Comments filed with the Federal Communications Commission in the Matter of Establishing a 5G Fund for Rural America and Universal Service Reform – Mobility Fund

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Federal Communications Commission
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In the Matter of	)	
	)	
Establishing a 5G Fund for Rural America	)	GN Docket No. 20-32
	)	
Universal Service Reform – Mobility Fund	)	WT Docket No. 10-208 (closed)
	)	

Proposal for a 5G USF Research Fund:
Comments of Sarah Oh, J.D., Ph.D.[*]

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The following comments are submitted in response to the Federal Communications Commission's ("Commission") Notice of Proposed Rulemaking and Order seeking comment on establishing a 5G Fund for Rural America and Universal Service Fund ("USF") reform.[1]

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[*] Senior Fellow, Technology Policy Institute. The Technology Policy Institute does not take institutional positions. Views are the author's only. The author is the creator of https://fiscly.com, a website displaying monthly historical disbursements of the four programs of the Universal Service Fund to 31,948 recipients over the last decade.

[1] *In the Matter of Establishing a 5G Fund for Rural America and Universal Service Reform – Mobility Fund*, WC Docket No. 20-32, Notice of Proposed Rulemaking and Order, FCC 20-52, 85 FR 31616, 31616-31661 ("5G Fund NPRM&O"), https://docs.fcc.gov/public/attachments/FCC-20-52A1.pdf.

Introduction

The Commission presents two options for establishing a 5G Fund for Rural America. Option A is to deploy funds in 2021 and Option B is to wait to deploy funds after new broadband maps are ready in 2023.

Both approaches require analyzing existing map data and incorporating new map data. Whether the Commission chooses to wait or not, incorporating new data into its subsidy distribution tools is a data analysis problem – not a maps problem. Whether the Commission chooses Option A or Option B in this proceeding, much preparatory work needs to be done to act upon these new datasets. To be ready to act upon the maps in 2023, the Commission needs to begin planning how it proposes to use the datasets as soon as possible.

I therefore propose a middle option under which the Commission begins to deploy funds in 2021 using the data it has now and is able to collect before the auction, but also uses that implementation process to more fully understand what data it needs to improve the USF distribution process, how it will analyze that data, and how it will integrate new data into its decision-making.[2]

To enable this analytical capability, I propose establishing a "5G USF Research Fund" to better develop the analytical tools needed to plan for and interpret new data. The resources required for a robust research effort pale in comparison to the subsidies that will be distributed and to the resources spent collecting the data. A starting point might be one percent of the proposed 9 billion dollars in the 5G Fund for Rural America—90 million dollars over 10 years—to support research on how USF spending can yield better outcomes.[3]

The need for careful study of broadband data has become acute as the stakes are higher than ever to narrow the digital divide. Economists at The Technology Policy Institute and other scholars have urged the Commission to use rigorous experimentation and analytical methods to measure the effectiveness of USF for many years.[4] By now, we should be able to quantify tradeoffs in allocation between this proposed 5G Fund for Rural America with other programs such as E-Rate, Lifeline, and Rural Health, but unfortunately this research has been lacking.

The time is right to enhance the study of universal service and the digital divide. With new maps from the Broadband DATA Act and a recently established Office of Economics and Analytics ("OEA"), the Commission can launch a research agenda to rigorously study the important economic questions related to broadband availability and access.

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[2] In the spirit of A/B testing, perhaps this middle option would best be called "Option A/B."

[3] Another way to consider this level of seed funding is 0.009 percent of the annual USF budget will be set aside from research and development (9 million dollars per year / 10 billion annual USF spending).

[4] "The Universal Service Fund Needs a Budget," July 29, 2019, https://ecfsapi.fcc.gov/file/10729684906832/Oh_Wallsten_USF072919.pdf, filed in *In the Matter of Universal Service Contribution Methodology*, WC Docket No. 06-122, Notice of Proposed Rulemaking, 84 FR 27570, 27570-76, https://docs.fcc.gov/public/attachments/FCC-19-46A1.pdf.

To help the OEA with this research agenda, a 5G USF Research Fund could be created with a combination of funds from the 5G Fund for Rural America, the general USF budget, and additional federal funds for broadband stimulus, should they be appropriated.

The Need for More Research on the Effects of USF

The Commission will have better broadband maps and datasets soon.[5] But more resources are needed to work with and understand the new data. Understanding new data requires the time and attention of skilled practitioners. Data scientists and researchers need to ingest and clean the data, visualize geographic shapes, and run regressions with relevant control variables. Dealing with new maps will require cloud computing infrastructure, geospatial analysis tools, and statistics packages.

The missing piece from Options A and B is how to incorporate new data and maps into the proposed 5G Fund for Rural America.[6] Even when the maps are available in 2023, will the Commission be prepared to act upon them?

In support of Option B, Senators Manchin, Lankford, Tester, and Hyde-Smith recently wrote to the Commission urging the necessity of using data generated by the Broadband DATA Act in the proposed 5G Fund because "[w]e can never deliver on the promise of Universal Service without accurate broadband coverage maps."[7] But even under Option B, accurate maps will not be enough to ensure effective disbursements of funds if the analytical tools are not ready in 2023.

Expert analysis of the new maps will be needed to make decisions based upon them.[8] Accurate maps is a necessary, but not sufficient, input in broadband policymaking. Outcomes from past subsidies need to be studied in order to inform future distributions. Fortunately, the Commission has an incredible opportunity to run experiments and collect data to study outcomes in the USF. The USF is a long-running, ongoing subsidy program with over 20 years of data with monthly payments to over 30,000 recipients nationwide. Much research could be conducted from data collections on these subsidy outcomes.

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[5] Broadband Deployment Accuracy and Technological Availability Act (Broadband DATA Act), Pub. L. No. 116-130, 134 Stat. 228 (2020).

[6] Statement of Commissioner Geoffrey Starks, Approving in Part, Dissenting in Part, FCC 20-52, https://docs.fcc.gov/public/attachments/DOC-363946A6.pdf (dissenting to Option A); Statement of Commissioner Jessica Rosenworcel, Approving in Part, Dissenting in Part, FCC 20-52, https://docs.fcc.gov/public/attachments/DOC-363946A5.pdf (dissenting to Option A and B).

[7] Letter to Chairman Pai on Mapping, Apr. 22, 2020, https://www.manchin.senate.gov/imo/media/doc/200420%20Bipartisan%205G%20Fund%20Letter%20to%20Chairman%20Pai.pdf?cb.

[8] *Id*. ("If the FCC requires any additional funding or reprogramming authority to successfully implement the mobile broadband mapping provisions from the Broadband DATA Act before the initiation of the 5G Fund Auction, we urge you to submit them to the Senate Committee on Appropriations and the Subcommittee on Financial Services and General Government no later than April 30, 2020 so that they may be considered in the Fiscal Year 2021 appropriations process or sooner"). *See also* Letter to Chairman Lowey, June 10, 2020, https://republicans-energycommerce.house.gov/wp-content/uploads/2020/06/Broadband-DATA-Act-Funding-Request_FINALdocx.pdf; 2021 FCC Budget Estimates to Congress, February 2020, https://docs.fcc.gov/public/attachments/DOC-362381A1.pdf.

Establish a 5G USF Research Fund

In this proceeding, the Commission asks for comment on how to reform the Mobility Fund II. But a few big questions about USF as a whole remain unanswered. How effective are additional funds in each program? Should the allocation of funds across urban and rural areas, and across schools, libraries, and telehealth programs be rebalanced? How can USF programs be designed so that the Commission collects more data and tracks outcomes from recipients?

Establishing a 5G USF Research Fund would help answer these and other big questions about USF. Few sources of funding exist for research on universal service. The National Science Foundation has funded a few studies[9] and workshops on broadband outcomes.[10] Graduate students interested in broadband have been encouraged to write and present original papers through the International Telecommunications Society Ph.D. Seminar,[11] Pacific Telecommunications Council Young Scholars Program,[12] and the Telecommunications Policy Research Conference.[13]

But the leading studies—rigorous economics studies of broadband availability, broadband access, and the digital divide—are written by professors, supported by foundation grants, or commissioned by private firms to accompany regulatory filings. Resources to conduct these studies are not free. These studies take time and resources to do well. Economists need to obtain datasets, clean the data, apply econometric methods, write the analysis, and undergo peer review. As the number and size of datasets grow, so do the questions and new combinations of interpretations.

Staff economists at the Commission conduct analysis within the agency, but their time is divided on other assignments such as merger review and annual competition reports. Staff economists at the Government Accountability Office and the Congressional Research Service also have considerable expertise in studying the USF. But their focus is limited to answering questions focused on Congressional oversight rather than program effectiveness.

The new OEA provides the Commission an office of experts who can design and procure studies on questions related to 5G buildout. The Commission could do much with a research fund to engage outside scholars who use cloud-based datasets and econometric tools. While the National Science Foundation may be a better agency to award and administer long-term grants, the Commission has ample specialized expertise to solicit, evaluate, and oversee research reports and studies from academics, scholars, and educational organizations.

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[9] "The National Broadband Research Agenda: Key Priorities For Broadband Research And Data," Report prepared by the National Telecommunications and Information Administration and the National Science Foundation, January 2017, https://www.ntia.doc.gov/files/ntia/publications/nationalbroadbandresearchagenda-jan2017.pdf.
[10] https://www.nsf.gov/awardsearch/showAward?AWD_ID=1637540; https://www.nsf.gov/awardsearch/showAward?AWD_ID=0344881; https://nsf.gov/awardsearch/showAward?AWD_ID=0438110.
[11] https://itseurope.org/2019/phd-seminar/
[12] https://www.ptc.org/outreach-initiatives/ptc-young-scholar-program/
[13] http://www.tprcweb.com/graduate-student-consortium-2

Currently, approximately two percent of the USF is spent on administration by the Universal Service Administrative Company ("USAC"), none of which is spent on research that impacts outcomes.[14] I propose that one percent of the proposed 5G for Rural America Fund be spent on research that directly studies outcomes of the USF program.[15] While research on broadband is not basic science research, average spend ratios may serve as a useful upper bound for this field of social science research. The global average ratio for basic science research to gross domestic product is above two percent.[16] The Commission would do well to support social science research at a level above zero percent and as high as two percent of subsidy expenditures.

Study New Maps from the Broadband DATA Act

Economists will need resources to implement the new datasets in the Broadband DATA Act. Staff economists will likely need to compare internal analyses with studies by outside experts. Without additional appropriations and resources, the Commission anticipates delays in integrating new datasets with their current datasets:

> "However, the Commission currently lacks an appropriation from Congress to fulfill its obligations under the Broadband DATA Act and complete mobile broadband coverage maps. Under this approach, we would first collect data and create new mobile broadband coverage maps, before using those maps to identify as eligible those areas that remain unserved on an unsubsidized basis. This would likely result in less expansive and more targeted eligible areas than under our proposal above. However, due to the current lack of appropriated funding, the expected length of time that would be needed to collect, verify, and analyze these data, and to collect and adjudicate objections from members of the public and state, local, and Tribal governments, this approach would also be likely to significantly delay the Phase I auction and disbursement of high-cost support to rural areas…"[17]

For the ten years of the proposed 5G Fund for Rural America, implemented from 2021 to 2031, economists will be using cloud-based econometrics tools to analyze these large datasets. Geolocation datasets should be matched with Census data of various shapes. Visualization of the results in dynamic webpages for public view has become standard practice and will become even more routine in the next few years. Researchers will need to become increasingly sophisticated in aggregating multiple data sources with different geolocation shapes in order to answer the questions asked by the Commission.

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[14] USAC's budget is 200 million dollars per year which is approximately 2 percent of nearly 10 billion dollars in annual USF spending. Statement of Operations and Expense Trends, at 7, https://www.usac.org/wp-content/uploads/about/documents/annual-reports/2019/USAC-2019-Annual-Report.pdf (reporting 82 million dollars in annual personnel expenses for 570 full-time employees).

[15] One million dollars per year is 0.01 percent of an annual 10 billion dollar USF budget.

[16] Average global expenditure on basic research and development is 2.2 percent of total GDP, with 2.8 percent in the United States and as high as 4.6 percent in South Korea. World Bank (2017), https://data.worldbank.org/indicator/GB.XPD.RSDV.GD.ZS?most_recent_value_desc=true.

[17] 5G Fund NPRM&O at ¶ 37. *See also* Statement of Chairman Ajit Pai, June 25, 2020, https://www.commerce.senate.gov/services/files/F0A932BC-ED68-462A-B325-C2A2050DA21D (seeking appropriations of 65 million dollars for the development and implementation of new broadband maps as directed by the Broadband DATA Act).

The expertise to run these analyses is limited. Policymakers still don't have answers to many important questions about broadband deployment and the digital divide, perhaps because research funding to support such analysis has not been allocated thus far.

Study Multiple New Data Sources

The Commission seeks comment on its proposal to use multiple data sources to allocate the 5G Fund for Rural America.[18] As datasets grow larger with more variables, the time to analyze datasets grows. It's easy for the Commission to ask tough empirical questions, and important that they do so, but extremely time-consuming to answer them intelligently.

The Commission asks whether to include six additional datasets in its methodology, how to select a point estimate for an optimal population density threshold, and how to select for the optimal geographic shape between three sets of census shapes.[19] The Commission is right to ask these questions, since the answers can ultimately affect how money is distributed. But each question takes hours, days, weeks, and sometimes months to answer intelligently with cloud datasets and statistical tools. Moreover, the most complicated questions yield nuanced, rather than definitive, answers, meaning the Commission should probably appoint several reports and then allow the expert FCC staff time to evaluate them.

The volume of data available to serve as inputs into the Commission's decision-making will only increase over time. Incorporating additional data means even more time required by researchers to ingest, clean, and load multiple datasets to cloud computing infrastructure. Researchers need to spend time understanding the weaknesses and strengths of each dataset, some of which have dozens of variables such as speed tiers, geographic clusters, and demographics. Datasets also change over time. The growing number of datasets will require more resources for research to fulfill the goals of the USF program.

Track the Impact of the 5G Fund

Economists, data scientists, and other scholars should study the new broadband maps as soon as they're available in 2023. In anticipation of these new maps, researchers should begin to design experiments, set up the cloud infrastructure, and test new econometric models as early as 2021. Whether the Commission chooses Option A or Option B, it will take lead time to prepare studies and experiments to use the new maps. Fortunately, the Commission could direct some funds toward these anticipated needs today.

With a 5G USF Research Fund, the OEA could design studies and USAC could administer the procurement of expert reports starting in 2021. Preparing experiments and economic studies will

[18] *Id.* at ¶ 30-32; *id.* at ¶ 66-67 ("To inform their proposals, we recommend that the Office of Economics and Analytics and the Wireline Competition Bureau use data from several sources including the U.S. Geological Survey, historical coverage and infrastructure deployment data received by the Commission, data from the U.S. Census Bureau, spectrum holdings information, Mobility Fund Phase I auction data, and other data as necessary").
[19] *Id.*

be resource intensive for economists inside and outside of the Commission. The OEA could specify the parameters of research through the design of experiments, building of datasets, and methods for empirical research. Each of these specific tasks could be funded on short time frames as needed.

Today, interested parties engage experts to submit economic reports to attach to their administrative comments, but these reports do not rise to the level of an empirical literature. Each expert builds their own models in a piecemeal fashion to argue specific views for their clients. With a research fund, the OEA could design the questions and answers to more systematically track broadband data analyses over time and across points of view.

Conclusion

The importance of new broadband maps in Option A and Option B reveals a need for analysis of the new data. A research fund could provide resources for the Commission to be ready to get the most out of these new broadband maps. New data should be rapidly integrated into the USF as soon as it is available. But to integrate this new data, we still need answers to many questions related to USF subsidies and the digital divide. The Commission may find the time opportune to innovate even more in the proposed 5G Fund for Rural America—by designating research funds for the study of USF.