiers should be increased.⁶

In its initial comments, FBA detailed how its weighting methodology would capture the benefits of each performance tier and maximize participation in the RDOF auction, thereby driving down prices, all while allowing for more areas to be served with services that have higher speeds, higher usage allowances, and lower latency.⁷ The methodology FBA proposed increases the discount applied to baseline low latency services to 70 points and baseline high latency services to 85 points to reflect the lesser benefits offered to consumers by services in

⁵ *Id.* at ¶ 27.

⁶ *See, e.g.*, Comments of ACA Connects – America’s Communications Association, WC Docket Nos. 19-126, 10-90, at 5-9 (Sep. 20, 2019) (“ACA Connects Comments”); Comments of ADTRAN, Inc., WC Docket Nos. 19-126, 10-90, at 10-11 (Sep. 20, 2019) (“ADTRAN Comments”); Comments of Buckeye Hills Regional Council, WC Docket Nos. 19-126, 10-90, at 9 (Sep. 19, 2019) (“BHRC Comments”); Comments of INCOMPAS, WC Docket Nos. 19-126, 10-90, at 12 (Sep. 20, 2019) (“INCOMPAS Comments”); Comments of the Illinois Department of Innovation & Technology, WC Docket Nos. 19-126, 10-90, at 7 (Sep. 20, 2019) (“DoIT Comments”); Comments of the Institute for Local Self-Reliance, WC Docket Nos. 19-126, 10-90, at 2 (Sep. 20, 2019) (“ILSR Comments”); Comments of ITTA – The Voice of America’s Broadband Providers, WC Docket Nos. 19-126, 10-90, at 18-19 (Sep. 20, 2019) (“ITTA Comments”); Comments of the North Carolina Department of Information Technology, WC Docket Nos. 19-126, 10-90, at 3-4 (Sep. 20, 2019) (“NCIT Comments”); Comments of NTCA – The Rural Broadband Association, WC Docket Nos. 19-126, 10-90, at 7 (Sep. 20, 2019) (“NTCA Comments”); Comments of USTelecom – The Broadband Association, WC Docket Nos. 19-126, 10-90, at 24 (Sep. 20, 2019) (“USTelecom Comments”); Comments of the Utilities Technology Council, WC Docket Nos. 19-126, 10-90, at 10 (Sep. 20, 2019) (“UTC Comments”); Comments of Verizon, WC Docket Nos. 19-126, 10-90, at 6 (Sep. 20, 2019) (“Verizon Comments”); Comments of Windstream Services, LLC, WC Docket Nos. 19-126, 10-90, at 11, 16 (Sep. 20, 2019) (“Windstream Comments”).

⁷ *See* FBA Comments at 6-13.

those tiers, as compared to gigabit and above baseline services.⁸ Unlike the weights used in the Connect America Fund Phase II (“CAF II”) auction and proposed by the Commission in the NPRM, FBA’s proposed weighting methodology would ensure that gigabit tier providers would have a reasonable chance of winning in the auction, which would spur their participation in the auction while maintaining the participation of providers in other tiers.⁹

Similar to FBA, ACA Connects concluded that shortcomings in the CAF II auction “deterred participation, limited competition, and reduced the overall cost-effectiveness of the program.”¹⁰ This was due in part to the Commission’s weighting methodology, which ACA Connects found to “unduly favor[] service providers relying on lower-performance tiers (technologies) while discouraging bidding in higher-performance tiers.”¹¹ In support of these conclusions, ACA Connects relied on a study it commissioned and provided to the FCC prior to the CAF II auction, which determined that the discount point spread between higher and lower tier services should be increased to maximize participation in the auction by service providers at all tiers.¹² The ACA Connects study found that performance tier discounts applied to lower speed and higher latency service tiers should be increased to “encourage significant and proportional participation by service providers across all performance tiers.”¹³ The increased participation would have decreased bid prices, which would have allowed more funds to be used

⁸ FBA Comments at 12.

⁹ *Id.*

¹⁰ ACA Connects Comments at 5.

¹¹ *Id.*

¹² *See* Letter from Thomas Cohen, Counsel for the American Cable Association, to Marlene H. Dortch, Secretary, Federal Communications Commission, WC Docket No. 10-90, Appendix I (Feb. 17, 2017).

¹³ ACA Connects Comments at 6.

to serve a greater number of areas at higher speeds, greater data allowances, and lower latency.¹⁴ ACA Connects proposed a 75-point discount for the baseline tier, coupled with an additional discount for high latency services, which does not differ materially from FBA’s proposal.¹⁵

In sum, for the RDOF auction, the Commission should adopt FBA’s weighting methodology, which applies a 70-point discount to the baseline low latency tier and an 80-point discount to the baseline high-latency tier, to reflect the relative benefits of each performance tier and maximize participation in the auction.

II. THE COMMISSION SHOULD IGNORE VIASAT’S WEIGHTING PROPOSAL, WHICH WOULD ONLY BENEFIT HIGH LATENCY PROVIDERS AT THE EXPENSE OF AUCTION PARTICIPATION BY PROVIDERS IN OTHER PERFORMANCE TIERS

Viasat urged the Commission to reduce the high latency discount from those used in the CAF II auction and proposed in the NPRM.¹⁶ Viasat defended its weighting proposal by providing a study that purports to show not only that a high latency discount of 35 points or higher would preclude its participation in the RDOF auction, but also that the 25-point discount in the CAF II auction amounted to a “significant disadvantage” and should instead be reduced to 5 points.¹⁷ However, Viasat’s weighting proposal would not ensure cost-effective results, maximize the Commission’s budget, or guard against widening the digital divide. Instead, its proposal favors only high latency providers at the expense of auction participation by providers in other service tiers, and it altogether ignores the Commission’s and consumers’ preference for higher speeds, higher usage allowances, and lower latency.

¹⁴ See *Id.* at 7-8.

¹⁵ *Id.* at 9.

¹⁶ Comments of Viasat, Inc., WC Docket Nos. 19-126, 10-90, at 4 (Sep. 20, 2019) (“Viasat Comments”).

¹⁷ *Id.*

Viasat’s claim that the CAF II high latency discount acted as a substantial hindrance to geosynchronous-orbit (“GSO”) satellite providers in the auction is belied by the auction results. Viasat pointed out that it, alone (*i.e.*, not including other high latency providers), placed winning bids for more than a quarter of all locations being served by the CAF II auction and that “Viasat *was the only bidder* in many areas where it provisionally won support.”¹⁸ If anything, these facts support the FBA study conclusions, as well as the study by ACA Connects, that the CAF II discounts favored lower tier and higher latency providers and did not maximize participation by higher tier providers. Compare, for example, Viasat’s statistics to those provided by FBA in its initial comments. Viasat, alone, placed winning bids for more locations (27%) than all gigabit tier providers combined (19%).¹⁹

Viasat argued that increasing the high latency discount to 40 points or higher for the RDOF auction would effectively preclude meaningful participation from GSO satellite providers.²⁰ Based on its study, Viasat asserted that under the 25-point high latency discount, it

¹⁸ *Id.* (emphasis in the original).

¹⁹ *Id.*; FBA Comments at 4. Similarly, the CAF II auction results undercut U.S. Cellular’s concern that increasing the baseline discount will keep baseline providers from effectively competing in the auction. Comments of United States Cellular Corporation, WC Docket Nos. 19-126, 10-90, at 2 (Sep. 20, 2019). Bidders in the baseline tier won 47% of all locations, compared to 34% for the above baseline tier and 19% for the gigabit tier, demonstrating that the discounts favored the baseline tier, as the FBA and ACA Connects studies showed, and that the discounts should be adjusted to better promote participation and competition by providers in all tiers in the RDOF auction. *Connect America Fund Phase II Auction Results*, Rural Broadband Auctions Task Force, FCC, 5 (Sep. 26, 2018), <https://docs.fcc.gov/public/attachments/DOC-354278A1.pdf>.

²⁰ Viasat Comments at 6; see also Comments of Pacific Dataport, Inc., WC Docket Nos. 19-126, 10-90, at 15 (Sep. 20, 2019) (“[T]he penalty imposed by the Commission for high latency has the effect of all but blocking the use of GEO High Throughput Satellite Systems.”) (“Pacific Dataport Comments”). Viasat also argued that increasing the high latency discount would be arbitrary and capricious in violation of the Administrative Procedure Act, Viasat Comments at 14, which is all the more reason why the Commission should adopt a non-arbitrary weighting methodology that is shown to

“was only barely able to bid successfully in the areas where it was ultimately awarded provisional support,” and that, had the discount been 40 points, “Viasat would not have been in a position to bid successfully for any locations.”²¹ According to the study, “if the latency penalty had been even 10 percent higher in the CAF Phase II a[u]ction, ‘Viasat’s support would have been reduced to zero before [the clearing round], preventing Viasat from winning any areas or to offering any competition to terrestrial providers.’”²² As a result, Viasat claimed, there would have been a significant decrease in the number of locations covered by a supported service from the CAF II auction because the locations where Viasat was the only bidder would have been left unserved.²³

However, Viasat’s study is narrowly focused—it deals only with how an increase in the high latency discount would have (1) affected Viasat (2) in the areas where it bid (3) in the CAF II auction. Thus, in actuality, the study does not support the claim that the areas in which Viasat was the only bidder would remain unserved by a supported service because it says nothing about whether the increased discount would have given other providers a reasonable opportunity to win in those areas, causing them to bid in Viasat’s absence. Similarly, the study does not show that an increased discount would have prevented Viasat from bidding in areas where it did not bid in

maximize participation by providers in all performance tiers. Viasat further argued that the proposed high latency discount “cannot be squared with the Commission’s legal obligations to ensure competitive and technological neutrality,” *Id.* at 21, but the FCC’s competitive neutrality principle “‘only prohibits the Commission from treating competitors differently in ‘unfair’ ways,’ and not from according different treatment to competitors whose circumstances are materially distinct,” *AT&T, Inc. v. FCC*, 886 F.3d 1236, 1250 (D.C. Cir. 2018) (*citing Rural Cellular Ass’n v. FCC*, 588 F.3d 1095, 1104 (D.C. Cir. 2009)), which the Commission accords with in the NPRM.

²¹ Viasat Comments at 6.

²² *Id.*

²³ *Id.* at 6-8.

the CAF II auction. Additionally, the study does not account for other factors that affect a provider's decision to bid, such as eligible areas and reserve prices, or how those factors may be different in the RDOF auction, thereby potentially providing GSO satellite providers with ample opportunity to win.²⁴

Viasat's call for reducing the high latency discount beyond what was used in the CAF II auction ignores the Commission's other goals for the RDOF auction. As the basis for its proposal, Viasat argued that a reduction in the high latency discount for the CAF II auction would likely have increased overall coverage and reduced the overall cost of the auction because Viasat would have been able to place winning bids in more locations, including some of those won by terrestrial providers.²⁵ It is true that low incremental deployment costs allow satellite providers to place winning bids at lower prices than terrestrial service providers and that a reduction in the high latency discount would position satellite providers to bid on and win in

²⁴ Verizon Comments at 7 (“A provider’s decision to bid is not based on the weights alone, but on the combined effect of the weights and other factors that affect the potential support amount, such as the eligible areas and the reserves.”). In fact, the shortcomings in Viasat’s study highlight how CAF II auction participation might have been increased had the high latency discount been greater. As Verizon aptly pointed out, “satellite broadband won support for large areas that were largely indistinguishable from the kinds of areas that won support for terrestrial broadband,” and “some census blocks that were awarded support for high-latency 25 Mbps satellite broadband are immediately adjacent to census blocks that won support for low-latency gigabit-speed fiber broadband.” Verizon Comments at 5. If a greater high latency discount resulted in more participation and competitive bidding from gigabit tier and other providers in the areas that Viasat won while preserving Viasat’s ability to bid in other areas, then overall participation in the auction would have increased as a result of the greater discount.

²⁵ Viasat Comments at 9-10. Notably, while satellite providers might be able to place lower bids than terrestrial providers, that does not mean that their bid prices represent the most cost-effective bid for the auction. As FBA explained in its initial comment, the Commission did not get the biggest bang for its buck because its weighting methodology did not maximize participation in the auction. FBA Comments at 4. The lost competition means that some auction winners, likely including Viasat, won the auction at higher prices than they would have if auction participation had been maximized. *Id.*

more locations. But cost and coverage are not the Commission’s only—or even its primary—goals of the RDOF auction. If they were, the Commission could have constructed a weighting methodology that incorporated and prioritized them over the performance tier discounts.²⁶ In the RDOF auction, however, the Commission has decided that equal, and perhaps more important goals, are auction participation and competition, reducing the digital divide, and its preference for higher speeds, greater usage allowances, and lower latency—the weighting methodology is meant to reflect these, but Viasat’s reduced high latency discount does not.

While Viasat claimed that a reduction in the high latency discount would increase competition,²⁷ it is evident that the reduction would increase participation of satellite providers at the expense of competition from other providers. Indeed, Viasat acknowledged that the goal of reducing the discount is to “further expand opportunities for satellite providers,”²⁸ and it is clear from Viasat’s study that a reduction of just eight points from the 25-point CAF II discount—not to mention Viasat’s proposed 20-point reduction—would allow it and other satellite providers to dominate the auction.²⁹ Thus, following Viasat’s advice would only exacerbate the clear benefit the CAF II discount awarded to high latency providers at the expense of competition in the auction.

²⁶ See *The Uniendo a Puerto Rico Fund and the Connect USVI Fund, et al.*, WC Docket No. 18-143, *et al.*, Report and Order and Order on Reconsideration, ¶ 13 (rel. Sep. 30, 2019) (creating a methodology that weighs (1) price per location, (2) network performance, and (3) network resilience and redundancy, and gives price per location the greatest weight).

²⁷ Viasat Comments at 4.

²⁸ *Id.* at 3.

²⁹ *Id.* at Exhibit A, p. 3.

Viasat also does not even attempt to grapple with the inability of low latency services to deliver on all the broadband use cases consumers rely on today and will increasingly demand in the future, downplaying those uses as insignificant.³⁰ As the Cartesian study FBA provided with its initial comments demonstrated, there are a wide variety of use cases with substantial economic benefits to consumers that require higher speed, lower latency services.³¹ Viasat and a few other commenters claimed that use cases that demand low latency make up a small portion of all broadband internet traffic.³² Yet, the majority of commenters addressing speed and latency made clear that low speed, high latency services cannot perform as needed for a number of use cases that consumers widely use today.³³ A number of commenters also urge the Commission to promote services that will be able to meet the increasing demand for these use cases, rather than those that will serve to expand the digital divide over the 10-year RDOF term.³⁴ Even Viasat's

³⁰ Viasat tries to get around the problems with high latency services by asking the Commission to provide additional flexibility for satellite operators that want to use hybrid networks with a terrestrial component to meet their support obligations. Viasat Comments at 4-5; *see also* Big River Communications at 2-3. Yet, it does not explain how a satellite service supported by a terrestrial component would be any less costly or more beneficial than an all-terrestrial service, particularly if it requires deploying a terrestrial component in completely unserved areas and areas that are difficult to reach.

³¹ FBA Comments at Appendix A, p. 8.

³² Viasat Comments at 17-18; Pacific Dataport Comments at 5-6; Comments of Hughes Network Systems, LLC, WC Docket Nos. 19-126, 10-90, at 4 (Sep. 20, 2019); Comments of SES Americom, Inc. and O3B Limited, WC Docket Nos. 19-126, 10-90, at 3 (Sep. 20, 2019). Viasat asserts that the high latency discount should be reduced to 5 points to match the amount of traffic it alleges results from low latency uses but does not explain how matching the discount and traffic in this fashion reflects the consumer benefits resulting from those uses.

³³ *See, e.g.*, ADTRAN Comments at 8-10; ILSR Comments at 2; ITTA Comments at 19; USTelecom Comments at 2; UTC Comments at 10; Verizon Comments at 4; Windstream Comments at 11-12.

³⁴ *See, e.g.*, ADTRAN Comments at 10-11; BHRC Comments at 9; Comments of the California Emerging Technology Fund, WC Docket Nos. 19-126, 10-90, at 3 (Sep. 20, 2019); DoIT Comments at 5; INCOMPAS Comments at 10; ILSR Comments at 2;

claim is true, rural consumers should not be relegated to services that are not reasonably comparable to their urban counterparts, thus precluding them from the same uses,³⁵ particularly when some of those uses may be more valuable to rural consumers, such as telecommuting, remote health and learning, and e-commerce.³⁶

III. A NEWLY DEVELOPED BROADBAND CONSUMER EXPERIENCE METRIC, BASED ON A TRANSPARENT AND WELL-DEVELOPED METHODOLOGY, FURTHER SUPPORTS THE ADOPTION OF FBA'S WEIGHTING METHODOLOGY

As detailed in its initial comments, FBA's weighting methodology focused on the relative benefits of each performance tier based on several categories of use cases that may be available to consumers depending on the network technology they use for broadband internet access.³⁷ Another way to examine these same benefits is to compare the quality of consumers' broadband service experiences based on the comparative performance of network technologies. Often times, industry will use a single measure, such as advertised download speed, to assess consumer

NTCA Comments at 6; USTelecom Comments at 26; Windstream Comments at 14; Comments of WTA – Advocates for Rural Broadband, WC Docket Nos. 19-126, 10-90, at 10-11 (Sep. 20, 2019).

³⁵ INCOMPAS Comments at 10 (“[B]roadband networks and services to be supported by the RDOF must be reasonably comparable to network capabilities in urban and suburban America when they are deployed.”).

³⁶ FBA Comments at Appendix A, p. 8.; *see also* Windstream Comments at 12-13 (“[R]ural customers may have a greater need for video conferencing and remote health monitoring due to their distance from a major hospital, university, or employer.”). Additionally, any study that measured internet traffic by use case is necessarily a product of existing limitations in the quality of services consumers can access today. In other words, if consumers do not have access to higher speed, lower latency services, they do not even have the opportunity to take advantage of uses that require services with those qualities, thereby depressing the percentage of traffic for those uses. *See also* NCIT Comments at 3 (explaining how consumers are unwilling to purchase poor quality internet services).

³⁷ FBA Comments at 7.

experience and comparative performance.³⁸ For example, Viasat argued that speed is the most important metric of broadband performance for consumers.³⁹ However, “a single attribute [can]not possibly capture the full picture of performance difference” and “consumers have indicated several factors that are important to measuring broadband.”⁴⁰ Market research firm RVA, LLC, has developed a Broadband Experience Index (“BEI”) for FBA, submitted here, using a transparent and consistent methodology that examines the critical performance and network characteristics of each broadband network technology and then ranks them. As discussed below, the BEI further supports FBA’s proposed weighting methodology by showing that consumers have substantially better experience with network technologies that fit into the gigabit and above baseline performance tiers than they do with lower speed and higher latency technologies.

The RVA study is unique in that it relies on three broadband performance factors that consumers value above all others to assess the quality of service for each network technology:

1. **Reliability** – Reliability refers to the stability of the technology, including the service being available when needed with a minimum number of user interventions to correct issues. According to the study, reliability has previously been shown to be “the single most important predictor of overall broadband satisfaction.”
2. **Bandwidth** – Bandwidth “is the amount of data that can be transmitted in a fixed amount of time, [which] influences the speed at which applications can load as well as the quality of communications.” Consumer rankings indicate that “bandwidth is the second most important broadband attribute,” and “that upload speeds currently influence satisfaction more than download speeds – perhaps because upload speeds are, on average, most constrained at present.”

³⁸ RVA Broadband Experience Index at Appendix A, p. 3 (“RVA BEI”).

³⁹ Viasat Comments at 14.

⁴⁰ RVA BEI at Appendix A, p. 3.

3. **Latency** – “Latency defines the time it takes an individual packet of information to travel from one point to another.”⁴¹ As discussed above and in FBA’s initial comment, latency affects a number of consumer use cases on the internet (*e.g.*, telecommuting, remote health & learning, e-commerce, and two-way video streaming).

Using these factors, RVA created a methodology to combine them into a single broadband performance index, with four components, informed in part by a random study conducted by RVA, which gathered data from 2,053 U.S. consumers:

1. **2019 RVA Consumer Broadband Study Performance Measurements** – RVA directly measured speed and latency through automatic and self-reported speed tests.
2. **FCC Operator Performance Measurements** – These measurements represent the most recent data from the 2017 FCC “Measuring Broadband America” report.
3. **2019 RVA Consumer Broadband Study Attitudinal Measurements** – RVA indirectly measured broadband reliability by asking users to recall and report the number of times they had technical issues with their service.
4. **Net Promoter Score Index** – This score is “a fairly common indicator of overall relative satisfaction and the likelihood of recommending a product or service to a friend.” It is determined by asking consumers to rate on a 10-point scale how likely they would be to recommend their product or service to others. “Promoters” are designated as those who indicate a 9 or 10 rating (“very likely to recommend”) while “detractors” are designated as those who indicate a 1-6 rating. The score is then determined by subtracting detractors from promoters.⁴²

As demonstrated in *Figure 1*, the raw data was tabulated under these components to show the consumer experience for each network technology. For example, the table shows that between the two performance measurements, fiber-to-the-home (“FTTH”) and cable provide the best download and upload speeds, while DSL and satellite provide the worst speeds. With respect to latency, both performance measurements show that satellite providers consistently provide the worst user experience. For reliability, DSL performs worse, while FTTH performs

⁴¹ *Id.* at Appendix A, pp. 3-4.

⁴² *Id.* at Appendix A, pp. 4-6.

best. Across the board, consumers are most satisfied with FTTH, which had the only positive Net Promoter Score, while satellite garners the least satisfaction from consumers.

*Figure 1*⁴³

2019 Broadband Experience Index: RAW DATA					
By Type Of Broadband					
	Best =				Worst=
	FTTH	Cable	Wireless	DSL/FTTN	Satellite
RVA PERFORMANCE MEASUREMENTS 2019					
Average Download Speed (Mbps)	119	108	24	22	9
Average Upload Speed (Mbps)	40	14	7	6	1
Average Latency (Milliseconds)	34	66	241	387	2281
Average Reliability (# monthly reboots and annual calls)	1.4	1.9	2.0	2.4	2.3
FCC PERFORMANCE MEASUREMENTS 2017					
Average Download Speed (Mbps)	73	97	na	17	16
Average Upload Speed (Mbps)	82	10	na	2	3
Average Latency (Milliseconds)	17	27	na	44	585
Reliability (No measurement)	na	na	na	na	na
RVA ATTITUDINAL MEASUREMENTS 2019					
Very Satisfied Download Speed	49%	40%	31%	36%	16%
Very Satisfied Upload Speed	49%	37%	32%	35%	16%
Very Satisfied Latency (No measurement)	na	na	na	na	na
Very Satisfied Reliability	51%	42%	40%	40%	23%
RVA NET PROMOTER SCORE 2019					
Net Promoter Score (NPS)	5%	-5%	-11%	-9%	-16%
SAMPLE SIZE FOR MOST MEASURES					
	363	879	261	378	158

RVA converted the raw data into percentiles and averaged them to determine the overall Broadband Experience Rating for each broadband service. As reflected in *Figure 2*, the high

⁴³ *Id.* at Appendix A, p. 7.

The Broadband Experience Ratings determined by the RVA study strongly support FBA’s proposed weighting methodology, which calls for increases in the performance tier discounts for baseline low latency and high latency services, and the shortcomings of high latency services discussed above. While the performance tiers do not precisely line up with the network technologies, *Figure 3* shows how the index aligns with FBA’s proposed weights.

Figure 3

Service Tier	FBA Weights	RVA Experience Rating	Service Tier
Gigabit Low Latency	0	98%	FTTH
Above Baseline Low Latency	15	65%	Cable
Baseline Low Latency	70	38%	Wireless/DSL
Baseline High Latency	85	1%	Satellite

CONCLUSION

The record is clear that the Commission should adopt a weighting methodology that increases the performance tier discounts for baseline low latency and high latency services from those proposed in the NPRM. FBA provided a detailed explanation of how its weighting methodology would (1) reflect the Commission’s and consumers’ preference for higher speeds, higher usage allowances, and low latency, (2) guard against widening the digital divide, (3) capture the benefits of each performance tier, and (4) maximize participation in the RDOF auction. FBA’s methodology is further supported by the RVA BEI, included here, which shows that higher tier services provide better performance and greater satisfaction to consumers. The Commission should adopt FBA’s non-arbitrary weighting methodology, which increases the baseline low latency discount to 70 points and the baseline high latency discount to 85 points.

Respectfully Submitted,



Lisa R. Youngers
President and CEO
Fiber Broadband Association
Suite 800
2025 M Street NW
Washington, DC 20036
Telephone: (202) 367-1236

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Appendix A

2019 Broadband Experience Index By Broadband Type

*Using Multiple, Measurable, Performance Criteria
To Compare The Real-World Consumer Experience
By Type Of Broadband*

Michael C. Render, RVA LLC
October 1, 2019



TABLE OF CONTENTS

BACKGROUND NEED.....	3
DETERMINING MEASUREMENT ATTRIBUTES	3
METHODOLOGY INNOVATION	4
RVA CONSUMER STUDY METHODOLOGY	5
BROADBAND EXPERIENCE INDEX METHODOLOGY	6
2019 RAW FINDINGS	7
2019 NORMALIZED FINDINGS	8
2019 BROADBAND EXPERIENCE INDEX.....	9
ALTERNATIVE CALCULATIONS.....	10
NOTES FOR FUTURE STUDIES.....	10

BACKGROUND NEED

One of the most significant needs that retail consumers, network operators, consultants, and government policy officials have when considering and evaluating Internet or “broadband” is a simple and reliable way to compare quality and performance across the various delivery options. The current Internet delivery options include DSL, Cable modem, Wireless, Satellite, and Fiber-to-the-Home service.

Many have observed that a measure of comparative performance should not be based only on one single specification, noting that a single attribute could not possibly capture the full picture of performance difference. Unfortunately, using a single measure is quite common today - broadband comparisons, especially for consumers, are often based only on advertised download speeds.

Realizing this deficiency, the Fiber Broadband Association (FBA) and RVA LLC have both had the goal of determining a method to more fairly and completely compare broadband types. (The Federal Communication Commission or FCC has also been pursuing a similar goal.)

DETERMINING MEASUREMENT ATTRIBUTES

Criteria for broadband measurement was developed based on the experience of past RVA consumer Internet studies.

While much of the industry only focuses on download speeds, consumers have indicated several factors that are important to measuring broadband:

Reliability

Reliability refers to the stability of the system – broadband being available when needed, with a minimum number of user interventions (rebooting modems or calling customer service) required.

Reliability has been shown in several past RVA studies to be the single most important predictor of overall broadband satisfaction. The importance of reliability was determined both by directly asking consumers how important individual broadband attributes were to their broadband overall, and by utilizing multiple regression analysis to independently model which attributes had the most influence on their satisfaction.

Bandwidth

Bandwidth, which is the amount of data that can be transmitted in a fixed amount of time, influences the speed at which applications can load as well as the quality of communications. Bandwidth can be thought of as the size of a pipe.

Based on consumer rankings, bandwidth is the second most important broadband attribute. Multiple regression analysis shows that upload speeds currently influence satisfaction more than download speeds - perhaps because upload speeds are, on average, most constrained at present.

Latency

Latency defines the time it takes an individual packet of information to travel from one point to another. Latency can be thought of as the speed of flow within a pipe.

Latency can affect quality communication. An obvious example of latency is the delay seen in real-time TV satellite feeds from across the world. Latency becomes especially important in some Internet consumer applications – such as gaming competitions or stock market day-trading. It is certainly important in background security and transportation monitoring applications.

METHODOLOGY INNOVATION

To help accomplish the goal of a more comprehensive and reliable broadband comparison methodology, RVA LLC has, over the past several years, honed online surveying methods to better measure broadband in its real-world application. This effort utilized multiple performance and attitudinal criteria. (It should be noted that determining attitudes about various broadband aspects in a survey is relatively standard and straight-forward, but determining performance measures via a survey instrument is more complex.)

To conduct meaningful performance measurement, RVA first developed ways to indirectly measure broadband reliability – primarily by asking consumers to recall the number of times they needed to reboot their modems monthly and call customer service annually.

RVA also implemented direct measurement of broadband speeds within the survey process by asking respondents to take and record a speed test (via a provided industry recognized speed test link).

More recently, RVA developed a process to automatically conduct and record speed test results during a survey without respondent interaction, thus saving time, increasing completion rates for the question, and, most importantly, increasing accuracy (eliminating transcription errors, etc.). This year, RVA has added automatic latency tests to the surveying methodology.

RVA CONSUMER STUDY METHODOLOGY

Raw data for determining the Broadband Experience Index was pulled from a May 2019 national RVA Consumer Broadband Study of online panelists. The random study gathered 2,053 U.S. responses. (There were over 2,500 responses when including Canada.)

One of the ways the consumer study differentiated users was by the method of final Internet delivery to the home: Fiber-to-the-home (FTTH) via fiber optic cable; Cable via coaxial cable; DSL or Fiber-to-the-node (FTTN) via copper wire; Wireless via radio waves; and Satellite via signals from geostationary satellites. (The wireless segment included those who utilized either fixed or mobile wireless for Internet service at home.)

Following the RVA random study of home broadband users, satellite Internet users were oversampled in order to obtain an additional 145 responses, thus bringing the total satellite sample to 158 and the total overall U.S. consumer sample to 2,198.

Where possible in the survey, actual measurements were taken of data relative to the broadband attributes. In addition, respondents were asked about their satisfaction with these attributes from their provider.

RVA survey data measures end-to-end performance, which can include the influence of backbone Internet and in-home Wi-Fi performance. These factors could penalize higher performing broadband methods, such as FTTH and cable, more than lower performing methods. (An example would be older Wi-Fi systems limiting the download bandwidth measured from high bandwidth “gigabit” users.)

One additional note: many providers of a given broadband method generally offer several speed tiers with different price points. The 2019 RVA Consumer Study did not test individual tiers, such as what experience the highest speed tier for each method provided. The study measured the average of what random consumers subscribed to for each method (which is related to what each method can provide at a reasonable price point).

BROADBAND EXPERIENCE INDEX METHODOLOGY

The Broadband Experience Index uses four components: 1) Performance measurements from the 2019 RVA Consumer Broadband Study; 2) The latest FCC Operator performance measurements (from the 2017 FCC “Measuring Broadband America” report); 3) Attitudinal measurements from the 2019 RVA Consumer Study; and 4) a Net Promoter Score Index calculated from the 2019 RVA Consumer Study raw data.

The “Net Promoter Score” is a fairly common indicator of overall relative satisfaction and the likelihood of recommending a product or service to a friend. The score is determined by asking customers to rate on a 10-point scale how likely they would be to recommend their product or service. “Promoters” are designated as those who indicate “very likely to recommend” (a “9” or “10” rating). “Detractors” are designated as those who only give a “1”-“6” rating to this question. The score is then determined by subtracting detractors from promoters. (Generally, net promoter scores for the telecom and communication industry are fairly low overall and are often negative.)

All raw data used in the Index is listed on the next chart, followed by a chart showing the normalized data, i.e. data converted to a common range for comparison (method to be described later).

Finally, the data from the four Index components was averaged to determine an overall Broadband Experience Index for each broadband delivery method. (It should be noted that no weighting was given to the various broadband attributes when calculating the Index.)

Results follow:

2019 NORMALIZED FINDINGS

In order to review multiple data points with different value ranges, all data was converted to percentiles, with the highest rating for any given attribute set at 100% and the lowest rating for any given attribute set at 0%. Thus, 100% represents “best in class” for a particular attribute, while 0% represents the “lowest in class”. In addition, all data was converted directionally, so that a high score would always be better (i.e. low latency and low reboots and service calls are better, of course in raw terms, but these measures were inverted when converted for comparability.)

2019 Broadband Experience Index: NORMALIZED SCORES					
By Type Of Broadband					
	Best =				Worst=
	FTTH	Cable	Wireless	DSL/FTTN	Satellite
RVA PERFORMANCE MEASUREMENTS 2019					
Average Download Speed (Mbps)	100%	90%	14%	12%	0%
Average Upload Speed (Mbps)	100%	33%	15%	13%	0%
Average Latency (Milliseconds)	100%	99%	91%	85%	0%
Average Reliability (# monthly reboots and annual calls)	100%	55%	40%	0%	10%
SUBTOTAL	100%	69%	40%	27%	3%
FCC PERFORMANCE MEASUREMENTS 2017					
Average Download Speed (Mbps)	70%	100%	na	1%	0%
Average Upload Speed (Mbps)	100%	10%	na	0%	1%
Average Latency (Milliseconds)	100%	98%	na	95%	0%
Reliability (No measurement)	na	na	na	na	na
SUBTOTAL	90%	69%	na	32%	0%
RVA ATTITUDINAL MEASUREMENTS 2019					
Very Satisfied Download Speed	100%	73%	45%	61%	0%
Very Satisfied Upload Speed	100%	64%	48%	58%	0%
Very Satisfied Latency (No measurement)	na	na	na	na	na
Very Satisfied Reliability	100%	68%	61%	61%	0%
SUBTOTAL	100%	68%	52%	60%	0%
Net Promoter Score (NPS)	100%	52%	24%	33%	0%
SUBTOTAL:	100%	52%	24%	33%	0%
2019 BROADBAND EXPERIENCE RATING	98%	65%	38%	38%	1%

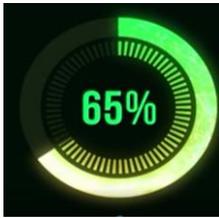
2019 BROADBAND EXPERIENCE INDEX

Averaging all the four measurement subtotals from the normalized percentile scores, without weighting – RVA 2019 Internet performance measurements, FCC 2017 Internet performance measurements, RVA 2019 Internet attitudinal measurements, and RVA 2019 Internet net promoter score - provides an overall 2019 Broadband Experience Index.

At present, Fiber is clearly providing the “best in class” consumer broadband experience, while Satellite is providing the lowest consumer broadband experience.



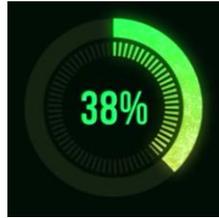
Fiber



Cable



Wireless



DSL



Satellite

ALTERNATIVE CALCULATIONS

The 2019 Broadband Experience Index normalizes the data using a range based on the current best data measurement for any attribute versus the current lowest data measurement for any attribute.

Another possible approach would be to use a range based on the current best data measurement for any attribute versus a zero score for any attribute. Using this calculation approach, the Alternative 2019 Broadband Experience Index would be as follows:

	FTTH	Cable	Wireless	DSL/FTTN	Satellite
2019 ALTERNATIVE BEI RATING	99%	69%	47%	45%	14%

NOTES FOR FUTURE STUDIES

The Broadband Experience Index could be expanded in the future as new methods of delivering broadband come into play. As an example, wireless may be divided into fixed and mobile wireless, especially as new wireless methods using millimeter wave frequencies become more commonly used.

The satellite category could be separated into two types: geosynchronous and non-geosynchronous lower orbit satellite delivery.

It is important to note that this is the first iteration of the Broadband Experience Index. Some evolution of methodology will likely occur over time. RVA and the Fiber Broadband Association certainly welcome any comments and suggestions regarding the Broadband Experience Index.