

The Economics of Universal Service Fund Reform

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Executive Summary

In the FCC's recent Future of the Universal Service Fund (USF) proceeding, one of the most extensively debated subjects in the record was the possibility of modernizing the USF contributions system. Among others, there were two broad proposals that were advanced – (1) expanding the contribution base to include revenues from broadband internet access service, and (2) broadening the USF contribution base to include entities including edge providers such as streaming video providers, digital advertising firms, and cloud services companies. We find that the most economically efficient option for reform is to expand the contribution base to include broadband internet access service revenues.

The USF is currently funded through fees collected from telecommunications providers. Funds are then used to subsidize the various programs under the USF, promoting universal connectivity. Even though the USF supports broadband through its disbursements, the contribution base for the USF is funded based on interstate and international telecommunications revenue. As the industry shifts towards internet-based communication, the contribution base for universal service has dramatically shrunk. Since 2012 the contribution base has declined more than 42%. Given this, in the past two decades the contribution factor (*i.e.*, Projected USF Expenditures/Contribution Base) has more than tripled – from around 7% to over 29%. Without funding reform we predict it will be 44.0% in 2025 and 49.7% in 2027.

There are economic consequences from such large fees (currently at 29.2%) on such a narrow base (mostly voice revenues) as fees become more distortionary and burdensome on an inequitable subset of Americans who primarily rely on voice services. Expanding the contribution base to include broadband internet access service revenues will simultaneously lower the effective USF fee (to 3.7%) and broaden the base from which the funding comes (all uses of broadband), reducing market distortions in line with economic principles and the institutional history of the USF. We also find, under plausible assumptions for service plan prices, that consumers will not face a significant price increase and many will likely achieve savings due to the decrease in contribution factor on voice service. In addition, to the extent any additional fees levied are passed onto downstream consumers, the burden will likely be borne relatively more by high-income consumers.

We also find that various other proposals to include certain edge providers would arbitrarily increase market distortions and are not in line with economic principles. In addition, these proposals also assert, without reliable evidence, that fees levied on edge providers will not be passed down to consumers. We find that economic principles and empirical trends in the industry suggest otherwise.

I. Introduction

The Federal Communications Commission (“FCC”) has been continuously working on modernizing and improving the Universal Service Fund (“USF” or the “Fund”) program to meet the changing needs of the telecommunications industry and to close the digital divide.¹ On the disbursement side, in addition to historically funded voice services, the Fund finances broadband subsidies in the high-cost programs, including, for example, the Alternative Connect America Cost Model (“ACAM”) program, the Rural Digital Opportunity Fund (“RDOF”) and the 5G Fund for Rural America; the Lifeline Program; the Rural Health Care Program; the Schools and Libraries (“E-Rate”) Program; and various other affordability and access programs.²

Telecommunications companies pay a percentage of their interstate and international end-user telecom revenues into the USF. This percentage is called the contribution factor, and this factor is calculated four times a year and is increased or decreased depending on the needs of the USF programs.³ The total USF funding budget has not varied significantly over the past decade. The financial constraints facing the USF arise from the composition of contributors to the Fund and the growing need for broadband internet access service support.⁴ The FCC has historically funded the program by assessing the revenues for interstate voice calling and other traditional telecom services, and that traditional telecom base is shrinking.⁵ This shrinking base (primarily due to shifts from voice to data) has caused the USF contribution

¹ In addition to USF other federal infrastructure programs include the Broadband Equity, Access, and Deployment Program funding (\$42.5 billion), the Reconnect Program (\$4.8 billion from 2018 to present), the Tribal Broadband Connectivity Program (\$3 billion), the Enabling Middle Mile Infrastructure Program (\$1 billion), the Broadband Infrastructure Program (\$288 million), and the Affordable Connectivity Program/ Emergency Broadband Benefit Program (\$17.2 billion). See, FCC, “In the Matter of Report on the Future of the Universal Service Fund,” WC Docket No. 21-476, Report, FCC-22-67, ¶¶ 6-9, released August 12, 2022, <https://docs.fcc.gov/public/attachments/FCC-22-67A1.pdf>, (“FCC USF Report 2022”).

² Congressional Research Service, “The Future of the Universal Service Fund and Related Broadband Programs,” July 11, 2023, accessed August 7, 2023, <https://crsreports.congress.gov/product/pdf/R/R47621>.

³ FCC, “Contribution Methodology & Administrative Filings,” accessed August 7, 2023, <https://www.fcc.gov/general/contribution-methodology-administrative-filings>.

⁴ Masha Abarinova, “Why the USF is a Ticking Time Bomb – Analyst,” Fierce Telecom, January 10, 2023, accessed August 7, 2023, <https://www.fiercetelecom.com/telecom/why-usf-ticking-time-bomb-analyst>.

⁵ Covington Alert, “Debate Over How to Fund the Federal USF Continues with Potential Impacts for Tech Companies, ISPs, and Consumers,” accessed August 7, 2023, <https://www.cov.com/en/news-and-insights/insights/2022/08/debate-over-how-to-fund-the-federal-usf-continues-with-potential-impacts-for-tech-companies-isps-and-consumers>.

factor to increase significantly over the past decade or more.⁶ The FCC has deliberated on this and commenters have proposed various solutions.⁷

On July 28, 2023, Members of the Senate Universal Service Fund (USF) Working Group, Senators Luján of New Mexico, Thune of South Dakota, Klobuchar of Minnesota, Capito of West Virginia, Peters of Michigan, and Moran of Kansas, invited comment submissions regarding the future of the USF.⁸ In response to this invitation, our report will discuss the solutions that have been proposed by various parties, both in FCC proceedings and other publications, from an economic perspective and evaluate the pros and cons, with a recommendation of the preferred approach. In summary, we support assessing revenues for the provision of broadband internet access service in the contribution base, in addition to the current mostly voice-related revenue contribution base. Doing so would significantly reduce the high current contribution factor, given that disbursement levels are expected to stay fairly stable.⁹ We believe this approach is a more economically sound one that causes the least distortion, as we discuss further below.

II. Brief Background on USF

A. History

The foundation of the USF can be traced back to the Communications Act of 1934, which established the Federal Communications Commission (FCC).¹⁰ The Act's stated objective was to create for "the people of the United States a rapid, efficient, nation-wide, and world-wide wire and radio communication service with adequate facilities at reasonable charges..."¹¹ The idea of universal service gained more formal

⁶ Covington Alert, "Debate Over How to Fund the Federal USF Continues with Potential Impacts for Tech Companies, ISPs, and Consumers," August 4, 2022, accessed August 7, 2023, <https://www.cov.com/en/news-and-insights/insights/2022/08/debate-over-how-to-fund-the-federal-usf-continues-with-potential-impacts-for-tech-companies-isps-and-consumers>.

⁷ FCC, "In the Matter of Report on the Future of the Universal Service Fund," WC Docket No. 21-476, Notice of Inquiry, FCC 21-127, released December 15, 2021, <https://docs.fcc.gov/public/attachments/FCC-21-127A1.pdf>.

⁸ Ben Ray Luján – U.S. Senator for New Mexico, "Universal Service Fund (USF) Working Group Request for Comment," accessed August 8, 2023, <https://www.lujan.senate.gov/usf/>.

⁹ White House, "Table 21-1 Federal Budget by Agency and Account," FY 2022 President's Budget Policy, p. 417, https://www.whitehouse.gov/wp-content/uploads/2021/05/21-1_fy22.pdf.

¹⁰ Maria Royle, "Broadband and the Communications Act of 1934," Vermont Legislative Counsel, January 12, 2021, accessed August 8, 2023, <https://legislature.vermont.gov/Documents/2022/WorkGroups/House%20Energy%20and%20Technology/Telecommunications/Broadband/W~Maria%20Royle~Broadband%20and%20the%20Communications%20Act%20of%201934~1-12-2021.pdf>.

¹¹ The Living New Deal, "Communications Act (1934)," November 18, 2016, accessed August 21, 2023, <https://livingnewdeal.org/glossary/communications-act-1934/>.

recognition when the FCC introduced the "universal service concept" in the 1950s.¹² The concept aimed to ensure that telephone service was available to all Americans at reasonable rates, regardless of where they lived. The vertically integrated pre-1984 Bell system was a regulated monopoly providing telecom services in that construct, and universal service encompassed the array of services mandated by regulators for widespread availability, the baseline service quality stipulated by regulators, and the interconnected pricing framework designed by regulators to remunerate the service providers.¹³ The modern USF began to take shape in the 1980s when the FCC established the "Universal Service High Cost Support" mechanism.¹⁴ This mechanism provided financial support to telecommunications carriers serving high-cost, rural, and remote areas, enabling them to offer services at affordable rates. In the past, the regulatory compact that was reached with telecommunication companies (and AT&T in particular) was that the guarantee of universal connectivity was to be funded through a fee on revenues generated by such connectivity.

The Telecommunications Act of 1996 overhauled the telecommunications regulatory landscape in the U.S. It expanded the concept of universal service to include not just voice services but also advanced telecommunications and information services.¹⁵ The Act aimed to promote the availability of affordable services for schools, libraries, rural healthcare providers, and low-income consumers.¹⁶ In its implementation, the FCC established the four primary programs that make up the USF today. These programs include the High-Cost Program, the Lifeline Program, the Schools and Libraries (E-Rate) Program, and the Rural Health Care Program.¹⁷

The USF is funded through fees collected from telecommunications providers, which are then typically passed on to consumers as a USF fee on their monthly bills.¹⁸ The FCC does not require companies to charge their customers for these contributions – this funding decision is left up to the individual companies.¹⁹ Historically, only long-distance companies were responsible for making contributions to

¹² Diane S. Katz, "13. What is Universal Service?" August 16, 2004, accessed August 15, 2023, <https://www.mackinac.org/6775>.

¹³ John D. Borrows, Phyllis A. Bernt, and Raymond W. Lawton, "Universal Service in the United States: Dimensions of the Debate," The National Regulatory Research Institute, June 1994, pp. 1-3, <https://ipu.msu.edu/wp-content/uploads/2016/12/Borrows-Universal-Service-in-the-United-State-94-08-June-94-1.pdf>.

¹⁴ "Universal Service: Transforming the High-Cost Fund for the Broadband Era," Senate Hearing 111-1021, June 24, 2010, <https://www.govinfo.gov/content/pkg/CHRG-111shrg67401/html/CHRG-111shrg67401.htm>.

¹⁵ Michael I. Meyerson, "Ideas of the Marketplace: A Guide to the 1996 Telecommunications Act," *Federal Communications Law Journal*, 49(2) (1997): 251-287, pp. 266-267, <https://www.repository.law.indiana.edu/cgi/viewcontent.cgi?article=1124&context=fclj>, ("A Guide to the 1996 Telecommunications Act").

¹⁶ FCC, "Universal Service," accessed August 9, 2023, <https://www.fcc.gov/general/universal-service>.

¹⁷ FCC, "Universal Service," accessed August 9, 2023, <https://www.fcc.gov/general/universal-service>.

¹⁸ Universal Service Administrative Co. (USAC), "Universal Service," accessed August 9, 2023, <https://www.usac.org/about/universal-service/>, ("USAC – About Universal Service").

¹⁹ USAC – About Universal Service.

support the USF.²⁰ The scope of contributors was expanded with the Telecommunications Act of 1996 and at present, all telecommunications companies that engage in interstate services are mandated to provide financial support to the USF.²¹ Additionally, providers offering international telecommunications services are also obligated to make contributions to the Fund. This was further reinforced in June 2006 when the FCC decided that providers of interconnected Voice over Internet Protocol (VoIP) services should contribute to the USF in the same manner as traditional telephone services.²² These funds are then used to subsidize the various programs under the USF.²³ The contribution base for the USF is the total revenue generated by the contributing telecommunication providers.²⁴ Note that the FCC does not assess revenue attributed to broadband internet access service, wireless data, texting, one-way VoIP, intrastate services, cable video, and Direct Broadcast Satellite (DBS) services.²⁵ But it does assess some broadband services, such as business data services.²⁶

The contribution factor is the percentage of a telecommunications provider's interstate and international end-user telecommunications revenues that must be remitted to the USF.²⁷ This contribution factor is calculated quarterly by the FCC based on the projected needs of the USF programs and the total projected contributions.²⁸ The FCC adjusts the contribution factor to ensure that the necessary funding is collected.²⁹

²⁰ FCC, “Universal Service Fund,” accessed August 9, 2023, <https://www.fcc.gov/general/universal-service-fund>.

²¹ A Guide to the 1996 Telecommunications Act, pp. 267-268.

²² Bloomberg News, “Net Phone Service Providers Are Told to Pay Subsidy Fee,” The New York Times, June 22, 2006, accessed August 9, 2023, <https://www.nytimes.com/2006/06/22/technology/22ownership.html>.

²³ USAC – About Universal Service.

²⁴ Covington Alert, “Debate Over How to Fund the Federal USF Continues with Potential Impacts for Tech Companies, ISPs, and Consumers,” August 4, 2022, accessed August 7, 2023, <https://www.cov.com/en/news-and-insights/insights/2022/08/debate-over-how-to-fund-the-federal-usf-continues-with-potential-impacts-for-tech-companies-isps-and-consumers>.

²⁵ Carol Matthey, “Universal Service Fund,” USForward, September 2021, p. 8, https://www.incompas.org/Files/filings/2021/USForward%20Report%202021%20for%20Release_FINAL.pdf, (“USForward Report”).

²⁶ USForward Report, p. 8.

²⁷ USAC – About Universal Service.

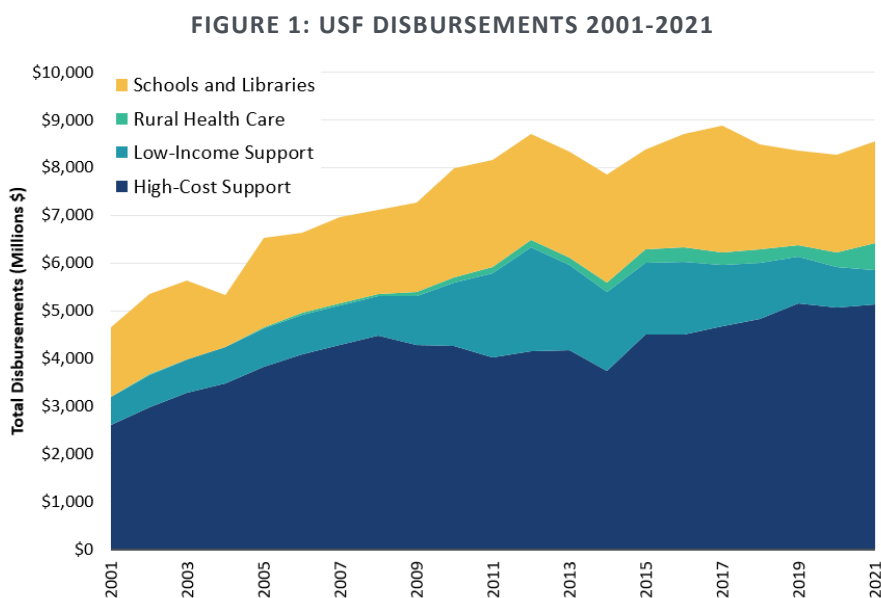
²⁸ USAC – About Universal Service.

²⁹ FCC, “In the Matter of Connect America Fund...,” WC Docket Nos. 10-90, 07-135, 05-337, and 03-109, GN Docket No. 09-51, CC Docket Nos. 01-92 and 96-45, WT Docket No. 10-208, Report and Order and Further Notice of Proposed Rulemaking, FCC-11-161, released November 18, 2011, p. 20, <https://docs.fcc.gov/public/attachments/FCC-11-161A1.pdf>.

B. Demand for and Supply of USF Funding

On the funding supply side, the contributing entities include “wireline and wireless companies, and interconnected VoIP providers, including cable companies that provide voice service.”³⁰ Providers must attribute their projected revenues to one of several categories on the annual reporting form; these categories include fixed local service, toll services, and mobile services. Providers must further break their revenue into interstate and intrastate categories.

On the demand side, every quarter the Universal Service Administrative Company (“USAC”) is required to submit a projection of demand for the four universal service programs – High-Cost Program, Lifeline Program, E-Rate Program, and Rural Health Care Program. The demand for funds is then compared with estimated interstate revenues and the contribution factor (the ratio of total projected expenses to the total projected revenue) is determined such that all funding objectives can be met. Actual deployment for the four programs can be seen in Figure 1 below. In 2021, USF disbursements totaled \$8.6 billion.



Sources and Notes: “Table 1.10 – Universal Service Disbursements 2001 – 2021,” 2022 USF Monitoring Report.

As the industry shifts towards internet-based communication, the contribution base for universal service continues to shrink.³¹ Since 2012 the contribution base has declined more than 42%, falling from \$65.8

³⁰ USAC – About Universal Service. Note that providers file quarterly estimates of projected revenues on FCC Form 499-Q and a detailed breakdown of annual revenue on FCC Form 499-A. See, USForward Report, p. 6.

³¹ USForward Report, pp. 9-10.

billion to \$37.9 billion in 2021.³² The average annual contribution base decrease from 2013 through 2021 was 5.9%.³³ We use this average decrease to forecast the contribution base in Figure 2. In 2027, we estimate the contribution base will be \$19.6 billion. As the FCC has recognized, this decline “does not generally appear to be a result of service providers reclassifying telecommunications revenues from interstate to intrastate; rather, providers are reporting a declining share of telecommunications revenues and an increasing share of non-telecommunications revenues.”³⁴

As the denominator continues to shrink, the contribution factor will continue to grow. In Q1 2001, the contribution factor was 6.67%.³⁵ In Q3 2023, the contribution factor is 29.2%.³⁶ We combine the estimated annual contribution base forecasts with the FCC’s USF budget estimates to calculate the projected contribution factor.³⁷ The estimated annual contribution factor can be seen in Figure 2 below. In the past two decades the contribution factor has more than tripled - from around 7% to over 29%. The current contribution factor, Q3 2023, is 29.2%, in 2025 we predict it will be 44.0%, and by 2027 we estimate it will be 49.7%.³⁸ Thus, if no new funding sources are brought into the contribution base, customers of voice telephone services will face an increasing burden due to the rising contribution factor.

³² FCC, “Universal Service Monitoring Report 2022,” CC Docket No. 96-45, WC Docket Nos. 02-6, 02-60, 06-122, 10-90, 11-42, 13-184, and 14-58, <https://docs.fcc.gov/public/attachments/DOC-391070A1.pdf>, (“2022 USF Monitoring Report”).

³³ 2022 USF Monitoring Report, p. 17. We see no reason to believe this decrease will slow or reverse with current market trends.

³⁴ FCC USF Report 2022, ¶ 91.

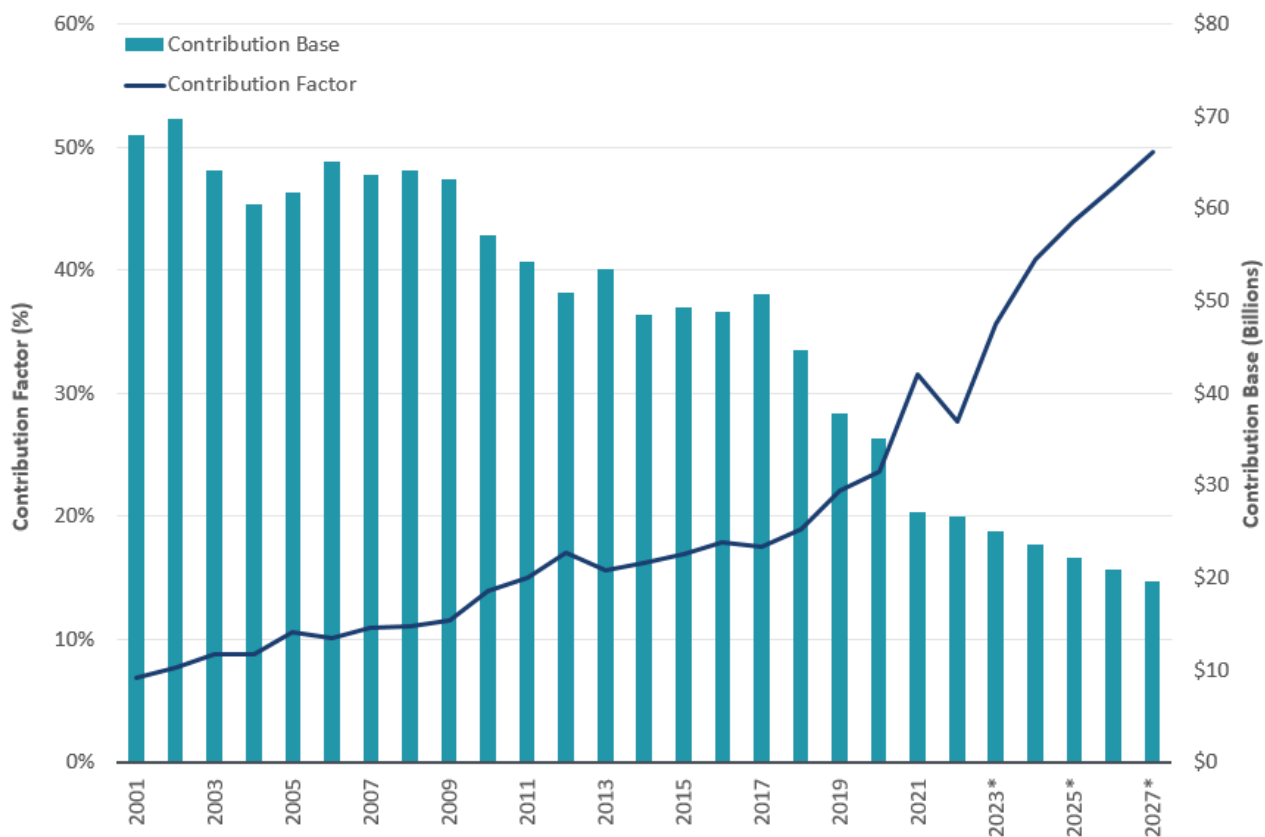
³⁵ FCC, “Proposed First Quarter 2001 Universal Service Contribution Factor,” CC Docket No. 96-45, Public Notice, DA 00-2764, released December 8, 2000, <https://docs.fcc.gov/public/attachments/DA-00-2764A1.pdf>.

³⁶ FCC, “Proposed Third Quarter 2023 Universal Service Contribution Factor,” CC Docket No. 96-45, Public Notice, DA 23-507, released June 14, 2023, <https://docs.fcc.gov/public/attachments/DA-23-507A1.pdf>.

³⁷ White House, “Table 21-1 Federal Budget by Agency and Account,” FY 2022 President’s Budget Policy, p. 417, https://www.whitehouse.gov/wp-content/uploads/2021/05/21-1_fy22.pdf.

³⁸ For current contribution factor, see, “Proposed Third Quarter 2023 Universal Service Contribution Factor,” CC Docket No. 96-45, Public Notice, DA 23-507, released June 14, 2023, <https://docs.fcc.gov/public/attachments/DA-23-507A1.pdf>. For estimated contribution factors, see, Figure 2.

FIGURE 2: ACTUAL AND PROJECTED CONTRIBUTION BASE AND FACTOR



Sources and Notes:

Historical contribution factors and disbursement totals sourced from the annual USF monitoring reports. See, <https://www.fcc.gov/general/federal-state-joint-board-monitoring-reports>. To calculate the historical annual contribution base, we divide the disbursement total by the contribution factor. We rely on federal budget estimates, see, White House, “Table 21-1 Federal Budget by Agency and Account,” FY 2022 President’s Budget Policy, p. 417, https://www.whitehouse.gov/wp-content/uploads/2021/05/21-1_fy22.pdf. The average growth rate of the contribution base from 2013-2021 is -5.896%. We forecast the contribution base using this annual growth rate. We then estimate the necessary contribution factor given our estimates for annual disbursement and the contribution base. 2022-2027 represent forecasted years.

Such a high contribution factor can lead to various market distortions. It might encourage telecommunications providers to shift their focus away from offering traditional voice services which could potentially result in a decline in the availability and quality of voice communications options. The original intent of the USF was to promote universal access to communications services. If the contribution factor becomes too high, it might inadvertently limit access due to higher costs incurred because of the USF fee. This is particularly an issue for underserved and rural areas, and low-income consumers, where affordability is already a concern. Note that those not on Lifeline (who the contributing companies cannot assess for USF fees) will be affected even more.³⁹ Additionally, it may also incentivize providers to

³⁹ FCC, “Universal Service Support Mechanisms,” accessed August 23, 2023, <https://www.fcc.gov/consumers/guides/universal-service-support-mechanisms>.

reclassify some of their services away from voice, as already seen in the mobile context, and lead to a further decline in the contribution base.⁴⁰

The growing gap between the demand and current revenue base of funding and the high contribution factor are driving the debate about USF contribution reform and possible ways of widening the contribution base of revenues and/or companies that can be assessed to subsidize the Fund. Four main proposals have been advanced – (1) increasing the base of revenues of current companies whose revenues already are assessed, (2) connection-based assessment, (3) number-based assessment and (4) whether new contributors should be brought in as direct contributors to the Fund.⁴¹ With respect to the first option, there is significant support in the FCC’s record that companies’ should include their broadband internet access service revenues, but the FCC also has sought comment on either a connection-based or number-based model.⁴² With respect to expanding direct contributors, certain large tech companies and streamers have been targeted for their online content services (such as streaming and advertising revenues).⁴³ Ultimately, which services and entities need to contribute to the Fund should be determined by economic principles based on efficiency arguments, and the historic context for why the Fund was set up and who should contribute to the Fund.

III. Economic Principles of Internalizing Externalities

The economic literature on what activities should be subsidized, and how to raise these funds, is well established and accepted. In particular, sound economic principles establish three key points when it comes to subsidies and funding subsidies efficiently. First, it would be welfare improving for society to subsidize activities that generate positive externalities.⁴⁴ Externalities arise when a transaction involving a set of parties cause benefits or costs on other parties not involved in the transaction. Second, the funds

⁴⁰ USForward Report, p.10.

⁴¹ Note that the new contributors considered in the proposals do currently pay in on the assessed telecom services they purchase.

⁴² See, USForward Report for why assessing a contribution on broadband is the preferred approach. For a connection-based approach, see, Michael A Williams and Wei Zhao, “NTCA-USF Study: Expert Report of Michael A. Williams, PhD. and Wei Zhao, Ph.D.,” Berkeley Research Group, May 7, 2020, <https://www.ntca.org/sites/default/files/documents/2020-05/2020-05-07%20-%20Williams-Zhao%20report%20Final.pdf>, (“NTCA-USF Study 2020”).

⁴³ See, Roslyn Layton and Petrus H. Potgieter, “Rural Broadband and the Unrecovered Cost of Streaming Video Entertainment,” ITS Gothenburg, June 11, 2021, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3820644, (“Layton and Potgieter Report”). See also, Hal Singer and Ted Tatos, “Subsidizing Universal Broadband Through a Digital Advertising Services Fee: An Alignment of Incentives,” Econ One, September 16, 2021, <https://www.econone.com/wp-content/uploads/2021/09/Digital-Divide-HSinger-TTatos-2.pdf>, (“Singer and Tatos Report”).

⁴⁴ Robert S. Pindyck and Daniel L. Rubinfeld, *Microeconomics*, Seventh Edition (Pearson, 2009), pp. 339-342.

for these subsidies should be raised from a broad, non-distortionary revenue base;⁴⁵ and third, a non-distortionary revenue base is from relatively inelastic economic activities.

A. Internalizing Society-Wide Externalities through a Broad Revenue Base

In the context of the USF, the fact that there are positive externalities associated with the universal connectivity of Americans is uncontroversial and presumed. In other words, the USF exists, not only because it is difficult to deploy broadband (and in the past, voice telephony) to high-cost and low-income areas, but also because it is understood that there are positive externalities generated from having Americans connected to affordable, nationwide internet access services (and in the past telephony services). The nature of these externalities take many forms. More recently, since the Covid-19 pandemic, the positive externalities generated by fast and reliable internet service has been motivated by the fact that it can soften the negative impact of diseases that prevent humans from interacting physically.⁴⁶ Note that this is but a small subset of the total societal benefits that accrue from voice and broadband connectivity. Other examples include the propagation of telemedicine,⁴⁷ improved equity of access to education,⁴⁸ and improved quality of education.⁴⁹ These benefits accrue to society in a real way, for

⁴⁵ Ved P. Gandhi, “9 Tax Structure for Efficiency and Supply-Side Economics in Developing Countries,” in *Supply-Side Tax Policy*, ed. Ved P. Gandhi *et al.* (International Monetary Fund, 1987): 225-249, pp. 231-232, 238-239.

⁴⁶ Canan Birimoglu Okuyan and Mehmet A. Begen, “Working from Home During the COVID-19 Pandemic, its Effects on Health, and Recommendations: The Pandemic and Beyond,” *Perspectives in Psychiatric Care*, 58(1) (2022): 173-179, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8242705/> (“[Working from home] also helps to reduce the spread of the disease by keeping most people at home to practice physical distancing”).

⁴⁷ Yosselin Turcios, “Digital Access: A Super Determinant of Health,” Substance Abuse and Mental Health Services Administration, March 22, 2023, accessed August 8, 2023, <https://www.samhsa.gov/blog/digital-access-super-determinant-health>; Ambrish A. Pandit, *et al.*, “Association Between Broadband Capacity and Telehealth Utilization Among Medicare Fee-for-Service Beneficiaries During the COVID-19 Pandemic,” *Journal of Telemedicine and Telecare*, (2023): 1-8, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10076155/>; Adie Tomer, *et al.*, “Digital Prosperity: How Broadband Can Deliver Health and Equity to All Communities,” The Brookings Institution, February 27, 2020, accessed August 21, 2023, <https://www.brookings.edu/articles/digital-prosperity-how-broadband-can-deliver-health-and-equity-to-all-communities/>.

⁴⁸ Thomas McElroy, “Addressing The Digital Divide an Education: Technology and Internet Access for Students in Underserved Communities,” *Forbes*, December 3, 2021, accessed August 8, 2023, <https://www.forbes.com/sites/forbestechcouncil/2021/12/03/addressing-the-digital-divide-in-education-technology-and-internet-access-for-students-in-underserved-communities/?sh=355949d25cec>; Adie Tomer, *et al.*, “Digital Prosperity: How Broadband can Deliver Health and Equity to All Communities,” The Brookings Institution, February 27, 2020, accessed August 21, 2023, <https://www.brookings.edu/articles/digital-prosperity-how-broadband-can-deliver-health-and-equity-to-all-communities/>.

⁴⁹ Internet Society, “Internet Access and Education: Key Considerations for Policy Makers,” November 20, 2017, accessed August 8, 2023, <https://www.internetsociety.org/resources/doc/2017/internet-access-and-education/>; North Carolina Department of Information Technology, “Benefits of Broadband,” accessed August 8, 2023, <https://www.ncbroadband.gov/broadband-101/benefits-broadband>.

example, the normalization and ability to take high quality online classes for students that are unable to attend classes physically for any reason is a society-wide positive externality because it contributes to a more educated and productive citizenry. Also, it is well-established that educational attainment levels are strongly associated with better health outcomes which alleviates pressures on a society's social security systems and reduces a nation's healthcare costs.⁵⁰

Given that the beneficiary of the positive externality is society as a whole, a broad society-wide contribution base is advised. The USF funding requirements could be put into the annual appropriations process by Congress, which would be the broadest contribution base and would generate minimal distortions. However, annual appropriations from Congress may in the long run make for an unpredictable and uncertain source of funding. Under the current statute, Congress has determined that the USF should have its own financial support that the FCC is responsible for ensuring is equitable, non-discriminatory, sustainable, and predictable.⁵¹

We emphasize that having a broad revenue base does not imply that we increase the number of contributors and sectors to be arbitrarily larger. Whether some entities should contribute or not to the base depends on the type of externalities being generated. It is true that specific use cases of broadband can generate positive externalities. For example, search providers use data from its users to improve its search results and map suggestions—if more internet users are connected and provide more data to the service provider there is a positive externality that is not captured in an individual user's decision to use the provider's products (*i.e.*, the search provider can make more desirable products for *all* of its users not just the one that provided data). Similar sector specific externalities may arise for various use cases of broadband (*e.g.*, video streaming, social media). These externalities in turn increase the general value of broadband too. However, these types of externalities are not relevant to the USF discussion. The USF is not a means to internalize these sector specific externalities but is an institution existing to ensure universal connectivity to schools, libraries, rural healthcare facilities, low-income consumers, and high-cost households. It would be historically inconsistent and politically unprecedented for the USF to disburse subsidies to large technology companies for popularizing and normalizing use cases of broadband and vice versa, even though it is inarguable that positive externalities are generated. We will discuss below, in Section V, that sector specific externalities are and can be internalized through private negotiations and contracts anyway.

⁵⁰ Anna Zajacova and Elizabeth M. Lawrence, "The Relationship between Education and Health: Reducing Disparities Through a Contextual Approach," *Annual Review of Public Health* 39 (2018); Jian Gao *et al.*, "The Effect of Primary Care Visits on Total Patient Care Cost: Evidence From the Veterans Health Administration," *Journal of Primary Care & Community Health* 13 (2022).

⁵¹ See, 47 U.S.C. § 254(b). As discussed in Section II.A above, USF was historically designed to be a within firm cross-subsidy across different voice telephony services offered, which by definition, was funded from its own sector. The modern incarnation of the USF is also explicitly mandated by the FCC to be funded from within the sector. 47 U.S.C. § 254(d).

B. Subsidies Should be Funded from a Non-Distortionary Revenue Base

Economic principles suggest that activities that generate positive externalities should be funded through lump-sum, non-discriminatory taxes/fees that minimize market distortions. This is because economic actors in a market economy decide, given their preferences, how to spend their limited resources based on a set of price signals for goods and services. A tax levied on a specific product changes the relative prices across all products and distorts the choices of consumers away from what they would want to consume absent the tax. This represents an inefficiency in the allocation of resources. This is the case for the USF fees. The idea that the fees assessed should not be distortionary to the market is the reasoning behind the FCC’s conclusion that the approach should be “competitively neutral” such that the contribution methodology will “avoid distorting how carriers chose to structure their businesses or the types of services that they provided.”⁵²

Consider raising funds for a known amount of required subsidies, as is the case for the USF. These funds could either be raised by high rates on a narrow revenue base, similar to the current situation that the USF program has evolved into (see Section II.B for details), or by lower rates on a broader revenue base. How do these funding schemes affect relative prices? A high rate on a narrow set of goods or services will have a more dramatic impact on relative prices than a low rate on a broad set of goods or services. With a lower tax rate any party is only induced to adjust their behavior slightly in response to the tax. As a tax rate gets larger, its social cost becomes more than proportionally larger. We discuss how these distortions can manifest and reduce social welfare in Section V below.

Note that an important economic consideration for government financing is administrative ease.⁵³ A broad base of services and goods achieves this as it leaves less room for payer gamesmanship and results in less monitoring costs compared to a regime with many exceptions and exclusions. It is more likely to raise the required revenue with the correct/intended relative contributions from each paying party. In other words, if the system is designed to optimally raise taxes, it is more likely that this design will be upheld with a broad base than compared with a narrow base. Furthermore, even if monitoring was cheap and perfect, we would still be facing a relative price distortion as the firm is taxed at different rates for various goods or services that it produces and sells – this distorts the margins that the firm can make on a given portfolio of production. Subsequently, the firm’s output for each product will be distorted away from its chosen levels absent the product specific tax.

⁵² FCC, “In the Matter of Universal Service Contribution Methodology...” WC Docket Nos. 06-122 and 04-36, CC Docket Nos. 96-45, 98-171, 90-571, 92-237, 99-200, 95-116, and 98-170, NSD File No. L-00-72, Report and Order and Notice of Proposed Rulemaking, FCC 06-94, June 27, 2006, ¶ 6, <https://docs.fcc.gov/public/attachments/FCC-06-94A1.pdf>.

⁵³ David N. Hyman, *Public Finance: A Contemporary Application of Theory to Policy*, Tenth Edition, (Cengage Learning, 2010), p. 425.

C. Money should be Raised from an Inelastic Revenue Base

Economic principles suggest that taxes on inelastic market activity induce less allocative distortions in the economy. Elasticity describes how sensitive the quantity demanded or supplied is to changes in prices. In general, the most efficient taxes are those levied on commodities or inputs that are in inelastic supply, demand, or both. This is because the excess burden of a tax (*i.e.*, the welfare lost from the distortion away from market equilibrium) on goods and services decreases with how sensitively demand or supply can react to price changes. Inelastic demand or supply describes situations where demand or supply has minimal, relatively small reactions to price changes. Goods which are necessities or lack viable substitutes exhibit inelastic demand, and production technology that cannot be scaled up or down easily and immediately exhibit inelastic supply. The intuition behind this result is similar to the argument about having a broad, non-discriminatory base. The less dramatic your reaction in consumption or production is for a given price change, the less is the distortion introduced in how you allocate your resources relative to your resource allocation absent the tax.

There are, however, nuances to this result. While choosing a broad and inelastic contribution base will minimize distortions for consumption decisions, it could have a more pronounced impact on low-income customers as any passed-through tax may be a larger share of their income. There are ways the FCC has tried to minimize this—and explicitly states that companies cannot collect any fees from a Lifeline program participant.⁵⁴

IV. Expanding the Contribution Base to Broadband Services

Expanding the contribution base of USF to include broadband internet access service revenues is the most consistent and effective way to reform the USF to ameliorate the concerns surrounding the declining contribution base and consequent increases in the contribution rate (see Section III.B.). Expanding the contribution base to include broadband internet access service revenues is both consistent and true to the institutional history and construct of the USF while also simultaneously consistent with the economic principles discussed above.

⁵⁴ FCC, “Universal Service Support Mechanisms,” accessed August 23, 2023, <https://www.fcc.gov/consumers/guides/universal-service-support-mechanisms>.

A. Consistency with Institutional History and Construct

As briefly explained in Section II, the USF was initiated in the United States to ensure that essential telecommunications services, particularly telephone services, are made accessible and affordable to all citizens, regardless of their geographic location or income level. The 1996 Act recognized that while urban areas had relatively easy access to modern telecommunications services, rural and underserved areas were at risk of being left behind due to the high costs associated with reaching them.⁵⁵ By creating the USF, the government sought to address these disparities and ensure that everyone, regardless of their location, could benefit from the social and economic advantages of telecommunications services. Voice service was the primary telecommunications service when the 1996 Act was passed and connectivity was measured in terms of voice. The USF funded ubiquitous voice connectivity and this was paid for by voice revenues—the services that benefited directly from the USF by receiving USF subsidies.

In the past two decades, as the world shifted to digital communication and internet connectivity, ensuring access to broadband internet access services in unserved and underserved areas has become the primary connectivity goal. The FCC’s National Broadband Plan specifically laid out recommendations to modernize the USF to ensure its programs were supporting the availability and affordability of broadband internet access networks and services.⁵⁶ The FCC has now modernized each of its four USF programs to support affordable broadband service. This is because it is widely recognized that large positive externalities can be captured with a better-connected population. USF subsidies target precisely this externality by helping to deploy broadband to difficult to serve areas and communities that are not served by the private market. The USF programs help bridge the digital gap and bring the benefits of digital connectivity to a broader population. Note that the USF programs were never a vehicle for addressing other market failures that could arise from externalities. For example, video streaming services have significantly increased the value of broadband services in recent years by offering consumers more choice and more affordable service, but the USF does not subsidize video streaming services as an avenue for increasing broadband deployment.

The contribution base was also determined to be largely voice as this was the service that was being deployed with the funding.⁵⁷ With the digital revolution, voice service now accounts for only 10.8% of the revenues from voice and broadband services in 2022,⁵⁸ but bears most of the contribution burden. Broadband internet access service now accounts for 89.2% of the revenues from connectivity and

⁵⁵ FCC, “Telecommunications Act of 1996,” January 3, 1996, 254(b)(3), <https://transition.fcc.gov/Reports/tcom1996.pdf>.

⁵⁶ FCC, “Connecting America: The National Broadband Plan,” pp. 141-151, <https://transition.fcc.gov/national-broadband-plan/national-broadband-plan.pdf>.

⁵⁷ A Guide to the 1996 Telecommunications Act, p. 253.

⁵⁸ See, Table 2, rows [2]/[1].

contributes nothing.⁵⁹ It is worth noting that 60% of the USF funds, or \$5.1 billion, went into funding broadband deployment and operations in 2021.⁶⁰ The shift in voice and broadband revenues reflects the changing landscape of communication technologies and the evolving needs of modern society—the USF contribution base needs to change to account for the fact that connectivity implies not just voice telephone services but predominantly, broadband internet access. We emphasize here that the USF is already being disbursed to support broadband service and networks. In other words, there is no uncertainty or debate that broadband is critical in providing Americans with affordable connectivity; rather, it is just a matter of funding these already existing efforts with a market distortion minimizing contribution base.

Given the regulatory compact that was reached with telecommunication companies (and AT&T in particular) in the past, about the guarantee of universal connectivity funded through a fee on revenues generated by such connectivity, it is a natural extension to include broadband internet access service, which is already supported by the USF, into the contribution base. From the standpoint of digital equity, broadband connectivity is front and center and the USF supports broadband connectivity and thus the USF should be supported by broadband internet access service revenues.

B. Consistency with Sound Economic Principles

a. Broadband Users Constitute a Broad and Non-Distortionary Contribution Base

As discussed in Section III.A above, assessing a low-rate tax on a broad set of goods or services minimizes behavioral distortion. This is because a small tax on a broad set of goods and services requires only a slight adjustment in behavior. Currently the USF fee is acting as a large tax on a shrinking base of traditional voice-centric telecommunications revenues. Introducing a broader base that helps level out this tax with minimal distortion is crucial to the continued work of the USF and will also address any current distortions from the high fee today.

Broadband internet access service revenues constitute a very broad base. Internet usage as a whole has been growing steadily over the years. In 2000 only 43% of the U.S. population used the internet, while today almost 92% of individuals in the United States access the internet.⁶¹ Broadband internet access services are a driving force of these rising penetration rates; in 2022 89% of households are estimated to

⁵⁹ See, Table 2, rows [3]/[1]. Please note that Business Data Services (BDS) are not included in the broadband revenue estimate.

⁶⁰ See, “Table 1.10 – Universal Service Disbursements 2001 – 2021,” 2022 USF Monitoring Report. See also, USAC, “Program Overview,” <https://www.usac.org/high-cost/program-overview/>.

⁶¹ Ani Petrosyan, “Percentage of Population Using the Internet in the United States from 2000 to 2023,” Statista, February 23, 2023, accessed August 15, 2023, <https://www.statista.com/statistics/209117/us-internet-penetration/>.

have broadband internet access service at home.⁶² With continued investment in broadband rollout, we expect this coverage to only continue to increase. Broadband's recent growth and stability is juxtaposed with the decreasing revenues of mobile and voice telephone services.⁶³ Between 2010 and 2019 retail mobile revenues declined 66%, local service revenues declined 35%, and toll revenues declined 35%.⁶⁴ Broadband's reach and penetration is outpacing the voice telephone market as voice telephone services are mostly provided through products that are bundled with broadband.

Broadband internet access service is not only a broad revenue base considering the reach of Americans who will participate in funding a society-wide positive externality. It is also broad (and importantly, non-discriminatory) when it comes to the use cases for broadband, which ultimately derives the positive externality, *i.e.*, it is not any particular use case or industry specific edge provider funding an externality accruing for society. In addition, distortions in consumption and investment decisions will be minimized. To achieve a similarly broad base on the services that use broadband, as opposed to the broadband connection itself, would require applying a fee to each service.

The make-up of broadband customers is important to consider when assessing the incidence of the USF fee. Many businesses are moving away from voice and towards broadband technology. This customer base would imply that a USF fee applied to broadband internet access (in addition to telecom services) would fall more heavily on businesses instead of residential consumers. We can see this breakdown by analyzing AT&T's 2022 annual report. It reports 67% of its wireline business stems from its business customer base.⁶⁵ Assuming AT&T's business is relatively representative of the broadband market as a whole, we expect that including broadband internet access revenues in the USF contribution base would induce the share of USF contributions from businesses to increase relative to residential consumers.

We recognize that if fees are levied on broadband internet access services, business customers may pass this fee on to their customers downstream. The incidence of who pays the passed-on USF fee is expected to shift away from lower income consumers if the base of support is expanded to include broadband internet access service. This is true for two reasons. First, as noted, the total business-paid share of USF support is expected to increase. The amount of revenue earned by businesses that use broadband is surely skewed toward higher income individuals. That is, people with more money tend to spend more on business services in general. Consequently, as businesses pass through some or all of the increased costs

⁶² Marketing Charts, "Home Broadband Penetration Rises to Almost 9 in 10 US Households," January 19, 2023, accessed August 15, 2023, <https://www.marketingcharts.com/industries/telecom-industries-228287>.

⁶³ USForward Report, Figure 3.

⁶⁴ These are only the reported revenues, bundling allocation could be misrepresenting these figures. See, USForward Report, p. 10.

⁶⁵ AT&T, "2022 Annual Report," 2022, p. 49, <https://investors.att.com/~media/Files/A/ATT-IR-V2/financial-reports/annual-reports/2022/2022-complete-annual-report.pdf>. To calculate total business wireline revenue, we take the total reported amount (\$22.5 billion). To calculate total consumer wireline revenue, we take the total reported amount (\$12.7 billion) less "Legacy voice and data" (\$1.7 billion).

from USF fees on broadband to their customers, those costs will ultimately be borne more by higher income individuals.

A second reason the USF fee would be expected to shift away from lower income consumers is that within the consumer-paid share of USF support, higher income consumers tend to pay more for their broadband than lower income consumers. There is not so much variation in the quality and cost of a voice line as compared to broadband connections. That is, when a high-income consumer purchases broadband, they are likely purchasing a much higher speed and more expensive connection relative to a low-income consumer than is the case with voice connections.⁶⁶ As USF contributions are revenue based, this shift to higher individual payments from high-income consumers would also shift the burden of USF funding towards those higher income individuals. Similarly, it is likely that elderly Americans rely more on voice services exclusively.⁶⁷ This means that currently they are paying a disproportionate share of USF support, and including broadband internet access service revenues will help rebalance this demographic burden.

b. Broadband Services have Inelastic Demand

That broadband services have inelastic demand is relevant to the USF contributions analysis because it implies that any potential price increase for broadband consumers will only induce a limited reaction in broadband consumption. This means that only a minimal distortion in resource allocation and overall economic welfare will be generated by the inclusion of broadband internet access services in the contribution base. Ultimately, this implies that even if broadband service revenues are included in the USF's contribution base and do cause a potential price increase for broadband consumers, there will be limited reaction in broadband consumption and, hence, will generate minimal distortion in resource allocation and minimal reduction in overall economic welfare.

Over the last two decades, many studies have explored the demand for internet and broadband services by U.S. households. A 2020 NTCA Report offers a comprehensive survey of what researchers have estimated broadband elasticity to be and also offers its own updated estimate of broadband demand elasticity.⁶⁸ One key takeaway is that over time, the demand for high-speed internet access services has become more price inelastic. Table 1 summarizes some broadband demand elasticity estimates.

⁶⁶ See, FCC, "In the Matter of Inquiry Concerning Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion," GN Docket No. 20-269, FCC 21-18, Figs. 8, 11, released January 19, 2021, <https://docs.fcc.gov/public/attachments/FCC-21-18A1.pdf>; Timothy Moore, "How Much Does Internet Cost Per Month?" Forbes Home, updated August 21, 2023, accessed August 24, 2023, <https://www.forbes.com/home-improvement/internet/internet-cost-per-month/>.

⁶⁷ Stephen J. Blumberg and Julian V. Luke, "Wireless Substitution: Early Release of Estimates from the National Health Interview Survey, July-December 2022," National Center for Health Statistics, May 2023, accessed August 19, 2023, p. 5, <https://www.cdc.gov/nchs/data/nhis/earlyrelease/wireless202305.pdf>.

⁶⁸ See, NTCA-USF Study 2020; Michael A Williams and Wei Zhao, "NTCA-USF Study: Universal Service Contribution Methodology," Berkeley Research Group, December 13, 2022, https://www.ntca.org/sites/default/files/documents/2022-12/Williams-Zhao%20report_121322.pdf?utm_source=sendgrid&utm_medium=email&utm_campaign=Newsletters, ("NTCA-USF Study 2022").

TABLE 1: LITERATURE REVIEW OF BROADBAND ELASTICITY ESTIMATES OVERTIME

Specification	Year(s)	Methodology	Segment	Elasticity of Broadband
<i>Past Estimates</i>				
Kridel et al. (2002)	[1] 1999	Survey	U.S. households	- 1.08 to - 1.79
Varian (2002)	[2] 1998 - 1999	Experimental data	Faculty, staff, and students at UC Berkeley	- 1.3 to - 3.1
Dutz et al. (2012)	[3] 2005 - 2008	Discrete choice demand model	Top 100 Metropolitan Statistical Areas of the U.S.	- 1.53 to - 0.69
Glass and Stefanova (2010)	[4] 2005 & 2009	Survey	Rural subscribers	- 0.66; - 0.21
<i>Recent Estimates</i>				
Williams and Zhao (2020)	[5] 2019	Survey	U.S. adults	-0.08

Sources and Notes:

[1]: Don Kridel, Paul Rappoport, and Lester Taylor, “The Demand for High-Speed Access to the Internet: The Case of Cable Modems,” *Forecasting the Internet: Understanding the Explosive Growth of Data Communications* (2002): 11-22.

[2]: Hal R. Varian, “The Demand Bandwidth: Evidence from the INDEX Project,” in *Broadband: Should We Regulate High-Speed Internet Access?*, eds. Robert W. Crandall and James H. Alleman, (Brookings Institution Press, 2002): 39-56.

[3]: Mark A. Dutz, Jonathan M. Orszag, and Robert D. Willig, “The Liftoff of Consumer Benefits from the Broadband Revolution,” *Review of Network Economics*, 11(4) (2012).

[4]: Victor Glass and Stela K. Stefanova, “An Empirical Study of Broadband Diffusion in Rural America,” *Journal of Regulatory Economics*, 38 (2010): 70-85.

[5]: NTCA-USF Study 2020.

Elasticities between 0 and -1 are considered inelastic; elasticities greater (in absolute value) than -1 are considered elastic. As shown in the table above, recent estimates suggest that broadband demand is highly inelastic with an elasticity of -0.08.⁶⁹ This figure can be interpreted in the following way: a 10% increase in price will reduce the quantity of broadband subscriptions by 0.8%, or less than one-tenth the magnitude of the price increase. The recent gradual change from broadband demand being relatively more elastic to becoming more inelastic is consistent with how our society has increased its reliance on broadband.

C. The Impact of Including Broadband Internet Access Service Revenues in the Contribution Base

If only the current telecommunications revenues are included in the contribution base, then in the next five years, that segment of the market will pay nearly 50% of their revenues as a USF fee.⁷⁰ Including broadband internet access in the base changes this dramatically and leads to the contribution factor

⁶⁹ NTCA-USF Study 2020; NTCA-USF Study 2022.

⁷⁰ See, Figure 2.

ranging from 3.0% to 3.7% for the next five years. We expect these lower ranges will hold in the long-term as well due to the stability of the broadband market.⁷¹

TABLE 2: ESTIMATED CONTRIBUTION FACTOR WHEN INCLUDING BROADBAND REVENUES

		2021	2022	2023	2024	2025	2026	2027	2028
Revenue	[1]	\$237.9	\$246.2	\$251.8	\$257.9	\$264.1	\$270.5	\$276.8	\$283.1
Current Base	[2]	\$27.1	\$26.6	\$25.1	\$23.6	\$22.2	\$20.9	\$19.7	\$18.5
Broadband	[3]	\$210.8	\$219.6	\$226.7	\$234.3	\$241.9	\$249.6	\$257.1	\$264.6
USF Demand	[4]	\$8.6	\$7.4	\$8.9	\$9.6	\$9.8	\$9.8	\$9.8	\$9.8
Contribution Factor	[5]	3.6%	3.0%	3.5%	3.7%	3.7%	3.6%	3.5%	3.5%

Sources and Notes:

[1]: [2] + [3]. Note, we assumed [3] contained “Business Data Services” (BDS) revenues in the total. As to not double count these revenues, as they are already included in [2], we subtracted out the revenue from interstate and international “Local Private Line and Business Data Service.” See, “S.1.2 Revenue Details – Historical.xlsx,” 2022 Supplementary Material, <https://www.fcc.gov/general/federal-state-joint-board-monitoring-reports>. In 2021, this value was \$3.1 billion. We forecasted BDS services using the average growth rate in revenues from 2013-2021, -1.73%.

[2]: Projected USF contribution base assuming a -5.896% growth rate (average growth rate from 2013-2021). See, Figure 1 for details of our projection.

[3]: Statista, “Mobile Data – United States,” accessed August 14, 2023, <https://www.statista.com/outlook/tmo/communication-services/mobile-data/united-states?currency=USD>; Statista, “Fixed Data – United States,” accessed August 14, 2023, <https://www.statista.com/outlook/tmo/communication-services/fixed-data/united-states?currency=USD>.

[4]: White House, “Table 21-1 Federal Budget by Agency and Account,” FY 2022 President’s Budget Policy, p. 417, https://www.whitehouse.gov/wp-content/uploads/2021/05/21-1_fy22.pdf.

[5]: [4] / [1].

Additionally, even if broadband internet access service revenues are included in the contribution base, consumers will not face a significant price increase, as they will experience a decrease for the USF fee for their voice service, and this will offset some of the USF fee on broadband.⁷²

For example, assume for simplicity that all fees are passed through to the customer in all cases, and the average monthly fixed broadband bill in the U.S. is about \$70 per month.⁷³ The projected contribution

⁷¹ Cisco, “Cisco Broadband Index: Workforce Insights on Access to Internet Services,” 2022, https://www.cisco.com/c/dam/m/en_us/solutions/broadband/broadband-index/reports/Cisco_Broadband_Index_2022.pdf; Statista, “Mobile Data – United States,” accessed August 14, 2023, <https://www.statista.com/outlook/tmo/communication-services/mobile-data/united-states?currency=USD>; Statista, “Fixed Data – United States,” accessed August 14, 2023, <https://www.statista.com/outlook/tmo/communication-services/fixed-data/united-states?currency=USD>.

⁷² Of course, for any customers that currently only use broadband and are not paying any contribution to the USF, their contribution to the Fund will increase with the inclusion of broadband.

⁷³ FCC, “In the Matter of Communications Marketplace Report,” GN Docket No. 22-203, 2022 Communications Marketplace Report, FCC 22-103, released December 30, 2022, ¶ 38,

factor of 3.7% next year will imply an added fee of \$2.59.⁷⁴ If that broadband customer also has a voice line, the savings on the voice side will more than offset the increase on the broadband side. The average monthly VoIP bill is about \$20 per month, but only \$12.98 of that bill is subject to USF assessment.⁷⁵ At the current contribution factor of 29.2%, that average consumer's contribution to USF would be \$3.79, but only \$0.48 for voice services if the contribution factor was 3.7%, for a savings of \$3.31 per month.⁷⁶ A consumer with fixed voice and data would save, on average, \$0.72 a month.⁷⁷

Mobile data tells a similar story.⁷⁸ The average American consumer uses 15 GB or less of data every month and one gigabyte costs about \$2.75 in 2023.⁷⁹ This would lead to a contribution fee of \$1.53 per month for 15 GB of mobile data.⁸⁰ If that consumer also has a mobile voice line, the savings offset the broadband fee. For example the average mobile voice bill with no data plan for an individual is about \$20 per month, with \$7.42 assessable for USF.⁸¹ With a contribution factor of 29.2%, and assuming complete pass through, current mobile consumers are paying about \$2.17 per month in USF fees.⁸² If the contribution factor decreased to 3.7%, this fee would decrease to \$0.27 implying a savings of \$1.90 every month for a

<https://docs.fcc.gov/public/attachments/FCC-22-103A1.pdf>. See also, Peter Holsin, "How Much Should I Be Paying for High-Speed Internet?," August 10, 2023, accessed August 15, 2023, <https://www.highspeedinternet.com/resources/how-much-should-i-be-paying-for-high-speed-internet-resource>.

⁷⁴ \$2.59 = \$70 x 3.7%. Calculations are based on an assumption of complete pass through to the consumer and 100% inclusion of broadband revenues.

⁷⁵ Katherine Stone, "What is VoIP? Voice Over IP Explained," May 23, 2023, accessed August 15, 2023, <https://getvoip.com/library/what-is-voip/>; John Sarkis, "USF Safe Harbor Rate is Costing Carriers Money," Advanced Technologies and Services, Inc., August 10, 2021, accessed August 18, 2023, <https://blog.atso.com/usf-safe-harbor-rate-is-costing-carriers-money>.

⁷⁶ \$3.79 = \$20 x 64.9% x 29.2%. After the contribution factor decreases to 3.7% we calculate the consumer contribution to be \$0.48. Calculations are based on an assumption of complete pass through to the consumer and includes the interstate safe harbor of 64.9% for allocating the interstate revenue for the VoIP line per FCC allowance. See, John Sarkis, "USF Safe Harbor Rate is Costing Carriers Money," Advanced Technologies and Services, Inc., August 10, 2021, accessed August 18, 2023, <https://blog.atso.com/usf-safe-harbor-rate-is-costing-carriers-money>.

⁷⁷ \$0.72 = \$3.79 - (\$2.59 + \$0.48).

⁷⁸ In this example, we have examined mobile plans for data and voice separately as it is difficult to decompose the price of a bundled plan into its constituent parts.

⁷⁹ Maxwell Shukuya, "Do You Pay for Unlimited Data? You're Probably Wasting Your Money, According to a New Survey," June 26, 2023, accessed August 18, 2023, <https://blog.cheapism.com/why-you-dont-need-unlimited-data-survey/>.

⁸⁰ \$1.53 = 15GB x \$2.75/GB x 3.7%. This calculation is conservative as we take the high end estimate of usage.

⁸¹ Google Fi Wireless, "Flexible," accessed August 23, 2023, <https://fi.google.com/about/plans/flexible?numpeople=4>. Interstate safe harbor of 37.1% for allocating the interstate revenue for the wireless service per FCC allowance. See, John Sarkis, "USF Safe Harbor Rate is Costing Carriers Money," Advanced Technologies and Services, Inc., August 10, 2021, accessed August 18, 2023, <https://blog.atso.com/usf-safe-harbor-rate-is-costing-carriers-money>.

⁸² \$2.17 = \$20 x 37.1% x 29.2%. Calculations are based on an assumption of complete pass through to the consumer and includes the interstate safe harbor of 37.1%.

single wireless voice line.⁸³ A consumer with mobile voice and data would save, on average, \$0.37 per month.⁸⁴

In summary, with a contribution factor of 3.7% after broadband service revenues are added, for a single consumer, they save a total of \$5.21 per month on voice (fixed and mobile).⁸⁵ Adding broadband, their mobile and fixed services would have a new fee of \$4.12 per month.⁸⁶ Including broadband revenues saves consumers money even in the unlikely amount of 100% pass-through.⁸⁷

To the extent price increases from pass-through fees to broadband customers do materialize, given the broad base and consequently small contribution factor, the price impact is likely to be small.⁸⁸ Even so, the inelasticity of broadband demand implies that there is not going to be a large decrease in broadband demand as supported by recent studies of broadband demand elasticity.⁸⁹ In addition, the inclusion of broadband will automatically require high-income users with on average more expensive broadband plans to pay more into the contribution. Low-income users will on average pay less into the contribution. While it is true that this may also induce high-cost customers with costly plans to pay more into the USF, they are the primary beneficiaries and will benefit more than this in subsidies back from the fund.

V. Assessment of the Alternative Proposals for Expanding the Contribution Base

In August 2022, the Commission published its Future of USF Report to the Congress.⁹⁰ One of the most extensively debated subjects in the record was the possibility of modernizing the USF contributions system. Among others, there were two broad proposals that were advanced – (1) expanding the contribution base to include revenues from broadband internet access service, and (2) “broadening the

⁸³ $\$0.27 = \$20 \times 37.1\% \times 3.7\%$.

⁸⁴ $\$0.37 = \$1.90 - \$1.53$.

⁸⁵ $\$5.21 = \$1.90 + \$3.31$.

⁸⁶ $\$4.12 = \$1.53 + \$2.59$.

⁸⁷ Similar exemplary calculations can be carried out for family plans and the argument would hold for reasonable assumptions for plan prices.

⁸⁸ Note that increases could be experienced by consumers who don’t have fixed voice service. Based on our example, they would be paying \$2.17 in USF fees on mobile voice today, but would pay an additional \$4.39 on fixed broadband, mobile voice, and mobile broadband, an increase of \$2.22. FCC recent data indicates that over 40 million households purchase fixed (wireline) voice service; thus for these households there is a likelihood of savings arising from the decrease in fees on voice service. See, FCC, “Voice Telephone Services: Status as of June 30, 2022,” Office of Economics and Analytics, August 2022, p. 3, <https://docs.fcc.gov/public/attachments/DOC-396138A1.pdf>.

⁸⁹ See, Section IV.B.b.

⁹⁰ FCC USF Report 2022.

USF contribution base to include entities including ‘edge providers’ such as streaming video providers, digital advertising firms, and cloud services companies.”⁹¹ The former is consistent with our support for the proposal to expand the contribution base to include revenues from broadband internet access services (discussed in Section IV). However, the proposal to include new entities, such as edge services providers, comes in various forms and is not consistent with sound economic principles. It also ignores the institutional background and history of the USF which is important from an ease of administration of expansion and existing social compact (revenue from all services supported pay in, see Section IV.A).

The proposals in support of the inclusion of edge providers that we have examined fall under two related but economically distinct categories. First, proposals attempting to justify the inclusion of arbitrary edge provider entities; and second, proposals attempting to justify inclusion of edge entities with an internalization of externality narrative.⁹² Both categories stray away from sound economic principles and only provide selective assessments of whether the proposals being described are welfare improving. The proposal to charge edge providers suggests that charging digital advertisers a service fee for USF is an optimal way to expand the USF contribution base;⁹³ and another suggests that a plethora of large edge providers should be considered for assessing the contribution base,⁹⁴ and that certain streaming companies⁹⁵ should pay for broadband infrastructure needs of the rural broadband providers.⁹⁶ We discuss each of these categories in further detail below.

A. Assessment of Arguments for Expansion through Inclusion of Additional Entities

The arguments asserted in support for expanding the USF contribution base by adding additional entities and sectors are two-fold:

- Fees levied on new entities will not be passed through to downstream consumers.⁹⁷
- Fees levied on new entities will improve market efficiency by aligning incentives without causing any market distortions.⁹⁸

⁹¹ FCC USF Report 2022, ¶¶ 98-106.

⁹² Roslyn Layton and Petrus Potgieter’s submission suggests that “Big Streamers” should pay for the broadband infrastructure needs of the rural broadband providers. See, Layton and Potgieter Report, p. 27.

⁹³ Singer and Tatos Report.

⁹⁴ Strand Consult, “Broadband Cost Recovery: A Study of Business Models for 50 Broadband Providers in 24 US States,” June 2023, <https://strandconsult.dk/broadband-cost-recovery-a-study-of-50-broadband-providers-in-24-us-states-new-report-from-strand-consult/>, (“Strand Consult Report”).

⁹⁵ The Layton and Potgieter Report considers Alphabet, Netflix, Amazon Prime Video, Disney+/Hulu, Xbox Live, and YouTube Premium as the set of “Big Streamers.”

⁹⁶ Layton and Potgieter Report, p. 27.

⁹⁷ Singer and Tatos Report, pp. 37-40; Stand Consult Report, p. 36; Layton and Potgieter Report, p. 27.

⁹⁸ Singer and Tatos Report, pp. 41-42; Layton and Potgieter Report, pp. 26-27.

However, the evidence provided to support these claims does not actually support them. In fact, a more comprehensive economic assessment suggests the opposite. In contrast to the assertions that consumers will not pay USF fees if edge providers are included, it appears likely that the costs will be passed through to consumers, and the incentives of the considered edge providers, users of edge services, and the beneficiaries of the USF will be far from aligned. The set of edge providers explicitly being proposed to be included to the USF contribution base include Meta, Google, Amazon, and ByteDance as examples of digital advertisers,⁹⁹ and also a slew of cloud computing service providers such as AWS (Amazon), Microsoft Azure, Oracle Cloud, and Alibaba Cloud.¹⁰⁰

Any claims that levied fees will not be passed through to end consumers imply that the demand for that product is elastic.¹⁰¹ Economic theory states that cost pass through is low for goods that have elastic demand.¹⁰² This is because with elastic demand, if costs are attempted to be passed through via higher downstream prices, consumers will react by reducing consumption by proportionately more than the price increase, implying that passing through a bulk of any cost increases could likely reduce profits. Given this well-established economic fact, for the claims made in these proposals to be true, it must be that all of the edge providers mentioned must have very elastic demand and/or supply. That is, in the context of digital advertising, it must be that businesses that purchase digital ads consider digital ads to be very substitutable with other forms of ads. Some commenters, however, claim that the two largest digital advertisers have seen “near exponential growth.”¹⁰³ This is more indicative of the increasing importance and necessity of digital advertising to businesses, which implies that demand for digital advertising will become more inelastic overtime, increasing pass through of the fees to downstream consumers.¹⁰⁴ The internet’s ability to give businesses access to a large number of ad impressions for relatively little cost could have lowered prices, and perhaps greatly increased the quality of matches between buyer and seller.¹⁰⁵ In general, firms decide on a mode of advertising to attain consumer attention, market share,

⁹⁹ Strand Consult Report, p. 40; Singer and Tatos Report, p. 45. Singer and Tatos only identify Meta and Google as digital advertisers to target for funding USF. See, Singer and Tatos Report, p. 42.

¹⁰⁰ Strand Consult Report, p. 42.

¹⁰¹ For example, Singer and Tatos Report, pp. 37-40; Strand Consult Report, p. 36.

¹⁰² Robert S. Pindyck and Daniel L. Rubinfeld, *Microeconomics*, Seventh Edition (Pearson, 2009), pp. 338-339. Note that this is why we proactively discuss pass through induced price increases in our proposal. There is an inherent tension in discussing optimal taxation. As discussed above, taxing an inelastic base minimizes distortions, however, there is potential for a larger pass through.

¹⁰³ Singer and Tatos Report, p. 31.

¹⁰⁴ Levying taxes arbitrarily on digital advertisers could encourage digital ad providers to move from ad-supported content to subscription content. This would likely disproportionately impact low-income consumers.

¹⁰⁵ IAB, “Internet Advertising Revenue Report,” April 2022, https://www.iab.com/wp-content/uploads/2022/04/IAB_Internet_Advertising_Revenue_Report_Full_Year_2021.pdf; Hochman Consultants, “The Cost of Pay Per Click Advertising – PPC Trends and Analysis,” accessed August 15, 2023, <https://www.hochmanconsultants.com/cost-of-ppc-advertising/>; Gabriel Shaoolian, “Digital Marketing Can Generate a Lower Cost-per-Acquisition than Offline Advertising,” MarketingDive, accessed August 15, 2023, <https://www.marketingdive.com/ex/mobilemarketer/cms/opinion/columns/23700.html>.

and differentiate their products. This is economically beneficial and should be encouraged, not discouraged, through government fees. Note that this is an example of a sector specific positive externality (discussed in Section III.A) and if you follow the logic through to consider aligning these incentives through the USF, you would reach the conclusion that digital advertisers should receive subsidies to continue providing these services. Similar arguments apply to the other sectors and edge providers proposed as well. In other words, the well reported growth in all of these sectors imply that demand for these edge provider services is becoming more inelastic, not less.¹⁰⁶

Moreover, pointing to the recent booms in the innovative edge provider sector illustrates the volatility in this base and is not an argument for why these sectors should be levied a fee.¹⁰⁷ During a boom for a given industry sector, it may myopically appear as if that sector makes for a good contribution base for subsidy programs, but it is important for policy makers and economists to consider the long-run perspective. For example, many industry observers believe that the rise of generative AI will bring disruptive changes in the keyword and syndicated digital ads industry.¹⁰⁸ Potential disruptions such as these make it difficult to predict what the contribution base will look like in the future. In contrast, by including broadband internet access services in the USF contribution base, the USF will be more stable and predictable as any medium to long-term changes in how consumers may use the internet will not cause volatility in the contribution base.¹⁰⁹

Imposing a fee on specific uses of broadband to fund the USF will not align the interests of edge providers and USF beneficiaries. The first order impact of a fee imposed on such a specific use case for broadband will be to cause economic distortions.¹¹⁰ Tech companies invest heavily in research, development, and

¹⁰⁶ “Projecting the global value of cloud: \$3 trillion is up for grabs for companies that go beyond adoption,” McKinsey Digital, November 28, 2022, accessed August 17, 2023, <https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/projecting-the-global-value-of-cloud-3-trillion-is-up-for-grabs-for-companies-that-go-beyond-adoption>.

¹⁰⁷ Singer and Tatos Report, p. 53; Strand Consult Report, p. 36.

¹⁰⁸ Matt Levin, “As Search Engines Race to Incorporate ChatGPT Technology, Where Does That Leave Digital Advertiser?,” Marketplace, February 7, 2023, accessed August 15, 2023, <https://www.marketplace.org/2023/02/07/as-search-engines-race-to-incorporate-chatgpt-technology-where-does-that-leave-digital-advertisers/>; Nico Grant and Cade Metz, “A New Chat Bot Is a ‘Code Red’ for Google’s Search Business,” December 21, 2022, accessed August 15, 2023, <https://www.nytimes.com/2022/12/21/technology/ai-chatgpt-google-search.html>.

¹⁰⁹ Cisco, “Cisco Broadband Index: Workforce Insights on Access to Internet Services,” 2022, https://www.cisco.com/c/dam/m/en_us/solutions/broadband/broadband-index/reports/Cisco_Broadband_Index_2022.pdf; Statista, “Mobile Data – United States,” accessed August 14, 2023, <https://www.statista.com/outlook/tmo/communication-services/mobile-data/united-states?currency=USD>; Statista, “Fixed Data – United States,” accessed August 14, 2023, <https://www.statista.com/outlook/tmo/communication-services/fixed-data/united-states?currency=USD>.

¹¹⁰ The three examples that they offer for incentives being aligned are highly selective and are at best second-order effects. The examples of “aligned” incentives in the Singer and Tatos Report are: more connected underserved customers implies a larger audience base for digital ads, higher speed internet in underserved geographies mean that video ads can be played and keyword bids can be submitted without latency, and that

infrastructure to enhance their services and contribute to the adoption of broadband by enhancing the value of the service to the consumer.¹¹¹ The U.S. tech industry has been in the forefront of innovation with numerous start-ups contributing to technological advancements. Charging fees on specific use cases will distort these incentives and policymakers must be mindful to minimize such distortions. Recall that the FCC has explicitly concluded that any contribution methodology should be competitively neutral.¹¹² For example, a traffic-based contribution requirement on a streaming company can distort the market and skew the competitive landscape for video services. Streamers compete with traditional MVPDs (such as cable and satellite), and we have seen in an increase in consumers who are actively choosing to “cut the cord.”¹¹³ This is because streamers are providing a service that some consumers prefer over traditional MVPDs, and any distortion in relative prices that may revert this choice is an explicit harm to consumers who have cut the cord for streaming. In the long run, such distortion could result in streamers reducing investment, leading to less competitive video options for all consumers. In addition, there are traditional MVPDs who now only offer a streaming product—for example, WideOpenWest (WOW) no longer provides its own video service, and it now relies on YouTube TV as a video option for its subscribers. If the USF fee applies to streaming, these providers would be competing on an unequal footing with services that are substitutable to the consumer. In contrast, expanding the contribution base to include broadband internet access service revenues retains the relative price across various uses for broadband. Hence little market distortion is created in resource allocation.

In fact, the edge providers considered are digital advertisers, cloud computing, and streamers, and they all imply the type of market distortions that arise from having a narrow revenue base. A USF fee on some online uses and not others could distort how consumers use their broadband as they are incented through higher prices to choose services without the fee. For example, if there is a USF fee on streamers, but not on cloud providers, this could reduce the number of consumers who switch to streaming as a more affordable alternative to cable. Should the fee apply to cloud, but not gaming, then you would see a similar result—harms to the development, innovation, and investment in the cloud.

urban dwellers can take advantage of work from home opportunities and work in rural areas to benefit the local rural economy. See, Singer and Tatos Report, pp. 41-42.

¹¹¹ David Abecassis *et al.*, “The Impact of Tech Companies’ Network Investment on the Economics of Broadband ISPs,” Analysis Mason, October 2022, p. 4, <https://www.incompas.org/Files/2022%20Tech%20Investment/FINAL%20Analysys%20Mason%20Report%20-%20Impact%20of%20tech%20companies'%20network%20investment%20on%20the%20economics%20of%20broadband%20ISPs.pdf>.

¹¹² FCC, “In the Matter of Universal Service Contribution Methodology...” WC Docket Nos. 06-122 and 04-36, CC Docket Nos. 96-45, 98-171, 90-571, 92-237, 99-200, 95-116, and 98-170, NSD File No. L-00-72, Report and Order and Notice of Proposed Rulemaking, FCC 06-94, June 27, 2006, ¶ 6, <https://docs.fcc.gov/public/attachments/FCC-06-94A1.pdf>.

¹¹³ Tom Butts, “Cord-Cutting Accelerates, Hitting Record High in Q1 2023,” May 16, 2023, accessed August 15, 2023, <https://www.tvtechnology.com/news/cord-cutting-accelerates-hitting-record-high-in-q1-2023>; Daniel Frankel, “Cord-Cutting Spiked 60% in 2022 for the Five Biggest Remaining Publicly Transparent Operators in the U.S.,” February 8, 2023, <https://www.nexttv.com/news/cord-cutting-spiked-60-in-2022-for-the-five-remaining-publicly-transparent-operators>.

From an economic perspective, it is also the case that bringing in these edge providers to fund the USF directly is completely arbitrary as there are no externalities relevant to the USF (*i.e.*, providing connectivity to low-income consumers and/or high-cost areas) that need to be internalized from these edge providers. There are externalities unrelated to USF involved here. The edge providers mentioned in the above-referenced proposals (*e.g.*, streaming platforms, digital advertisers, and cloud computing services) can, and do, generate positive externalities for broadband networks and the internet ecosystem as a whole. These positive externalities increase broadband usage and increase the value of the network. However, it would be historically inconsistent and politically unprecedented for the USF to disburse subsidies to edge providers for popularizing and normalizing use cases of broadband and vice versa, even though it is inarguable that positive externalities were generated. Hence, going down the path of accounting for these sector specific externalities would be straying away from both economic principles and the historical and institutional construct of the USF.

B. Assessment of Arguments Claiming an Internalization of an Externality

We emphasize that consumers already pay for broadband infrastructure through their broadband subscription fees, and the USF already provides support for both the consumer and provider such that consumers are served. Thus, assessing edge providers would be tantamount to a double payment for an externality that consumers did not cause (*i.e.*, the externality here is that the geography is high cost to deploy resulting in difficult to achieve economies of scale required for efficiency, potentially in middle mile infrastructure). An additional fee on streaming could potentially discourage use, causing market distortions.

Despite this, some proposals suggest that certain streamers are imposing a congestion externality and causing rural broadband providers to face increasing capital and operating expenditures, and hence should be made to pay into the USF.¹¹⁴ However, notwithstanding the lack of support for this assertion, congestion issues do not necessitate government intervention by their nature.¹¹⁵ Indeed, there are private Coasian bargaining solutions to these problems as illustrated by the propagation of Content Delivery

¹¹⁴ Layton and Potgieter Report and Strand Consult Report.

¹¹⁵ It is not within the scope of this paper to criticize the survey methods and data collected by the Strand Consult Report. But it is worth noting that there are some clear inconsistencies with how the data was collected and used. For example, the report's definitions of revenues and expenditures seem inconsistent and incompatible for comparison by using revenue data for just home subscribers but using expenditure data for home and business subscribers. To this extent, we are skeptical of the quality and relevance of the data. However, the proposals laid out in the Strand Consult report are flawed at a conceptual level, even if one were to take the data as given.

Networks (“CDN”) owned by online content providers in recent years.¹¹⁶ Coasian bargaining describes an economic theory which states that with well established and enforced property rights, if parties are able to negotiate freely, externalities can be internalized by the parties privately contracting, without government intervention.¹¹⁷ These deals between streamers and internet service providers to effectively have the streamers pay for the incremental network infrastructure required to provide streaming services are a classic example of a Coasian bargain at work. Both parties realize that there is a benefit (in this context, streamers get more subscribers as the quality of their stream improves, internet providers get a less congested network for non-streaming users while also allowing subscribers to stream as much as they like) to coming to a deal that internalizes these negative externalities. Coasian bargaining implies that these parties will be able to figure out a contract to split the combined benefit. The split is facilitated by the streamer providing the sector with CDNs.

Congestion externalities in the context of streaming are only a potential problem in high-cost areas, and in most other geographies, as discussed above, they can be, and have been, resolved through private negotiations and contracting.¹¹⁸ The sub-segment of the market where these issues are suggested to be prevalent is just a small segment of the industry (e.g., incumbent telephone companies providing broadband in rural areas).¹¹⁹ For example, even in the proposal where this issue is brought up, the analysis only looks at rural broadband providers that are offering fiber to the home services,¹²⁰ and even of this sub-segment of the market, only examine four networks.¹²¹ Furthermore, given this analysis, there is no way to conclude if the increasing expenditures asserted in this analysis are just reflecting the natural lumpiness in capital expenditures or indicative of an on going problem due to purported externalities imposed by the consumption of streaming services.¹²²

This demonstrates that it is not an inherent issue between consumer demand for streaming services, streamers, and broadband provision. It is an issue of market failure from economies of scale and high-cost deployment, not broader sector specific negative externalities imposed by the consumption of streaming services. To the extent that the USF High-Cost programs may need to be modified to address market failures (e.g., allowed to cover middle-mile costs as currently USF funds for deployment are earmarked

¹¹⁶ Layton and Potgieter Report, pp. 5, 8; Optimal CDN, “Web Performance Optimization,” accessed August 15, 2023, <https://www.optimalcdn.com/en/content-what-is-a-cdn.php>; Mark Hoelzel, “Here’s Why Netflix And Google Are Pouring Resources Into Their Own Content Distribution Networks,” June 3, 2014, accessed August 15, 2023, <https://www.businessinsider.com/netflix-and-google-are-building-out-their-own-content-distribution-networks-2014-6>.

¹¹⁷ Hal R. Varian, “Intermediate Micro Economics,” Seventh Edition (Norton, 2006), pp. 630-632.

¹¹⁸ Even the Strand Consult Report states that rural providers’ economies of scale is the reason that CDN services cannot be purchased. This is not a streamer specific issue and the inclusion of streamers would be completely arbitrary. See, Strand Consult Report, pp. 17-18.

¹¹⁹ Layton and Potgieter Report, pp. 8-9.

¹²⁰ Strand Consult Report, p. 11.

¹²¹ Strand Consult Report, pp. 19-20.

¹²² Note the authors themselves point out that “Capital expenditure (capex) is somewhat irregular (and this can be attributed to the cyclical nature of investment).” See, Strand Consult Report, p. 23.

for last-mile support) that should be the focus of the discussion and further research. Discussions around the technical specifics of how the USF can be spent to achieve its mandate raise wholly separate issues; in this case they are not relevant to how USF should be funded. Even taking the claims about the consumption of content provided by certain edge providers creating negative externalities on a handful of rural broadband providers on its face, it does not make economic sense to require new entities and sectors to start contributing to the USF, which has a much broader, society-wide mandate.

VI. Conclusion

We find the current USF contribution base is narrow and distortionary. This is because over the last two decades there has been a broad and general shift in the industry from voice-based services to internet-based communication, simultaneously shrinking the contribution base and only covering a narrow segment of the market (*i.e.*, mostly voice services) in terms of who pays into the fund. Given this issue, sound economic principles state that the modernization of the USF should strive to make the contribution base broader, less distortionary, and predictable to improve economic efficiency and sustainability over time.

We find that expanding the contribution base to include revenues from broadband internet access service will achieve these goals. Broadband internet access service is ubiquitous and is an input to all specific uses of the internet, making it a broad and non-distortionary base. For this same reason, it is also stable and predictable in the medium to long-term, resisting fluctuations in specific internet industry trends.

We also find that, under plausible assumptions for service plan prices, consumers will not face a significant price increase and could potentially experience savings due to the decrease in the contribution factor on voice service. And to the extent any additional fees levied are passed onto downstream consumers, the burden will be increasingly borne by relatively more by high-income consumers.

We have also examined alternative proposals to include various edge providers in the USF contribution base. We find that these proposals are arbitrary and inconsistent with sound economic principles. We have not found any economically consistent reason that a particular edge provider industry should be included to fund the USF as the market failures and externalities generated by these providers are not society-wide, but are sector specific. Internalizing sector specific externalities has never been part of the USF mandate. In addition, singling out any sector to be included into the contribution base will necessarily cause a reshuffling of resource allocation, for consumers, businesses, and entities paying into the USF — imposing arbitrary distortions on the market. We find that arguments claiming that the fees will not be passed through to consumers are unfounded and contrary to empirical fact patterns, which show that edge provider services such as digital advertising and cloud computing are becoming more necessary and important, which sets the stage for increasingly inelastic demand and high pass-through rates to consumers.