Best Practices in Promoting Widespread and Affordable Broadband Service After the Covid-19 Pandemic

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ABSTRACT

During the Covid-19 pandemic, many nations undertook unprecedented efforts to promote affordable broadband service, even in remote locales. As the pandemic appears to have become more manageable, costly ad hoc programs have started to wind down. Without serious consideration of what universal service efforts remain necessary, both developed and developing nations risk a significant decline in broadband access, because carriers may not be able to handle operating expenses to serve rural households and businesses without ongoing subsidization from external sources. Likewise, low-income subscribers may not be able to afford monthly subscriptions for readily available service, absent retention of discounts offered during the pandemic.

Post pandemic, we no longer need to shelter in place, and to rely solely on wired and wireless technologies for remote access to education, healthcare, government services, social networks, ecommerce, entertainment, and communications. However, reversion to pre-pandemic conditions appears unlikely, as significant numbers of subscribers continue to prefer remote access, and some "bricks and mortar," in person services have not resumed, and might not ever.

This paper assesses post-Covid, universal service sustainability issues now that emergency funding programs have concluded, or soon will do so. The paper provides recommendations on how legislators, regulators, and policy makers can prevent a significant regression in progress reached before and during the pandemic. Best practices categories

addressed by the paper include both supply side efforts to increase broadband capacity and geographical reach, as well as demand side stimulation by promoting digital literacy, inclusion, and equity.

The paper also identifies ways governments can finance subsidy programs without creating an unfair and market distorting burden on specific types of carriers and consumers. The paper recommends legislation explicitly appropriating universal service funding from the national treasury. Second best alternatives identify ways to spread the cost over a large array of contributors, who collectively benefit from the program and individually would incur a manageable financial burden.

I. Introduction

Quality of life challenges presented by the Covid-19 pandemic emphasized the importance in achieving progress toward making access to voice and broadband [1] data services widespread and affordable. [2] The virus forced nearly everyone to shelter in place, and to access

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[1] The term broadband commonly refers to the speed that a data network can adequately transmit digital bits of information, both downstream to subscribers and upstream from them. "The term broadband commonly refers to high-speed Internet access that is always on and faster than the traditional dial-up access. Broadband includes several high-speed transmission technologies such as: Digital Subscriber Line (DSL); Cable Modem; Fiber; Wireless; Satellite [and] Broadband over Powerlines (BPL)." United States Federal Communications Commission, *Types of Broadband Connections*; https://www.fcc.gov/general/types-broadband-connections#:~:text=The%20term%20broadband%20commonly%20refers,Fiber.

[2] Mark Beech, *COVID-19 Pushes Up Internet Use 70% And Streaming More Than 12%*, FORBES (March 25, 2020); https://www.forbes.com/sites/markbeech/2020/03/25/covid-19-pushes-up-internet-use-70-streaming-more-than-12-first-figures-reveal/?sh=3e30db243104; Tyler Clifford, *Web traffic spiked 20% in one week amid coronavirus shutdown, Verizon CEO says*, Mad Money, CNBC (March 19, 2020); https://www.cnbc.com/2020/03/19/verizon-ceo-web-traffic-up-20percent-in-one-week-amid-coronavirus-shutdown.html; Colleen McClain, Emily A. Vogels, Andrew Perrin, Stella Sechopoulos, & Lee Rainie, Pew Resch., *The Internet and the Pandemic* (Sept. 1, 2021); https://www.pewresearch.org/internet/2021/09/01/the-internet-and-the-pandemic/.

education, healthcare, government services, social networks, ecommerce, entertainment, and communications via wired and wireless connections. [3]

[3] The global pandemic surfaced both the importance and availability of online connectivity as millions obliged the calls for physical social distancing and transitioned online for remote work, school, health care, government services, and regular communications with friends and family members. Yet, millions of other people still struggle with sustaining consistent access to broadband internet, especially low-income and rural populations. Where one lives also matters when it comes to the quality of their digital life, with more rural populations experiencing disconnects compared to urban populations in both online access and quality of life. At the pandemic's peak, vulnerable populations were restricted from various tasks, such as applying for unemployment benefits, engaging in distance learning, or scheduling and receiving vaccinations due to a lack of online access. Rural residents were more likely to be impacted by the disruption in their access to these very basic functions, and as a result, experienced higher rates of COVID-19 deaths due to the medical and social isolation they experienced before and throughout the pandemic." Nicol Turner Lee, James Seddon, Brooke Tanner, & Samantha Lai, Brookings Inst., *Why the federal government needs to step up efforts to close the rural broadband divide*, (Oct. 4, 2022); https://www.brookings.edu/research/why-the-federal-government-needs-to-step-up-their-efforts-to-close-the-rural-broadband-divide/.

Despite greater certainty about the need to bridge the so-called Digital Divide, [4] many rural locales in the United States, [5]and other developed and developing nations, [6] still have no

[4] "The digital divide has an overall negative impact on the economy and deepens income inequality. Without digital skills and knowledge of advanced technologies, citizens are unable to progress in their careers and contribute less to the country's economy.

As a result, the economy becomes less competitive. Companies that require advanced digital skills may outsource their positions to other regions, taking money away from a country's economy. The result is more people living in poverty, which in turn impacts the financial health of their nations.

Perpetuating exclusionary systems like the digital divide hinders future growth and societal harmony. To tap into a country's full economic potential, it is in the best interest of governments to take advantage of digital technologies and help citizens understand how to use them." Institute of Electrical and Electronics Engineers, Economic Effects of the Digital Divide: Unlocking Growth with Equitable Access; https://ctu.ieee.org/impact-of-the-digital-divide-economic-social-and-educational-consequences/.

[5] "Approximately 24 million U.S. households, or one in five, lack high-speed Internet service, preventing them from fully participating in modern life. Reliable, highspeed Internet service is vital to work, learn, and thrive in the 21st century. The COVID-19 pandemic highlighted what many already knew: broadband access is not a luxury; it is a necessity. As hybrid work, education, and other online services have become the norm, the need to provide high-speed Internet for all is imperative. Connecting the country will ensure that everyone can participate in the modern economy, facilitate inclusive growth, and enhance U.S. competitiveness on the global stage." Nat'l Telecomm. & Info. Admin., Off. of Internet Connectivity & Growth, 2022 Annual Report, 3 (March, 2023); https://ntia.gov/sites/default/files/publications/office_of_internet_connectivity_and_growth_2022_annual_report.pdf.

[6] "[O]nly 36 per cent of the population in LDCs used the Internet in 2022, compared with 66 per cent globally. As many as seventeen per cent of the population in LDCs did not even have access to a fixed or mobile broadband network, the so-called access gap. The remaining 47 per cent offline population, representing the usage gap, were facing other barriers, such as the affordability of ICT services. Accessing the Internet in LDCs is more costly than anywhere else. Int'l Telecommunication Union, Development Sector, *Facts and Figures: Focus on Least Developed Countries* (March 2023); https://www.itu.int/itu-d/reports/statistics/facts-figures-for-ldc/. *See also*, Joe Supan. *Report: 1 in 5 households is not connected to the internet*, Allconct (March 23, 2023); https://www.allconnect.com/blog/key-internet-statistics-for-2023.

terrestrial broadband option, [7] or lack a critical mass of residents with sufficient discretionary income and digital literacy skills. Addressing an even greater need for improved access, national governments achieved significant progress in bridging the Digital Divide during the pandemic, thanks to generous grants, subsidies, and loan guarantees. [8] For example, the United States Congress allocated over 90 billion dollars, [9] much of it quickly available in one-time grants. Unfortunately, few legislators, regulators, and policy makers have considered what to do after the pandemic becomes manageable and emergency funding programs wind down. [10]

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[7] For credible statistics on global and regional access to broadband, *see* International Telecommunications Union, Telecommunication Development Sector, Statistics; https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx.

[8] *See* Kevin Taglang, *Federal Broadband Support During the COVID-19 Pandemic*. Benton Inst. For Broadband & Soc. (Apr. 23, 2021); https://www.benton.org/blog/show-us-money-federal-broadband-support-during-covid-19-pandemic. For a compilation of current funding programs, *see* Nat'l Governors Assn., Broadband; https://www.nga.org/broadband/; Connected Nation, Funding Opportunities; https://connectednation.org/funding-opportunities/.

[9] "The Biden-Harris Administration is announcing new investments from the American Rescue Plan to help provide every American with access to affordable, high-speed internet. The American Rescue Plan funding [$25 billion] is in addition to the $65 billion investment in high-speed Internet access in the Bipartisan Infrastructure Law and recent announcements to lower the cost of high-speed internet for tens of millions of American families." The White House, FACT SHEET: Biden-Harris Administration Announces Over $25 Billion in American Rescue Plan Funding to Help Ensure Every American Has Access to High Speed, Affordable Internet (June 7, 2022); https://www.whitehouse.gov/briefing-room/statements-releases/2022/06/07/fact-sheet-biden-harris-administration-announces-over-25-billion-in-american-rescue-plan-funding-to-help-ensure-every-american-has-access-to-high-speed-affordable-internet/. *See also*, Connected Nation, Broadband Related Funding; https://connectednation.org/current-broadband-funding/ (estimating over $77.3 billion as of May 2022, not including past and future portion of the $350 billion allocated by the American Rescue Plan Act that includes a Coronavirus State & Local Fiscal Recovery Fund that states and municipalities can use to subsidize broadband access).

[10] For example, in the U.S., the FCC's Affordable Connectivity Program, is projected to run out of funds in the middle of 2024: "FCC Chairwoman Jessica Rosenworcel told reporters last month after a meeting that the agency expects the funding from the program to 'deplete' within the year." Cristiano Lima, *Biden's internet affordability battle looms*, THE WASH. POST, June 27, 2023; https://www.washingtonpost.com/politics/2023/06/27/biden-internet-affordability-

Notwithstanding compelling reasons to bridge the Digital Divide and robust identification of best practices categories, strategies, and tactics, [11] governments rarely achieve optimal results from substantial disbursements. [12]

The absence of a post-Covid universal service strategy constitutes part of a broader failing. Governments lack a cohesive, holistic assessment of what limits progress in making broadband ubiquitous and affordable, [13] as well as desirable to segments of society who historically have questioned the value in becoming broadband subscribers.

Governments have disbursed billions of dollars annually in universal service funding without achieving optimal results. Much of the funds target supply-side challenges that

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battle-looms/. The program currently provides low-income households with monthly discounts of $30 in most instances, and up to $75 in high-cost localities. Affordable Connectivity Program, WC Docket No. 21-450, Sixth Report and Order, FCC 23-62 (rel. Aug. 4, 2023); https://docs.fcc.gov/public/attachments/FCC-23-62A1.pdf (adopting rules implementing the Infrastructure Investment and Jobs Act, 47 U.S.C. § 1752(a)(7) mandating enhanced discounts available for monthly broadband services provided in high-cost areas by participants in the Affordable Connectivity Program). *See also*, FCC, *Affordable Connectivity Program*, https://www.fcc.gov/acp.

[11] *See, e.g.*, Arif Wismadi & Parvez Iftikhar, The ASEAN Framework for Next Generation Universal Service Obligation (USO2.0), ASEAN-ITU Project 2018-19 (July, 2019); https://asean.org/wp-content/uploads/2021/08/ASEAN-Framework-for-Next-Generation-Universal-Service-Obligation.pdf; Dr. Thomas A. Senaji, *Universal service: obligations and requirements in a collaborative digital economy*, Presentation at the Regional Economic Dialogue on Telecommunications/ICT for Africa, Lomé, Republic of Togo 9-11 September 2019; https://www.itu.int/en/ITU-D/Regulatory-Market/Documents/Events2019/Togo/Ses5_Thomas%20Senaji.pdf.

[12] *See, e.g.*, U.S. Government Accountability Off., *A National Strategy Needed to Coordinate Fragmented, Overlapping Federal Programs*, GAO-23-106818 (May 10, 2023); https://www.gao.gov/assets/gao-23-106818.pdf.

[13] *See, e.g.*, United States Government Accountability Office, *Affordable Broadband: FCC Could Improve Performance Goals and Measures, Consumer Outreach, and Fraud Risk Management*, GAO-23-105399 (Jan. 18, 2023); https://www.gao.gov/products/gao-23-105399.

governments consider best remedied with one time, facilities construction grants and recurring subsidies flowing to carriers. This technology-driven mindset assumes that if incumbent operators cannot make a business case to extend their networks into high cost, low density locations, then governments must use financial subsidies to augment or supersede marketplace forces. Supply-side initiatives also assume that if carriers have new incentives to install infrastructure in unserved or underserved areas, the residents will gladly subscribe.

Decision makers, with the power of the purse, have insufficiently addressed demand-side issues, such as the ability of rural households to afford monthly broadband subscriptions, plus the additional cost of digital devices, including personal computers, modems, routers, and wireless handsets. U.S. government decision makers appear unable or unwilling to address why fewer than 30% of low-income households, qualifying for a monthly broadband service discount, have applied. [14]

More broadly, few government decision makers appear interested in understanding the reasons why households do not subscribe to available broadband service and what tactics might increase digital literacy and knowledge of the opportunities and risks in accessing information, communications, and entertainment via the Internet. Additionally, it appears that government decision makers have not given much thought to universal service sustainability in a post Covid-19 pandemic environment where both service providers and subscribers must bear a higher

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[14] "The Federal Communications Commission's (FCC) Affordable Connectivity Program (ACP) provides the primary subsidy available to cover broadband subscription costs for low-income households, but only 1 in 4 eligible households have enrolled in the ACP since it launched in 2021." Anna Read & Kelly Wert, The Pew Charitable Trusts, *Enrollment Hurdles Limit Uptake for FCC's Affordable Connectivity Program* (Feb. 28, 2023); https://www.pewtrusts.org/en/research-and-analysis/articles/2023/02/28/enrollment-hurdles-limit-uptake-for-fccs-affordable-connectivity-program.

percentage of ongoing operational expenses while also financing frequently necessary network upgrades.

This paper identifies what local governments, and carriers must do to forestall likely, measurable declines in broadband geographical penetration and subscription rates achieved during the Covid-19 pandemic. The paper specifies reforms needed to make ongoing universal service subsidy programs sustainable and more effective in achieving additional progress in bridging the Digital Divide, as emergency grant programs wind down.

The paper has a second, equally important objective: considering universal service sustainability in terms of both supply-side and demand-side initiatives. Before, during, and after the pandemic, governments in the U.S. and elsewhere, have relied primarily on supply-side, technological solutions to broadband access and affordability. This strategy appears prudent, if so-called first and last mile connections are emphasized. Under this rubric, governments need to augment or supersede market forces that have left remote geographical locales unserved, or underserved. By emphasizing "shovel-ready projects," governments can generate more compelling financial incentives for incumbent carriers that heretofore deemed hinterland service unprofitable and not worth the bother, given the absence of sufficiently generous financial inducements.

Understanding the Multiple Factors in Bridging the Digital Divide

Bridging the Digital Divide is not simply a matter of increasing financial subsidies targeted at specific locations lacking broadband access:

> "There is no one digital divide. At a high level, the digital divide is the gap between those with Internet access and those without it. But the digital

divide is multifaceted and includes many factors such as access, affordability, quality, and relevance. . .." [15]

Best practices require national governments, carriers, and other stakeholders to create strategies that consider the universal service challenge from many templates. This paper questions the merits of emphasizing technology driven, supply side solutions. It recommends greater attention to the underappreciated benefits in demand-side stimulation of digital literacy, inclusion, and equity. [16]

Other strategic goals warrant consideration best summarized by the Broadband Commission for Sustainable Development, established in 2010 by the International

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[15] Charlie Muller & Joao Paulo de Vasconcelos Aguiar, Internet Society, *What Is the Digital Divide?* (March 3, 2022); https://www.internetsociety.org/blog/2022/03/what-is-the-digital-divide/.

"Here are some of the things that lead to disparities in Internet access:

- **Availability**: Is there available access to the Internet in your area? Is there a nearby point of connection to the Internet? If yes, this is just the first step to having Internet access.
- **Affordability**: Is that access affordable? How does the cost compare to other essential goods? What percentage of your income do you need to pay for access?
- **Quality of service**: Are the upload and download speeds sufficient for the local needs of Internet users?
- **Relevance**: Does the connected community have the necessary skills and technologies? Is there local interest and understanding of the relevance of Internet access? Are there locally available mobile apps? Is there content in the local language and relevant to the people in the community?

Additional divides: Other areas that can create digital inequality include security, interconnectivity, digital literacy, and access to equipment." *Id*.

[16] "The role of technology and importance of access to high-speed broadband has become glaringly obvious during the COVID-19 pandemic. High-speed Internet is a tool people rely upon to conduct the daily business of their life and interact with each other, the economy, and government. However, millions of people in the USA still have no home access to high-speed Internet. Low-income, people of color, older, Native Americans, and rural residents in particular are on the wrong side of the digital divide. This structural reality perpetuates social, economic, and political disparities. Consistent with a social work human rights approach, the United Nations General Assembly declared access to the Internet a basic human right in 2016." Cynthia K. Sanders & Edward Scanlon, *The Digital Divide Is a Human Rights Issue: Advancing Social Inclusion Through Social Work Advocacy*, 6 J. Human Rights Social Work, Issue 2, 130 (2021).

Telecommunication Union and the United Nations Educational, Scientific, and Cultural Organization. The Commission has developed a comprehensive list of targets for bridging the Digital Divide:

> 1) Make Broadband Policy Universal; By 2025, all countries should have a funded National Broadband Plan (NBP) or strategy, or include broadband in their Universal Access and Service (UAS) Definition;
>
> 2) Make Broadband Affordable; By 2025, entry-level broadband services should be made affordable in low- and middle-income countries at less than 2% of monthly Gross National Income (GNI) per capita;
>
> 3) Get Everyone Online; By 2025, broadband-Internet user penetration should reach: i) 75% worldwide; ii) 65% in low- and middle-income countries; and iii) 35% in least developed countries;
>
> 4) Promote Digital Skills Development; By 2025, 60% of youth and adults should have achieved at least a minimum level of proficiency in sustainable digital skills;
>
> 5) Increase Use of E-Finance; By 2025, 40% of the world's population should be using digital financial services;
>
> 6) Get MSMES Online; By 2025, improve connectivity of micro-, small- and medium sized enterprises (MSMEs) by 50%, by sector; [and]
>
> 7) Bridge the Gender Digital Divide; By 2025, gender equality should be achieved across all targets. [17]

Even if both governments and carriers can map and identify unserved and underserved areas, [18] the emphasis on installing wires and wireless towers may blunt the efficacy of parallel strategies. Billions of dollars could be spent on state of the art, "bleeding edge" technologies,

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[17] Broadband Commission for Sustainable Development, *What are the 2025 Broadband Advocacy Targets?*; https://www.broadbandcommission.org/advocacy-targets/.

[18] *See, e.g.*, Francella Ochillo, Ryan Johnston, Corian Zacher, & Lukas Pietrzak, Next Century Cities, *Broadband Mapping Across The US: Local, State, And Federal Methods & Contradictions* (May, 2021); https://nextcenturycities.org/wp-content/uploads/Next-Century-Cities-_-Report-on-Broadband-Mapping-Across-the-US-May-2021.pdf.

even though cheaper, less elegant technological solutions could reach far more rural residents. Mandating technological parity between rural and urban locales [19] could result in less progress in reaching the most remote locations. The duty to match network performance characteristics could obligate carriers to install fiber optic lines, that by nature offer blazing fast transmission service, but only to subscribers directly linked, i.e., "hard wired," to the network. Subscribers in rural locales typically are widely disbursed and many residences and businesses will not be located close to a single terrestrial conduit housing a fiber optic transmission line.

Best practices on the supply side should include a commitment by universal service funders to support technology agnosticism, a willingness to consider all technological options, rather than the newest and most expensive ones that could accrue least cost per subscriber scale efficiencies in urban areas, but not in rural locales. Installing older vintage technologies in the hinterland does not relegate users to inferior options, nor does it represent some sort of view that rural residents do not deserve optimal broadband access. In most instances, a decision to deploy something other than a fiber optic network represents prudent conservation of funds and the deployment of infrastructure able to serve the most potential subscribers dispersed over a wide expanse of territory.

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[19] In the U.S. and other nations, legislation and regulatory policy seeks equal access and uniform pricing for all residents regardless of the actual cost to provide service. § 254(b)(3) of the U.S. Telecommunications Act of 1996 states that: "Consumers in all regions of the Nation, including low-income consumers and those in rural, insular, and high cost areas, should have access to telecommunications and information services, including interexchange services and advanced telecommunications and information services, that are reasonably comparable to those services provided in urban areas and that are available at rates that are reasonably comparable to rates charged for similar services in urban areas." 47 U.S.C. § 254(b)(3), Pub. L. 104-104, 110 Stat. 56 (1996).

Additionally, solving the first and last mile challenge does not guarantee end-to-end connectivity between a remote broadband subscriber and the Internet cloud.[20] The wired or wireless network serving a subscriber must also interconnect with networks that provide "middle mile" [21] service between the remote network and other long-haul facilities eventually extending to data centers typically located in urban and suburban locales.

II. The Need for Best Practices in Both Supply-side and Demand-side Initiatives

Emphasis on supply-side, technology solutions can reflect an assumption that "if we build it, they will come," Older readers may recall the 1989 movie entitled *Field of Dreams* [22] where a rural Iowa farmer built a baseball field in the expectation that long dead superstars would return to life. Such suspension of disbelief served that movie well, but it will not solve universal service challenges. The demand side needs much more attention.

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[20] The Internet cloud refers to the vast array of interconnected networks that make up the Internet and provide users with seamless connectivity to these networks and the content available via these networks. “The increasing functionality of the Internet is decreasing the role of the personal computer. This shift is being led by the growth of 'cloud computing'—the ability to run applications and store data on a service provider’s computers over the Internet, rather than on a person’s desktop computer.” William Jeremy Robison, Note, *Free at What Cost?: Cloud Computing Privacy Under The Stored Communications Act*, 98 GEO. L.J. 1195, 1199 (2010).

[21] "Middle mile infrastructure means any broadband infrastructure that does not connect directly to an end-user location, including an anchor institution; and includes— (i) leased dark fiber, interoffice transport, backhaul, carrier-neutral internet exchange facilities, carrier-neutral submarine cable landing stations, undersea cables, transport connectivity to data centers, special access transport, and other similar services; and (ii) wired or private wireless broadband infrastructure, including microwave capacity, radio tower access, and other services or infrastructure for a private wireless broadband network, such as towers, fiber, and microwave links." U.S. Department of Commerce, National Telecommunications and Information Administration, Internet for All, *Frequently Asked Questions and Answers Version 4.0 Enabling Middle Mile Broadband Infrastructure*, at 3; https://broadbandusa.ntia.doc.gov/sites/default/files/2022-09/Middle-Mile-FAQs_Version-4.0.pdf.

[22] *See* IMDb, *Field of Dreams*; https://www.imdb.com/title/tt0097351/.

Remarkably, government decision makers devote very little attention to this side of the calculus. The primary stakeholders, such as telecommunications companies, and even consumer advocates, emphasize infrastructure, i.e., installed physical plant, as tangible proof that the network is being extended into the hinterland. Decision makers blithely assume that all rural residents would gladly become subscribers if given the chance. The current statistics of subscribership belie this assumption. [23]

For a household to become broadband connected, one or more occupants must have ascended a possibly daunting and intimidating learning curve. Young, so-called Digital Natives, [24] instinctually have an aptitude for acquiring digital literacy skills, while others (Digital Immigrants) may struggle.

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[23] *See, e.g.*, Kathryn de Wit, The Pew Charitable Trusts, *Congressional Action Needed to Boost Efforts to Expand Broadband Access*, (April 6, 2023); https://www.pewtrusts.org/en/research-and-analysis/articles/2023/04/06/congressional-action-needed-to-boost-efforts-to-expand-broadband-access; Anna Read and Kelly Wert, *Broadband Access Still a Challenge in Rural Affordable Housing* (Dec. 8, 2022); https://www.pewtrusts.org/en/research-and-analysis/articles/2022/12/08/broadband-access-still-a-challenge-in-rural-affordable-housing. The Pew Charitable Trusts, *21 Million Americans Still Lack Broadband Connectivity* (July 10, 2019); https://www.pewtrusts.org/en/research-and-analysis/fact-sheets/2019/07/21-million-americans-still-lack-broadband-connectivity; Fed. Comm. Comm'n, *2020 Broadband Deployment Report* (April 24, 2020); https://docs.fcc.gov/public/attachments/FCC-20-50A1.pdf; The FCC acknowledged that between February, 2022 and July, 2022, the U.S. ranked 24th out of 26 representative nations in terms of wired and wireless broadband service costs. *Id*. at 213. *See also*, Nat'l Telecomm. & Info. Admin., *Switched Off: Why Are One in Five U.S. Households Not Online?*; https://ntia.gov/blog/2022/switched-why-are-one-five-us-households-not-online.

[24] "Digital natives have grown up with internet access, depend heavily on mobile devices, heavily consume social networking services, consider speed to be among the most important characteristics of digital products and services, and multitask across devices and between work and entertainment." Library of the Future, American Library Ass'n., Digital Natives; https://www.ala.org/tools/future/trends/digitalnatives#Notes%20and%20Resources; *citing* Saskia Schippers & Meike Mak, *Creating Outstanding Experiences for Digital Natives*, UX Magazine (July 24, 2014); https://uxmag.com/articles/creating-outstanding-experiences-for-digital-natives.

A. Digital Advantages and Disadvantages

At first glance, digitization appears to offer a better outcome for just about every private, commercial, social, institutional, and government transaction. Most of us have accepted the premise that a computer-enhanced, virtual encounter can offer an equal or better value proposition than the prior "real world," bricks and mortar experience.

What's not to like when a digital signal delivers four or more broadcast television channels within the same bandwidth previously used to provide a single analog channel? Broadband networks transmit digital bits at extremely fast speeds compared to what narrowband analog channels could handle. Our daily consumption of information, entertainment, news, data, commentary, and communications well exceeds what was readily accessible, and what networks could handle in the analog age.

Alas, it has become painfully obvious that digitization offers a mixed bag. Grand visions of consumer empowerment, personal sovereignty, and an enhanced value proposition [25] have overstated the upside, because offsetting, detrimental outcomes are commonplace and typically do not become apparent until well after an innovation has become widely adopted. Blind boosterism for an unfettered marketplace emphasizes how government oversight can thwart innovation, investment, and employment. Such a negative perception about the merits of government regulation favors the libertarian view that nothing should stand in the way of anything new and digital.

Digitization makes data an easily accessible asset, but it also tends to convert more interactions into a marketable transaction, including aspects previously considered private such

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[25] *See, e.g.*, John Perry Barlow, *A Declaration of the Independence of Cyberspace* (Feb. 8, 1996); https://www.eff.org/cyberspace-independence.

as one's location, wants, needs, desires, and affiliations. Do we want to have privacy and data treated as a marketable asset no different than bricks and mortar traded agricultural products?

Digitization promotes competition, because technology provides ways for global markets to develop, thereby reducing localized monopolies. However, it also creates "winner take all" [26] markets where a single firm can acquire dominant market share and exercise monopoly power. For example, in 2022, Amazon generated approximately 60% of all online retail purchases in the U.S. [27] While consumers may benefit from the scale and operating efficiencies Amazon has accrued, such market dominance risks conduct that raises prices and forecloses competition.

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[26] *See* Patrick Barwise, London School of Economics, *Nine reasons why tech markets are winner-take-all* (July 10, 2018); https://www.london.edu/think/nine-reasons-why-tech-markets-are-winner-take-all; Herbert Hovenkamp, *Antitrust and Platform Monopoly*, 130 YALE L. J., No. 8, 1952 (June, 2021); Rob Frieden, *Challenges to the Conventional Wisdom About Mergers and Consumer Welfare in a Converging Internet Marketplace*, 65 VILLANOVA LAW REVIEW, 479-521 (2020); https://digitalcommons.law.villanova.edu/cgi/viewcontent.cgi?article=3456&context=vlr; Rob Frieden, *Two-sided Internet Markets and the Need to Assess Both Upstream and Downstream Impacts*, 68 AMERICAN UNIVERSITY LAW REVIEW 713-760 (2019); http://www.aulawreview.org/two-sided-internet-markets-and-the-need-to-assess-both-upstream-and-downstream-impacts/; Rob Frieden, *How Internet Platforms Intermediaries Affect Competition and Consumers*, 20 NETWORK INDUSTRIES QUARTERLY, No. 3, 3-8 (June, 2018); Rob Frieden, *The Internet of Platforms and Two-Sided Markets: Implications for Competition and Consumers*, 63 VILLANOVA LAW REVIEW 269-320 (2018); https://digitalcommons.law.villanova.edu/cgi/viewcontent.cgi?article=3373&context=vlr.

[27] AOVUP, *Amazon US ECommerce Sales: 11 Mind Blowing Stats*; https://aovup.com/stats/amazon-us-ecommerce-sales/.

Digitization also encourages new pricing strategies, including free access to content that previously required one time, or recurring payments. [28] We belatedly have come to understand that free does not mean without cost. [29] Access to content requires consumers to give up something quite valuable: their personal data. Free web sites, such as Google and social networks like Facebook and Twitter, acquire, analyze, and offer for sale comprehensive dossiers about subscribers that advertisers can use to better target prospective consumers. Such "surveillance capitalism" [30] has generated quite serious, unanticipated outcomes, many of which

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[28] "SNAP, Reddit, Pinterest, TikTok, WeChat, Twitter, YouTube and thousands of other companies offer attractive free platforms, enabling commerce and communication. It is no secret that the value extracted by these companies lies in user data. In lieu of charging subscription fees or other forms of access payments, modern technology companies thrive on selling user profiles, sometimes anonymized, to third-party advertisers and to ecommerce vendors." Alex Alben, *Breaking Up is Hard to Do--Why Any Remake of Antitrust Law for the Digital Economy Should Advance the Principles of Consumer Protection* and *Free Competition*, 28 UCLA J. L. & TECH. 224, 266-67 (Spring, 2023) (citations omitted).

[29] "Modern data mining and predictive profiling techniques permit marketers to identify consumers well enough to target ads with at times uncanny precision, relying mainly or entirely on boring, non-sensitive data. Data mining entails using sophisticated computer programs to analyze large collections of data to find patterns that a human researcher could not identify. Predictive profiling starts with a deep analysis of everything an advertiser knows about existing purchasers and uses that information to decide what products to offer, and at what prices, to other individuals whose profiles "look like" those of previous customers. These targeted ads are designed to interest individual consumers, and can include offers at specific prices calculated to be just below what each individual consumer is willing to pay. This system works: targeted ads produce many times the "click-through rate" of untargeted ads, and have an overall "conversion rate" (clicked-on ads leading to sales) more than twice as high as untargeted ads." Christopher W. Savage, *Managing the Ambient Trust Commons: The Economics of Online Consumer Information Privacy*, 22 STAN. TECH. L. REV. 95, 103-4 (2019) (citations omitted).

[30] "Surveillance capitalism is the monetization of data captured through monitoring people's movements and behaviors online and in the physical world. Consumer surveillance is most commonly used for targeted marketing and advertising." Nick Barney, *surveillance capitalism*, TechTarget, Whatis.com; https://www.techtarget.com/whatis/definition/surveillance-capitalism; *See also*, Shoshana Zuboff, *You Are Now Remotely Controlled*, THE NEW YORK TIMES (Jan. 24, 2020); https://www.nytimes.com/2020/01/24/opinion/sunday/surveillance-capitalism.html; Shoshana Zuboff, *The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power* (2019).

are quite harmful to individuals and society. No wonder a significant number of households eschew or limit broadband access even though they could afford a subscription.

In many instances, individuals and society benefit from innovations that are faster, better, smarter, cheaper, and more convenient than what the analog world offered. At other times, the net impact ends up being riskier, sinister, slower, more expensive, less convenient, more burdensome, intrusive, and a dangerous threat to privacy, national security, and individual wellbeing.

Individuals and institutions need to acquire digital literacy skills and insights to understand the risks, rewards, opportunities, and threats when technological innovations substantially change the value proposition from many sorts of transactions. Additionally, they should understand how governments can stimulate access to affordable broadband, digital networks needed to ensure that everyone has opportunities to access broadband services. The Digital Divide refers to the lack of parity between individuals and communities ready, willing, and able to access broadband networks, and others having no affordable option, [31] or the skills and interest required to make such access worthwhile.

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[31] "Nearly a third of Americans who do not have broadband say the reason is because it costs too much. There are federal programs designed to help. For example, the FCC's Affordable Connectivity Program offers monthly discounts on broadband service to eligible households. As of September 2022, more than 14 million households had enrolled—about a third of the estimated eligible households. We looked at this disconnect and found that the FCC could strengthen the program with better consumer outreach (including to those with limited English proficiency) and better fraud protection. Taking these steps may make more eligible households aware of the program and how to receive the discounts on their monthly internet service bills." U.S. Gov. Accountability Off., *Closing the Digital Divide for the Millions of Americans without Broadband* (Feb. 1, 2023); https://www.gao.gov/blog/closing-digital-divide-millions-americans-without-broadband.

Digital Natives rely on broadband network access as an essential, daily part of their lives. They have an instinctual understanding of how to operate devices, software, and all sorts of new and emerging technologies. They may overestimate the benefits and underestimate the costs of broadband access, but the "court of public option" clearly favors near constant use. Similarly, they appear to underestimate the value of their personal data and the consequences of reduced privacy.

Other segments of society may share Digital Natives' enthusiasm, but significant numbers do not. [32] Even when cost and accessibility present no barriers, many people have opted out, or limit their reliance on, and use of broadband applications, software, services, and content. One should not dismiss this attitude as Luddite opposition to progress and ignorance about the substantial value proposition presented by broadband. Plenty of people, conducting a personal cost benefit analysis, have determined that it is not worth the bother to ascend a digital literacy learning curve, often steep, costly, and frustrating. Non-subscribers also may have a greater appreciation for what they must relinquish including: less privacy, inadequate data protection, limited freedom to be left alone and anonymous in financial and other transactions, and perhaps even a decline in the sense of wellbeing.

Digital Immigrants, risk missing out on quality-of-life enhancements, and increasingly, may lack fundamental skills necessary to execute essential transactions over digital networks that

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[32] "Consistent with our previous findings, offline households citing either lack of interest or expense as the main reasons for non-use were more likely than their online peers to make less than $25,000 per year, and their reference persons were more likely to be people of color, and to have lower educational attainment." Michelle Cao, U.S. Dep't. Commerce, Nat'l Telecomm. & Infor. Adm., *Switched Off: Why Are One in Five U.S. Households Not Online?* (2022); https://www.ntia.gov/blog/2022/switched-why-are-one-five-us-households-not-online. Carmen Ang, Visual Capitalist, *United States Internet Adoption in America: Who Isn't Online Yet?*, (Aug. 7, 2023); https://www.visualcapitalist.com/internet-adoption-in-america/.

may replace "bricks and mortar" options, or constitute the preferred and more convenient procedure. Examples include: online renewal of automobile registrations, including printout of the necessary documents every driver must possess; online papering of travel, entertainment, and other ecommerce transactions; telehealth; and pandemic triggered remote, broadband access to education, government services, social networks, and streaming video.

The costs, benefits, opportunities, and risks of digitization became more immediate and acute during the Covid-19 pandemic. [33] With most people in the United States and elsewhere sheltering in place, a broadband connection provided a vital lifeline link to content, applications, software, and services ranging from mission critical to boredom abating. As person-to-person interaction presented a serious threat to one's health, virtual, broadband-mediated connections provided a safe alternative. With various degrees of ease, a large percentage of the population, in developed nations, increased their use of broadband networks and expanded the number and type of services accessed. Many people downloaded and used teleconferencing software, such as Zoom, as they quickly acquired the skills and made the compromises necessary to make virtual and remote interactions functional. Even as the pandemic has receded, many people are reluctant to return to the office, having become comfortable with remote access and reluctant to give up the financial savings and reduced stress in not having to make the daily commute.

For people lacking any broadband connection, or having one ill-suited for bandwidth intensive applications, such as streaming video, the pandemic exacerbated the Digital Divide. People with broadband access benefited by having opportunities to mitigate the consequences of

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[33] *See, e.g.*, Jamie Greig and Hannah Nelson, *Shifting Perspectives: How COVID-19 and In-Home Information and Communication Technology Impacted U.S. Residential Internet Perceptions*, 12 J. INFO. POL'Y 128 (2022).

having to shelter in place. They could engage in real time, full motion video links with family, teachers, health care providers, business associates, co-workers, counselors, advisors, and friends. Households without a broadband option, or the financial means to pay monthly broadband subscriptions for available services suffered greater deprivation and isolation. [34] These households may have had one or more wireless cellphone subscriptions, which while better than nothing, are qualitatively inferior when used for teleconferencing and other applications optimally displayed on a screen much larger than that offered via a mobile handset. [35] A "homework gap" [36] separated households with personal computers and large video display screens and households without these increasingly essential devices.

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[34] "COVID-19 has led to unprecedented limitations on people's mobility as governments have sought to curb the spread of the airborne virus and avert crises in unprepared health systems across the world. Following the varying levels of restrictions put in place globally at different periods throughout 2020 and into 2021, people have been forced to turn to e-learning, remote working, online shopping and even virtual funerals. The pandemic has opened the door to the use of digital technology in ways never before imagined and given real meaning to the prefixes "e-", "remote," "virtual," "online" and "distance." During this time, digital technology has been crucial – for those with access. While on the one hand, the crisis has led to the fast-tracking of digital adoption in countries that already had some level of digitalization; on the other, it has exposed digital inequalities, which are particularly large in less developed economies. Never has the impact of the digital divide been so glaring." International Telecommunication Union, Development Sector, *Financing universal access to digital technologies and services*, Executive Summary 1 (2021); https://digitalregulation.org/wp-content/uploads/Financing-universal-access-to-digital-technologies-and-services-2021-1.pdf.

[35] Philip M. Napoli & Jonathan A. Obar, *The Emerging Mobile Internet Underclass: A Critique of Mobile Internet Access*, 30 THE INFORMATION SOCIETY, Issue 5, 323 (Oct. 2014); https://www.tandfonline.com/doi/abs/10.1080/01972243.2014.944726.

[36] "Widespread home-based learning has highlighted a long-documented and persistent inequity of students that lack adequate broadband access. This digital divide, commonly known as the homework gap impacts millions of students." Nat'l School Boards Ass'n, *The Homework Gap*; https://www.nsba.org/Advocacy/Federal-Legislative-Priorities/Homework-Gap; *See also*, Jessica Rosenworcel, Notes from the FCC, *Addressing the Homework Gap* (Feb. 1, 2021); https://www.fcc.gov/news-events/notes/2021/02/01/addressing-homework-gap; FCC,

III. Universal Service Conceptualized in the U.S. and Abroad

Affordable and ubiquitous access to a telephone became goals soon after introduction of service in the central business districts of the most prosperous and densely populated cities throughout the world. [37] In the United States, AT&T championed universal service to achieve two objectives: to showcase its public service commitment, but also to obscure its strategy of acquiring potential competitors thereby bolstering its market dominance.

In 1907, AT&T President Theodore N. Vail highlighted the company's commitment with the phrase "One Policy, One System, Universal Service." [38] In application, this objective incorporated self-serving interests in promoting a benevolent Bell System "natural monopoly," [39]

Homework Gap and Connectivity Divide; https://www.fcc.gov/about-fcc/fcc-initiatives/homework-gap-and-connectivity-divide.

[37] "Universal service is the principle that all Americans should have access to communications services. Universal service is also the name of a fund and the category of FCC programs and policies to implement this principle. Universal service is a cornerstone of the law that established the FCC, the Communications Act of 1934. Since that time, universal service policies have helped make telephone service ubiquitous, even in remote rural areas. Today, the FCC recognizes high-speed Internet as the 21st Century's essential communications technology, and is working to make broadband as ubiquitous as voice, while continuing to support voice service." FCC, *Universal Service*, https://www.fcc.gov/general/universal-service. . "Enhanced and affordable access to ICT connectivity will deliver an expanding range of development interventions and public services, not only in urban areas but also in remote and rural areas for vulnerable groups in society." United Nations Economic and Social Commission for Asia and the Pacific, *The Impact of Universal Service Funds on Fixed-Broadband Deployment and Internet Adoption in Asia and the Pacific*, Executive Summary, 7 (Oct. 2017), https://www.unescap.org/sites/default/files/Universal%20Access%20and%20Service%20Funds.pdf.

[38] *See* Milton Mueller, *Universal Service in Telephone History: A Reconstruction*, 17 Telecomm. Po'ly, No. 5, 352-69 (July 1999), ; https://doi.org/10.1016/0308-5961(93)90050-D DOC69A; Richard R. John, *Theodore N. Vail and the Civic Origins of Universal Service*, 28 Bus. & Econ. Hist., No. 2, 71-81(Winter 1999).https://www.jstor.org/stable/23703321.

[39] So-called natural monopolies operate in markets where consumers would not benefit from competition. Government regulatory oversight is necessary to prevent predictable

despite its refusals to interconnect its network with other carriers and its acquisitions of many independent local exchange telephone companies. On the other hand, AT&T expressed a commitment to serve the national interest by expanding its service far and wide, thereby promoting economies of scale [40] and accrual of positive network externalities. [41]

In other countries, universal service started as a fundamental policy goal of the government. Many nations had government ownership of the telecommunications carrier, but subsequently opted to privatize the sector. [42] Other countries rely on private enterprise, but impose more comprehensive oversight based on the view that universal access constitutes a right of all residents.

IV. Universal Service Policy in the United States Before a Clear Statutory Mandate

In the United States, the Federal Communications Commission ("FCC") asserted statutory authority to promote universal service based on it general mandate to regulate interstate

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monopoly practices such as price gouging and erecting barriers to market entry when technological innovations could promote robust competition. *See* Milton Mueller, Universal Service : Competition, Interconnection and Monopoly in the Making of the American Telephone System (MIT Press 1997).

[40] Broadband subscription rates typically decrease as the technology matures and carriers serve more subscribers. Economies of scale refers to the ability of service providers to spread fixed costs over a larger user base, thereby reducing the per-subscriber expense.

[41] Telecommunications networks increase in value as the number of connections and subscribers increase.

[42] *See* Jonathan P. Doh, Hildy Teegen & Ram Mudambi, *Balancing Private and State Ownership in Emerging Markets' Telecommunications Infrastructure: Country, Industry, and Firm Influences*, 35 J. Int'l Bus. Studies, No. 3 (May, 2004); https://www.jstor.org/stable/3875147.

and foreign wire and radio. [43] The Commission first supported AT&T's unilaterally created and self-managed plan that deliberately underpriced local telephone service rates and generously compensated non-affiliated local companies for the use of their network facilities to originate and terminate calls made by AT&T customers. The term cross-subsidy refers to the strategy used by AT&T to offer below cost local service using higher than necessary pricing of long-distance service.

The FCC subsequently adopted the AT&T cost allocation strategy as wise public policy even though it distorted the marketplace for local and long-distance service. By intentionally underpricing local service, AT&T and other telephone companies could extend their networks into rural, high-cost regions. The FCC and in turn, state Public Utility Commissions, considered it just and reasonable for long distance users to help carriers build out their networks to serve localities with less population density and higher service costs.

V. Enactment of the Telecommunications Act of 1996

In 1996, the U.S. Congress codified the universal service mandate and required the FCC to establish an explicit subsidy mechanism. Section 254 of the Telecommunications Act of 1996[44] requires the Commission, in consultation with a Federal-State Joint Board comprised of

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[43] "The basic tenet of universal service has been a cornerstone of telecommunications policy for nearly a century. The 1934 Communications Act charges the Federal Communications Commission to 'make available, so far as possible, to all 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.' Over the years, Congress and the Commission have taken numerous steps to assist those who, because of geographic or socioeconomic difficulties, lack basic access to the nation's telecommunications network.". *at 808* Daniel A. Lyons, *Narrowing the Digital Divide: A Better Broadband Universal Service Program*, 52 U.C. DAVIS L. REV. 803, 805 (2018)(citing Communications Act of 1934, 47 U.S.C. § 151 (2021).

[44] 47 U.S.C. § 254(a)-(b).

FCC and State Public Utility Commissioners, to establish a comprehensive universal service financial support system to ensure that the largest number of U.S. residents possible has access to high-quality telephone service regardless of their household income or geographic location. The 1996 Act mandates transparency in universal service funding and specifies that only revenues generated by providers of telecommunications services must contribute to universal service funding, even though subsidies now support access to broadband data services.

The 1996 Act further authorizes the FCC to provide funding support for "advanced telecommunications capability" [45] that the Commission interprets as including broadband service, available to qualifying carriers operating in high-cost areas, low-income subscribers, schools, libraries, and rural health care providers.

VI. Overemphasis on Supply-Side Strategies

Supply-side strategies achieve progress in universal service by emphasizing technological solutions and the installation of broadband infrastructure in localities currently unserved, or underserved. These tactics require substantial investment both in terms of the capital expenditure in physical plant, as well as the labor needed to install equipment. Before the onset of low earth orbiting satellite constellations, technically capable of widely nearly ubiquitous broadband, [46] most supply-side investments involved terrestrial technologies. Wired conduits and

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[45] "The Commission and each State commission with regulatory jurisdiction over telecommunications services shall encourage the deployment on a reasonable and timely basis of advanced telecommunications capability to all Americans (including, in particular, elementary and secondary schools and classrooms . . .." 47 U.S.C. § 1302(a). *See also* Connect America Fund, 29 FCC Rcd. 15644 (2014), *clarified* 31 FCC Rcd. 2384 (2016).

[46] *See, e.g.*, Colby Leigh Rachfal, Congressional Rsch. Serv., *Low Earth Orbit Satellites: Potential to Address the Broadband Digital Divide*, R46896 (August 31, 2021); https://crsreports.congress.gov/product/pdf/R/R46896; Nils Pachler, Inigo del Portillo, Edward F. Crawley, & Bruce G. Cameron, *An Updated Comparison of Four Low Earth Orbit Satellite*

wireless towers extended existing networks farther into more remote localities with low population density and often difficult terrain, such as mountains, swamps, deserts, and islands.

It makes sense to emphasize the installation of equipment capable of providing broadband in areas heretofore lacking such infrastructure. However, governments may excessively rely on this strategy, because stakeholders have incentives to secure as much public funding as possible and to become the sole operating carrier, provided adequate subsidies are disbursed. Additionally, the "sunk" nature of new plant installation means that carriers do not generate any revenue until after they have heavily invested in infrastructure. Accordingly, governments must create financial incentives for a carrier to undertake a new plant construction project and to maintain service over time. This translates into the need for substantial startup funding for initial capital expenditures, as well as ongoing subsidies to defray operating costs, particularly if some or all subscribers do not pay fully compensatory monthly subscription rates.

Universal service funding can become a constant financial drain on households that must pay a surcharge on their monthly telecommunications service bills to support costly programs. "Compassion fatigue" can arise particularly when supply side programs are structured in ways

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Constellation Systems to Provide Global Broadband, 2021 IEEE International Conference on Communications Workshops (ICC Workshops), Montreal, QC, Canada, (2021); http://systemarchitect.mit.edu/docs/pachler21a.pdf; John Garrity & Arndt Husar, *Digital Connectivity and Low Earth Orbit Satellite Constellations: Opportunities for Asia and the Pacific*, Asia Development Bank, Sustainable Development Working Paper Series No. 76 (April, 2021); https://www.adb.org/sites/default/files/publication/696521/sdwp-076-digital-connectivity-low-earth-orbit-satellite.pdf; Steven S. Ross, *Bandwidth Hawk: Low-Earth Orbit Satellites: Great Idea but Not for Everything – And Not Cheap*, BROADBAND COMMUNITIES MAG. (Nov./Dec. 2020); https://www.bbcmag.com/rural-broadband/bandwidth-hawk-low-earth-orbit-satellites-great-idea-but-not-for-everything-and-not-cheap#:~:text=It%20means%20the%20marginal%20cost,launch%20as%20many%20as%2042%2C000; FiberRise, *5 Reasons Fiber Internet Is Better Than LEO Satellites*; https://www.fiber-rise.com/5-reasons-fiber-internet-is-better-than-leo-satellites/.

that necessitate ongoing subsidization with no possibility that a universal service mission can be reached before funding programs winding down and eventually terminate. [47]

It appears that stakeholders can become infatuated with cutting edge technology, ill-suited for service in remote areas with limited demand. Public policies, mandating parity in terms of access to technology and subscriber out of pocket costs, can thwart progress. Not every remote region can have access to multi-gigabit per second bit transmission service like that provided by fiber optic networks in areas with higher population density. A commercial business case cannot support the initial investment, and a program that augments or supersedes market forces should require analysis whether cheaper, less elegant technologies could suffice. For example, a single tower providing omnidirectional wireless broadband service can provide sufficiently fast data transmission speeds at a fraction of the cost to install fiber optic links to each remote household. [48]

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[47] *See* Rob Frieden, *Remedies for Universal Service Funding Compassion Fatigue*, 40 SANTA CLARA HIGH TECH LAW JOURNAL __ (2023)(in production).

[48] "**Where does fiber make more sense?**
Because of the shared infrastructure in a fiber network, the larger the number of customers per mile of network, the more "bang for the buck" the network will have. Terrain that limits the capabilities of a wireless network will mean that more tower locations will be required, making a wireless network far more expensive than it would be in wide-open flat areas. An aerial fiber network passing more than 20 homes per mile could be cost-effective versus a wireless network covering the same area.

Where does fixed wireless make more sense?
In open terrain, with few homes per mile, fixed wireless may be more cost-effective than fiber. Wireless can also work over water crossings or difficult terrain, or other locations where it is hard to get permits for fiber construction." Jack S. Burton, *Fixed wireless, FTTH or satellite? It depends...* LIGHT READING (June 7, 2021); https://www.lightreading.com/opticalip/fttx/fixed-wireless-ftth-or-satellite-it-depends/a/d-id/770028.

VII. What Demand-Side Strategies Can Achieve

Demand-side strategies achieve progress in universal service by emphasizing how individuals and society can benefit from widely available and affordable broadband. Rather than heavy reliance on technological solutions and disbursement of funds to broadband service providers, government execution of demand-side strategies can promote consumer interest in accessing services via broadband conduits. More people demanding broadband service can stimulate facilities-based carrier competition in densely populated markets and perhaps a greater willingness to consider serving less dense locales. With an emphasis on users, governments can promote digital literacy, i.e., the skills needed to achieve personal fulfillment and value from broadband access, as well as the ability to minimize harm from such activity.

The primary demand-side strategies to promote widespread and affordable broadband include: 1) Direct monetary subsidies to reduce the cost of a monthly broadband subscription, 2) User training with respect to cybersecurity, privacy, and other digital safety matters; 3) Remote learning or telehealth services and facilities; 4) Digital literacy and skill enhancement from beginner-level to advanced; 5) Computer science, coding, and cybersecurity education programs; 6) Broadband sign-up assistance and programs that provide technology support; 7) Multi-lingual outreach to support adoption and digital literacy; 8) Targeting segments of society that historically have lagged in subscribership; and 9) Using digital navigators and tutors to provide training and troubleshooting.

VIII. The Concept of Digital Literacy

Remarkably, the extensive literature on universal service funding lacks much consideration of demand-side strategies, and in particular how governments can encourage individuals to acquire necessary digital literacy skills. To fully accrue the benefits of broadband

access, while minimizing the risk of harm, individuals need to acquire a variety of competencies. These include generalized skills such as how to operate personal computers, laptops, tablets, and smartphones, conduct Internet searches, and use peripheral devices, such as printers, modems, and wireless routers. Specific and narrow proficiencies include the ability to download and install new software and applications, select content for streaming and downloading, and fill out online documents.

Even having ascended the learning curve to a moderate level of expertise, many broadband subscribers confront the need to acquire even more skills, such downloading and using a QR Code Reader for wireless tablets and handsets to access a restaurant's online menu. One cannot overstate the powerlessness and incompetency experienced by individuals lacking inherent, possibly instinctual, abilities to manipulate data and maneuver through the Internet cloud.

Governments need to devote more attention and resources to outreach and personalized tutoring, particularly for constituencies with perennially lower subscription rates, such as the elderly and people with heath challenges. Stakeholders generally agree that digital inclusiveness and equity [49] are worthy goals, as is the view that everyone should have affordable access to broadband services. Broadband access has become indispensable, obligating governments to

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[49] " [A]ll individuals and communities [should] have the information technology capacity needed for full participation in our society, democracy, and economy. Digital equity is necessary for civic and cultural participation, employment, lifelong learning, and access to essential services. When we use the word equity, we accurately acknowledge the systemic barriers that must be dismantled before achieving equality for all. " National Digital Inclusion Alliance, Definitions; https://www.digitalinclusion.org/definitions/.

promote fair opportunities for everyone to have "civic and cultural participation, employment, lifelong learning, and access to essential services." [50]

IX. The Individual Burden of Ascending the Learning Curve to Achieve Digital Literacy

Digital literacy requires significant time and effort by individuals to ascend a learning curve that can challenge Digital Immigrants. Outreach by governments and stakeholders can stimulate interest, but ultimately individuals must commit to undertaking the work needed to achieve competency. As set out below, the type of personal effort combines narrow, micro-level skills acquisition and a broader understanding of the vigilance and safeguards broadband users need to safeguard privacy, protect their online identity and personal data, and maintain a sense of wellbeing and security.

A. Micro-Level Competencies

At the micro-level, individuals need access to computers, tablets, smartphones, modems, routers, printers, and other devices. The skill in operating hardware combines with the ability to use the vast array of services, content, applications, and software available via broadband networks. As noted previously, digital literacy necessitates skills for maneuvering through broadband, digital networks to sources of content, data, and software. This requires understanding how to achieve a virtual connection and the differences between a "bricks and mortar" analog interaction and one that is digital and virtual.

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[50] *Id*. *See also*, Benton Inst. For Internet & Soc., *Visions of Digital Equity* (June 1, 2023); https://www.benton.org/visions-digital-equity; Infrastructure Investment and Jobs Act, DIVISION F—BROADBAND, Pub. Law 117-58 (Nov. 15, 2021); https://www.congress.gov/bill/117th-congress/house-bill/3684/text; (allocating $2.75 billion to promote digital inclusion and equity primarily allocations to state governments and a competitive grant program administered by NTIA); Dept. of Commerce, Nat'l Telecomm. & Info. Admin. Digital Equity Act Programs Overview (May, 2022); https://www.internetforall.gov/sites/default/files/2022-05/digital-equity-act-info-sheet.pdf.

Despite countless assertions that one need only "plug and play," to install equipment, software, applications, the actual undertaking often requires much skill and a little luck. This process rarely works seamlessly, but the digitally literate typically can achieve the desired outcome without great travail. In any event, "plug and pray" rarely suffices.

B. Macro-Level Competencies

A much larger array of skills, insights, and competency falls within a broader landscape. [51] Macro-level expertise addresses what individuals need to know about the broadband ecosystem span a broad range of issues. We need to understand that free access to social networks and other sources of content on the Internet does not come without costs to consumers and marketplace competition. [52] When one does not have to make direct, out of pocket payments for access, another replacement, our data, provides the necessary compensation. Much of what makes the Internet irresistible lies in the perception of a worthwhile value

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[51] The ITU's Capacity Development program seeks to promote " a digitally competent society where all people use knowledge and skills on digital technologies to improve their livelihoods. This is realized by developing capacities of ICT professionals, boosting digital literacy and skills of citizens, and developing knowledge resources." International Telecommunications Union, Telecommunication Development Sector, *Develop skills and knowledge to become a competent digital citizen*; https://www.itu.int/itu-d/sites/capacity-development/.

[52] Michael Kende, *The Flip Side of Free Understanding the Economics of the Internet* ISBN: 9780262045650, MIT Press (2021); Katherine Forrest, Competition Policy In'tl, *When "Free" Is Not "Free,"* (Sep. 20, 2021); https://www.competitionpolicyinternational.com/wp-content/uploads/2021/09/2-When-Free-Is-Not-Free-By-Katherine-B.-Forrest.pdf; THE ECONOMIST, *The "free" economy comes at a cost* (Aug. 24, 2017); https://www.economist.com/finance-and-economics/2017/08/24/the-free-economy-comes-at-a-cost; Daniel L Rubinfeld & Michal Gal, *The Hidden Costs of Free Goods: Implications for Antitrust Enforcement*, 80 ANTITRUST L.J. 521 (2015-2016); https://www.law.berkeley.edu/wp-content/uploads/2015/04/80AntitrustLJ521_stamped.pdf. John M. Newman, *Antitrust in Zero-Price Markets: Foundations*, 164 UNIV. PA. L. REV. 149 (2015).

proposition. Digitally literate broadband subscribers understand the desirability of their data to advertisers, data analytics firms, governments, criminals, and mischief makers. Advertisers and other persuaders covet data about our wants, needs, desires, location, and demographics, because such knowledge promotes more targeted and effective influence.

Other macro-level competencies include the ability to manage marketplace transitions such as the replacement of content scarcity and rationing with unmetered, "all you can eat," access on demand to a "long tail" inventory of video content. Despite massive upheaval, the traditional advertiser-supported marketplace for content appears resilient even as viewership migrates from cable and broadcast television to streaming video options delivered by broadband links.

Also at the macro-level, are legal, regulatory, and competition policy issues such as reliance on marketplace factors versus intervention by legislatures, courts, and regulatory agencies to remedy so-called market failure, conflicting rights and responsibilities of content creators, disseminators, and consumers, and the need for consumer safeguards and guardrails. governments also need to confront broader societal issues such as expansion of state and corporate surveillance of consumers, incivility, and challenges to civil society by disinformation. Additionally, we all should consider how digitization and the ascendency of broadband platforms, such as Amazon, Apple, Facebook, Google, and X (Twitter) have contributed to the decline of newspapers and local news outlets, and threated national security, and trust in the fairness of elections, media, and governments.

C. Future Proofing Digital Literacy

Maintaining digital literacy requires ongoing learning and acquiring new skills. The future broadband ecosystem likely will integrate into user-friendly services, a blend of sensors, monitors, algorithms, virtual and augmented reality, and artificial intelligence.

X. The Risk of Regression Post-Pandemic

One can anticipate a measurable decline in broadband penetration in rural locales and low-income households unless governments add funds to extend emergency funding after the pandemic becomes manageable. Broadband operators must generate sufficient revenues to defray ongoing operating costs while retaining some earnings for future upgrades. Additionally, a significant percentage of low-income households may have to abandon their subscriptions without continuation of programs that provide a monthly discount for broadband access by low-income households.

XI. What Governments Can and Should Do to Promote Universal Service

In addition to presenting a toolkit of best practices, several benchmark universal service strategies are worth highlighting, in addition to governments' fundamental role as financial underwriter. This section identifies best practices in structuring and funding a universal service campaign, followed by consideration of supply-side and demand-side factors.

The International Telecommunication Union and United Nations Educational, Scientific and Cultural Organization provide a helpful start with the work performed by their Broadband Commission for Sustainable Development. The Commission created a Working Group on 21st Century Financing Models for Sustainable Broadband Development that prepared a comprehensive roadmap for universal access to affordable and good quality broadband services. The Working Group offers a helpful, macro-level list of funding best practices:

> Ensure that the commercial broadband market is open and structurally prepared for competitive private investment.
>
> Reduce non-economic costs and risks of market entry and investment.
>
> Provide public/donor funding support for larger, high-cost infrastructure investments to reduce risk and increase commercial viability.
>
> Expand the market through government procurement and implementation of broadband based digital services, networks, and facilities.
>
> Provide direct funding support for extending affordable broadband access to commercially challenging rural and remote areas to women and low-income users under a Mobilizing Finance for Development approach.
>
> Increase ICT market commercial attractiveness through demand stimulation and affordability initiatives.
>
> Promote long-term sustainability by ensuring that appropriate technical skills to operate and maintain digital infrastructure are increasingly available on the African continent [and elsewhere]. [53]

Best practices in promoting progress in bridging the Digital Divide create incentives for new and incumbent carriers to expand supply-side broadband capacity and geographical reach. [54] Additionally, nations should embrace demand side strategies such as outreach, creating a fund for discounting the monthly broadband subscription rate paid by low-income households, and providing individualized tutorials and problem solving. [55]

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[53] Broadband Commission for Sustainable Development, *21st Century Financing Models for Sustainable Broadband Development*, Fig. 6.2, p. 52 (Oct. 2021); http://www.broadbandcommission.org/download/4323/.

[54] *See, e.g.*, International Telecommunication Union, *Universal Service Financing Efficiency Toolkit*; https://www.itu.int/itu-d/reports/regulatory-market/usf-financial-efficiency-toolkit/.

[55] *See, e.g.*, ITU-D Digital Inclusion, Ensuring inclusive, equal access and use of ICTs for all; https://www.itu.int/itu-d/sites/digital-inclusion/.

Governments should pay attention to the need to achieve greater efficiency, reduced waste and fraud, and optimal progress. A primary goal should be conservation of funds achieved by requiring project applicants to participate in so-called reverse auctions that require them to determine the lowest amount of government subsidies they need to meet specific deliverables established in a project proposal. [56]

Additional strategies include requiring specific, time sensitive deliverables with financial penalties and possible disqualification for failing to meet them. Funding government agencies with universal service funding responsibilities, such as the FCC, National Telecommunications and Information Administration, and U.S. Department of Agriculture in the U.S., should identify what type of program best serves a specific locale rather than have applicants make the determination based sole on the timing of an application and which agency administers the program. Currently in the U.S., the FCC primarily manages the four core universal service funding programs and some pandemic funding programs such as the Affordable Connectivity Program that provides low income households with a monthly $30 discount on their monthly broadband subscription cost. The Department of Commerce's NTIA disburses most pandemic funding, and the USDA provides bank-like loan guarantees rather than funding grants, as an extension of its rural electrification mission.

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[56] *See* Scott Wallsten, *Reverse Auctions and Universal Telecommunications Service: Lessons From Global Experience*, 61 FED. COMM. L.J. 373 (2009) (tracking use of reverse auctions to achieve universal service goals at the lowest cost); *see also*, High-Cost Universal Service Support, WC Docket No. 05-337, Order on Remand and Report and Order and Further Notice of Proposed Rulemaking, 24 F.C.C. Rcd. 6475 (2008) (early adoption in the U.S of reverse auctions to achieve more efficient disbursement of universal service funds); Sarah Oh Lam, *Using Reverse Auctions to Stretch Broadband Subsidy Dollars: Lessons From The Recovery Act of 2009*, 18 OHIO St. Tech. L.J. 301 (2022).

National legislatures should codify a national broadband mandate and direct the regulatory authority to establish a comprehensive plan, with specific goals, like that undertaken by the FCC in its 2010 National Broadband Plan. [57] A Broadband Plan should emphasize strategies for disbursing the lowest amount necessary, and reduce inefficiency and overlap on universal service funding by specifying which agency has jurisdiction over what types of initiatives. Best practices help determine when to use loan guarantees, one-time grants, recurring subsidies to carriers and subscribers, and reverse auctions [58] of project monetary awards.

A nation's legislature, executive branch, and regulatory authority should have a uniform strategy offering greater specificity and granularity than reiterating the statutory encouragement to use best efforts to achieve rural and urban parity in broadband rates, access to an Internet "for all," and universal "advanced telecommunication capability." If the legislature cannot or will not allocate the total amount of funds needed to achieve ubiquitous broadband access, then it needs

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[57] FCC, *National Broadband Plan* (March 17, 2010); https://transition.fcc.gov/national-broadband-plan/national-broadband-plan.pdf.

[58] " A reverse auction format selects winners based on the lowest bids. The FCC uses a reverse auction format in its auctions to distribute Universal Service Fund support to those entities willing to accept the lowest support amounts to provide required service to areas eligible for support.

In a descending clock auction, as its name suggests, the clock price starts high and descends in a series of timed bidding rounds. In each round, bidders indicate if they are willing to provide service to certain areas at the current support price level. When prices decline to the point that the current bids for support can be accommodated within the budget, the auction begins to assign support to the winning bidders in exchange for providing the required service to the areas specified in their bids. If more than one bidder requests support for the same area, additional rounds will be held, and support will be assigned to the bidder willing to accept the lowest price.

In this way, competition in the auction allows the FCC to target its limited Universal Service Funds to those areas — and within those areas, to those bidders — where service can be provided most cost-effectively." FCC, Auction Format; https://www.fcc.gov/auction-formats. *See* Scott Wallsten, *Reverse Auctions and Universal Telecommunications Service: Lessons From Global Experience*, 61 FED. COMM. L.J. 373 (2009).

to establish service priorities in terms of where, when, and how to achieve access and affordability for the highest number of households, located in the widest possible expanse of geographical locations.

Legislatures should identify what conditions warrant reliance on satellite service options that currently lag terrestrial service, such as fiber optics and terrestrial wireless services, including fixed cellular radio. Absolute parity between urban and rural quality of service, including a uniform benchmark of 100 Megabits per second ("Mbps") downstream and 20 Mbps upstream being proposed unilaterally [59] by FCC senior officials, [60]likely has a negative impact on overall availability of service. Unserved households would rather access single Megabit per second service than nothing at all.

National Regulatory Authorities should regularly assess what unused or underused radio spectrum can be allocated for wireless broadband use on an exclusive, licensed basis, shared with other licensees, or available for unlicensed use by the public. Additionally, the national legislature should preempt state, provincial, or local prohibitions on municipal and public utility broadband networks for locations where incumbent carriers have no intention of serving. Incumbent carriers should not have the ability to use legislation and the jurisdiction of state

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[59] *See* United States Government Accountability Office, *BROADBAND SPEED, FCC Should Improve Its Communication of Advanced Telecommunications Capability Assessments*, GAO-23-105655 (April, 2023); https://www.gao.gov/assets/gao-23-105655.pdf.

[60] *See* FCC, *Chairwoman Rosenworcel Proposes to Increase Minimum Broadband Speeds* (July 15, 2022); https://www.fcc.gov/document/chairwoman-rosenworcel-proposes-increase-minimum-broadband-speeds; FCC, *Rosenworcel Proposes Goal of 100% Access to Affordable Broadband* (July 15, 2023)(proposing a goal of 100 Mbps downstream and 500 Mbps upstream) https://www.fcc.gov/document/rosenworcel-proposes-goal-100-access-affordable-broadband.

public utility commissions to retain an open-ended option to change their mind. No private entity should have a right of first refusal in perpetuity.

National governments should emphasize demand-side programs addressing consumer affordability, particularly when ventures must raise rates to defray operating costs and network upgrades. Demand-side outreach promotes digital literacy and knowledge of available broadband service discounts by individuals, with access options, who heretofore have opted out.

A workable and successful model for outreach already exists: the labor intensive, hard work performed by librarians and tutors over recent decades to help Digital immigrants ascend the learning curve in the use of personal computers and maneuvering ("surfing") the Internet cloud, previously characterized as the World Wide Web.

XII. Conclusion

Governments throughout the world responded to the Covid-19 pandemic with emergency support for existing universal service funding programs and with new supplemental subsidies. The need for immediate action helped sustain broadband access that had become an essential lifeline when the virus forced most people to shelter in place. However, the haste in disbursing funds to carriers and subscribers triggered fraudulent grant seeking, duplication of efforts by multiple government agencies, and waste. By emphasizing shovel ready, supply-side programs, governments risked creating the impression that they were "throwing money at the problem" without a coherent plan to ensure maximum progress while the funding programs were in effect, and without much consideration for what to do after the pandemic became manageable.

On their own accord, and in response to ample and legitimate criticism, some governments have begun to evaluate the positive and negative aspects of their pandemic response. Now would be an ideal time for all governments and inter-governmental agencies,

such as the International Telecommunication Union, to identify best practices in bridging the Digital Divide and finally reach the goals of making broadband accessible, affordable, and widely available, if not ubiquitous.

This paper has demonstrated that universal service programs need to address both supply-side and demand-side issues, blending infrastructure deployment with programs to promote awareness of available subsidy programs, equitable access to broadband technology and services, and digital literacy.