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**Comments filed with the Federal Communications Commission in the
Matter of Rural Digital Opportunity Fund Auction**

Greg Rosston and Scott Wallsten

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**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

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| In the Matter of |) | |
| Rural Digital Opportunity Fund Auction |) | |
| (Auction 904) |) | AU Docket No. 20-34 |
| |) | |
| Rural Digital Opportunity Fund |) | WC Docket No. 19-126 |
| |) | |
| Connect America Fund |) | WC Docket No. 10-90 |

Reply comments of

Gregory L. Rosston*

and

Scott J. Wallsten**

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We have worked at the Federal Communications Commission (Commission) and written numerous academic articles regarding broadband and federal universal service programs. We are submitting these comments to contribute some lessons from our work to the success of the Commission’s Rural Digital Opportunity Fund (RDOF) program.

The Commission’s greatest successes have come when it has harnessed the power of competition to serve customers. From long distance telephony in the 1980s to wireless service and internet services, competition has led to vast changes in how we communicate. If the Commission can use competition to increase service to high cost rural areas, it is likely to be more effective than other mechanisms.

However, it is also important to note that those successes did not involve abdicating all regulatory responsibility. For example, the Commission ensured consumers had access to

* Gordon Cain Senior Fellow, Stanford Institute for Economic Policy Research (SIEPR) and Director, Public Policy Program, Stanford University.

** President and Senior Fellow, Technology Policy Institute (TPI).

Many companies with interests in RDOF support the TPI (full list of supporters is available here: <https://techpolicyinstitute.org/supporters/>). We have provided consulting services to telecommunications companies. None of these companies were involved with these comments. The views expressed here are those of the authors only and do not necessarily reflect anyone else associated with TPI or SIEPR.

multiple competing long-distance providers on a non-discriminatory basis, it developed the PCS auctions with an aim of supporting multiple providers, and it implemented the Telecommunications Act of 1996 in a way that internet service providers could connect to the network at reasonable rates.

The RDOF should strive to achieve the biggest bang for the buck possible. That means maximizing competition in the auction phase subject to having a mechanism that allows apples-to-apples comparisons of bids. Three key mechanisms are important for generating this outcome. First, the Commission is correct to insist on being “technology neutral” in evaluating different providers. Truly being technology neutral means evaluating bids on the service attributes that will be provided and how much consumers value those attributes. That in turn requires the Commission to think about how to correctly weigh those attributes and use them as part of the scoring. Third, the Commission should make provisions to ensure that subsidy recipients perform as they promise.

We expand on each of these points below and show that the Commission can include all technologies, including fiber, cable, geosynchronous and low-earth orbit satellites, terrestrial wireless, and even DSL to increase coverage and reduce the cost of the program within its goals.

Technology Neutrality

The Commission’s stance on advocating for “technology neutrality” in its auction is wise. Consumers care about what they can do with their broadband service not the technology used to provide that service. Therefore, subsidies should be based on performance, as the FCC proposes. If a copper-based system can provide high performance, it should not be blocked from receiving the same amount of subsidy as fiber for a similar service. Similarly, terrestrial wireless systems and satellite-based systems should be judged on performance.

By allowing different technologies to compete for subsidies on the same performance basis, the Commission has the opportunity to spend its scarce subsidy dollars more wisely and increase the number of connections without increasing its budget.

Different technologies tend to have different cost structures that lead to different comparative advantage in serving different areas. The cost to a terrestrial wireline (or fiber) of providing incremental service depends on many factors, including how much additional cable must be laid, the topography it has to cover, and the distance to existing infrastructure, for example. A satellite system, by contrast, generally has the same cost of providing incremental service regardless of location. Service provided by geosynchronous satellites, though, has higher latency than wireline providers. These relative advantages and disadvantages mean that satellite providers might be yield the highest net benefits in some areas while terrestrial providers yield the highest net benefits in others.

Consider a hypothetical example. Some households in rural areas are relatively close together even though they do not currently have service. Connecting those households with a physical connection may cost—in this completely hypothetical example—\$100, amortizing the large upfront fixed costs. The same households connected to a satellite system might cost \$150 per

month. Even if the cost were the same, the benefits to these households from satellite are likely to be lower because of the latency issue. However, for more dispersed households, the physical connection might cost \$200 per month while the satellite connection would still be \$150 per month. Depending on how much people value low latency, satellite service will be more cost-effective and the net benefit higher.

Favoring one technology over another may eliminate the most cost-effective provider and reduce net benefits. Focusing on service attributes rather than technology and weighing those attributes based on consumer value will yield the most value from the subsidies.

Service Weighting

The Commission is right to weigh different tiers of service differently. The rationale is that to the extent that the Commission values higher speed, lower latency, lower jitter, and other factors, it should include weights in the calculations of auction bids.¹

There is some debate in the comments about the levels of the weights and the application of the weights.

The Commission's weights should reflect the value of the service to consumers.

Research has estimated how much people value elements of broadband provision. Rosston, Savage, and Waldman (2010) found that the incremental value of faster speeds, as measured in Mbps, decreases with increasing speed.² Liu, Prince, and Wallsten (2018) built on that work to estimate how much people value different speeds and latency.³ This research also showed that while people are willing to pay more for higher speeds, the incremental amount they are willing to pay decreases quickly above 50 Mbps.

The CAF Phase II auction used a weighting scheme to compare bids. The relative weights on speed aligned well with how much consumers seem to value changes in speed. The scoring mechanism penalized latency, as it should given that consumers value low latency, but the penalties were larger than estimated consumer valuation justify. In particular, latency was penalized about five times as much as it should have been.⁴

Additionally, using consumer preferences as the foundation for weighting bids suggests that the Commission should take into account the time required to provide service. Broadband service available tomorrow is worth more than broadband service provided five years from now. The

¹ Bazelon, C. "Public Interest Benefits of Expanding Fiber Networks," submitted Oct 21, 2019. p-16.

² Gregory Rosston, Scott Savage, and Donald Waldman, "Household Demand for Broadband Internet Service," *The B.E. Journal of Economic Analysis and Policy* 10, no. 1 (September 9, 2010).

³ Yu-Hsin Liu, Jeffrey Prince, and Scott Wallsten, "Distinguishing Bandwidth and Latency in Households' Willingness-to-Pay for Broadband Internet Speed," *Information Economics and Policy*, July 2018, <https://doi.org/10.1016/j.infoecopol.2018.07.001>.

⁴ Liu, Prince, and Wallsten. P. 12

Commission should add a factor for the promised delivery date of service, even considering its construction and service requirements.

In its spectrum auctions, the Commission implemented Congress' preference for small business license ownership through the use of bidding credits. Bidding credits operate on a percentage basis. As the price of the license increases, the absolute value of the bidding credit increases and the dollar value of the small business preference increases, but the relative price stays the same.

In the CAF auction and the one proposed here, the Commission adopted a fixed difference model to express its preferences for differences in speed and latency. The Commission's implementation subtracts a fixed amount from the clock for the weights assigned to each bid. For example, if the clock price is 100 and the weights for a bid are 40, the payout for that bid would be 60 or 60% of an unweighted bid. As the clock moves to 80, the payout moves to 40, or 50%. So, under this approach, the discount percentage increases. If the clock, in this example, went to 40, there would be no payout for the weighted bid.

Increasing the weights under the fixed difference model could cause bidders with higher speed and latency weights to drop out of the auction earlier. This reduction in competition could increase the prices paid to unweighted bidders and the cost to the Commission. For example, Auctionomics, in its filing for Viasat, calculates that in many areas the bids by a weighted bidder before its exit drove down the bids by lesser-weighted providers without causing exit.⁵ In essence, they claim that competition from these bids led to lower prices and the same service.⁶ If this argument is correct and can be replicated in the RDOF auction, including more competition from these providers has the potential to increase service territories and reduce costs.

Risk of Non-performance

One factor for the Commission to consider is how to treat novel satellite services or other "risky" services that promise to deliver broadband service, but whose technology may not live up to their claims. Such risks of non-performance are important in any procurement plan. Buyers need to understand the risks and take actions that protect them. However, it is important not to attempt to eliminate all risks. After all, a risk of non-performance by providers of established technologies also exists. If the Commission's objective were to minimize risk, it would only buy fully built and operating systems.

The Commission devotes significant thought to ensuring performance. We agree that the Commission should not only to do its own due diligence as a buyer, but also assign risk to the service provider who has both more information and also more ability to affect performance.

⁵ Auctionomics, "Lessons from the CAF II Auction for the RDOF Auction." September 20, 2019. Filed as attachment to Viasat's comments of September 20, 2019.

⁶ "Using Spectrum Auctions to Enhance Competition in Wireless Services" *Journal of Law and Economics*, November 2011. (Cramton, P., Kwerel, E., Rosston, G. and Skrzypacz, A.) show that providing bidding credits to some bidders can increase revenue from the auction.

Much of the concern, understandably, comes from terrestrial providers who are worried about competing with satellite providers who may face lower marginal costs of serving additional consumers. The terrestrial providers may feel that they have more to lose from non-performance and, therefore, are more likely to fulfill the obligations than are satellite providers. For example, if a provider has to put up a small amount of money after the close of the auction to determine if it will be able to fulfill its obligations, it may be willing to bid aggressively knowing that its downside risk is low (subject to bankruptcy rule, for example).

Nevertheless, attempts to thwart competition are likely to result in higher costs and delay in serving rural areas. A better approach would be for the Commission to put in place mechanisms that align incentives to perform and to increase competition.

For example, low-earth orbit (LEO) satellites have the potential to provide broadband service with low latency.⁷ If such systems can provide service, their cost structure would make them attractive candidates to provide service in the areas that have the highest cost for terrestrial service. Depending on their capacity and cost, they may even be the lowest cost provider for a large number of areas in the RDOF auction. If they are the most efficient provider, then preventing them from competing in the auction could raise costs to the public significantly.

If the Commission is concerned about LEO satellite systems not fulfilling their obligations, instead of limiting their eligibility to participate in the auction to 0% as some commenters urge, the Commission could set limits on all providers to a certain percentage of the CBGs or dollars available. For example, it could mandate that no provider could be awarded subsidy for more than 40% of eligible Census blocks or receive more than 40% of the subsidy dollars. That would ensure a multiplicity of winners and provide more assurance of performance. On the other hand, it also might reduce the efficiency of service provision and increase expenditures relative to no restrictions.

Conclusion

The Commission has long understood the power of competition in achieving social goals. Using auctions for universal service is a welcome addition to the toolkit to move closer to efficiently connecting households. In order to connect as many households as efficiently as possible given its budget constraints and desired performance, the RDOF auction should embrace competitors with different business models and different technologies. The Commission should be careful with its weighting for speed and latency and consider a weight for time to market. Finally, the Commission should ensure performance by those to whom it awards subsidies.

⁷ We do not make any claims regarding the technical feasibility of such systems and encourage the Commission to come to its own conclusions.