

Closing the Digital Divide: A Historic and Economic Justification for Government Intervention

Executive Summary

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Abstract:

Access to high-speed Internet is essential for full and consequential participation in the civic, economic, and education systems of modern life. According to the Annual Broadband Adoption Survey, approximately 30% of Californians continue to lack “meaningful internet access” at home, creating a Digital Divide that is worse among already disadvantaged communities. As recent efforts have made access to the necessary broadband infrastructure near ubiquitous, this indicates alternative barriers to expanding the adoption of broadband technology. We explore the economic benefits of broadband adoption and historical precedence of government investment in utility infrastructure and adoption, arguing that government support for broadband must move beyond infrastructure deployment to further household adoption. We develop a framework for thinking about broadband adoption, applying it to the case of California to generate policy recommendations.

The full paper can be viewed at: http://spp.ucr.edu/publications/closing_digital_divide.pdf

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Summary

A full 31% of people in California lack meaningful access to the Internet. This Digital Divide prevents rural, lower-income, and disabled individuals from fully and meaningfully participating in the civic, economic, and education systems of California life in 2018. California's elected and regulatory leaders should address this technological disparity in order to prevent it from furthering the economic and educational divides that are in part generated by it.

The argument put forward in this paper is that government investment in broadband infrastructure and adoption for the purpose of closing the Digital Divide is in the public interest, has historic precedent, and will generate a net positive economic impact for the state; if the funding and policies are implemented correctly.

Using data from the 2017 Annual Broadband Adoption Survey conducted by IGS Berkeley, this paper lays out the magnitude of the Digital Divide and provides an in-depth examination of factors that contribute to the Divide and looks at which groups are most affected. The paper also introduces and defines the specific term: Meaningful Internet Access. The term embodies a dynamic concept to address the ability of an individual to utilize full functionality of the technology. Conceptually, it can be defined as the condition created by combining internet service, computing equipment, and digital literacy skills. The paper draws from other research to describe how the lack of such meaningful internet access negatively impacts people's lives, with a specific focus on employment impacts.

A common understanding of terms and definitions specific to this policy area is imperative, yet often lacking. Before proceeding to the analysis, the paper lays out the specific definitions necessary for a complete understanding of the analysis and policy recommendations. While some of the terminology used is familiar to policy makers at large – at least in a general sense – many terms have specific meanings when it comes to technology, current policy, and the existing literature. Conceptually, policy makers may know the term “broadband” refers to higher speed internet access. However, they may be unfamiliar with the specific – and slightly varied – definitions attached to the term by regulatory bodies, the industry, and researchers. Likewise, the term “access” is frequently used as catchall for people without the internet, but that obscures the magnitude of those with access who choose not to “adopt”.

With the scope and impacts of the problem laid out, the paper begins the analysis by presenting a chronologic discussion of public investment in utility infrastructure going back 200 years; from the Erie Canal to the broadband funding in the American Reinvestment and Recovery Act and the California Advanced Services Fund. This analysis clearly shows there is a long-standing precedent of public investment in utility infrastructure, both public and private. And, more specifically, there is ample precedent for government assistance with infrastructure deployment and household level adoption of communications technologies.

The paper includes an analysis of the economic impacts of broadband adoption and deployment. Though we cannot fully quantify the myriad of benefits that come with meaningful Internet access because of the expense and time involved, it is possible to shed light on the cost-effectiveness of such programs and speak to their desirability through the analysis engaged in here. First, the paper offers a list of the economic benefits generated by expanding meaningful access to broadband – a necessary first step for any attempts to quantify and value these benefits. Second, it offers an analytic method to review the existing academic literature that has calculated the return on investment of expanded broadband access. California specific data is then run through that methodology to derive California specific economic impacts.

In addition, the paper synthesizes the historic and economic analysis, and combines it with policy and programmatic assessments. Ultimately, the paper reaches the conclusion that greater government investment in broadband infrastructure and adoption, for the purpose of closing the Digital Divide, is in the public interest (and has public support), has historic precedent, and will generate a net positive economic impact for the state. Building on that, the final section of the paper sets forth specific policy recommendations for closing the Digital Divide.

The policy recommendations include an examination of the appropriate administrative body to oversee the program. The analysis yields two basic options: 1) place the program administration with an existing body or bodies, or 2) create a new entity for the purpose of administration. To determine which approach is best, these options are evaluated in

the context of their ability to most effectively and efficiently close the Digital Divide as quickly as possible to avoid additional or continued negative impacts. The analysis finds that option one is preferred as creating a new entity would result in significant delays while the entity is created. Further, of the existing state entities, the analysis finds that the CPUC is the place with the most appropriate expertise, skills, and jurisdiction to administer the funding for the programs. However, the administration of the actual programs is spread among many entities, including government, non-profit, and corporations.

Overview of Findings

Key Findings

- 3,882,584 households in California that lack meaningful internet access
- Of the total 3,263,865 (25.22%) are urban households, and
- 618,719 (4.78%) are rural California households who lack network access,
- Affordability of service and device are the biggest impediments to meaningful internet access in urban households,
- Public funding of broadband adoption and infrastructure yield significant economic benefits to the state,
- “Meaningful Internet Access” is the key concept for broadband adoption.

Status and Impacts of Digital Divide

- 31% of the overall California population lack “meaningful internet access” at home,
- 40% of rural Californians lack “meaningful internet access” at home,
- 43% of those making under \$40,000 per year lack “meaningful internet access” at home,
- 46% of Latino households lack “meaningful internet access” at home,
- 40% of those with disabilities lack “meaningful internet access” at home.

Additionally, these groups are far more likely to rely on a smartphone for their internet access. With data caps, miniature keyboards, small screens, and less than full versions of word-processing and other essential programs, smartphones fail the test to meet the definition of an appropriate computing device.

According to studies by the Pew Research Center and the Council of Economic Advisors, job seeker who use the internet find jobs more quickly and easily than those who do not. Additionally, those who use the internet to find a job tend to keep that job significantly longer than those who do not. There are similar impacts in educational outcomes and accessing government services.

Key Terminology

In trying to solve a problem, it is imperative to define and understand it. Since this paper’s goal is to look at solutions to close the “Digital Divide” it is key to provide a specific definition of it. The term Digital Divide is commonly used to describe the technology divide between those who are able to access the Internet via a home broadband connection, and those who don’t. While there is no official, governmental definition of the Digital Divide, a good general rule is to use statistical variation in populations as the principle. A divide can be deemed to exist if any segment of the population is 10 percentage points or more away from the population as a total (or average).

The second key term is “meaningful internet access”. This term describes a dynamic concept that addresses the functionality of the technology. Conceptually, it can be defined as the condition created by combining of internet service, computing equipment, and digital literacy skills. If any one of those three elements are missing, a person cannot be said to have meaningful internet access.

The paper also defines “dial-up”, “broadband”, “access”, and “adoption” so that policymakers can all be working from a shared set of terms and definitions.

History of Public Investment in Utility Infrastructure

Utilities in California and the United States have a long history of regulation and public investment. A consistent line can be traced from the canal and railroad systems, to the electricity grid, through the interstate highway system and the telephone network, and all the way to cellular telephones and broadband infrastructure. Public funding has played a key role in the development and deployment of utility infrastructure in the United States for the past 200 years.

- One of the earliest examples of public funding of utility infrastructure is the Erie Canal, which began construction in 1817. The canal cost \$7 million to construct,¹ and generated over \$121 million in revenue over its 57 years in operation.²
- The B&O Railroad was created and funded by the Maryland General Assembly as an economic development tool in 1826³ to compete for trade with the Erie Canal.⁴
- The Assembly provided an initial \$3 million in funding. By 1954 the line was generating nearly \$3 million a year in profit and transported millions of dollars of goods to and from Baltimore.⁵
- In 1843, with \$30,000 in financial backing from Congress, Morse built a telegraph system connecting Washington, D.C. to Baltimore.⁶ That company turned into Western Union and grew from a valuation of \$10 million in 1864 to \$21 million the following year. By 1866, its capital stock value was in excess of \$40 million.⁷
- The Rural Electrification Act of 1936 appropriated \$50,000,000 for the first year of the program and \$40,000,000 per year for the next 8 years.⁸
- “Adoption Programs” were also funded by the Rural Electrification Act, as it allowed funds to be spent “...for the purpose of financing the wiring of the premises of persons in rural areas and the acquisition and installation of electrical and plumbing appliances and equipment.”⁹
- As recently as 2009, under the American Recovery and Reinvestment Act, \$7.2 billion was appropriated for the purpose of expanding broadband deployment and increasing adoption.

California Specific History of Public Investment in Utility Infrastructure

- The multibillion dollar California Solar Initiative (CSI), administered by the CPUC, provided significant subsidies to incent home-owners to install solar panels on residential roof tops.¹⁰
- The state viewed CSI as an economic development tool to help foster a competitive solar manufacturing and installation industry.¹¹
- Investor owned, CPUC regulated, private, for-profit water companies have received billions of dollars of public funding for infrastructure construction and repair.¹²
- Telephone corporations of a variety of sizes have received millions of dollars in subsidies through the California High Cost A and B Funds (CHCF-A and CHCF-B) administered by the CPCU.
- The CHCF-A was created to keep rural, voice telephone rates comparable to urban rates.

¹ New York State Canal Corporation. (2016). Canal History. Retrieved from <http://www.canals.ny.gov/history/history.html>

² Ushistory.org. (2018). The Canal Era. U.S. History Online Textbook. Retrieved from <http://www.ushistory.org/us/25a.asp>

³ Maryland State Archives. (2015). Department of Transportation: Origin. Retrieved from <http://msa.maryland.gov/msa/mdmanual/24dot/html/dotf.html#canals>

⁴ The North American Review. 1827 Boston: Frederick T. Gray. 25 (56): 62–73.

⁵ Stover, John F. (1987). History of the Baltimore and Ohio Railroad. West Lafayette, IN: Purdue University Press.

⁶ Anderson, J. Q. (2005). Imagining the Internet: Personalities, predictions, perspectives. Rowman & Littlefield

⁷ Ibid

⁸ Rural Electrification Act. (1936 <http://legisworks.org/congress/74/publaw-605.pdf>)

⁹ Ibid

¹⁰ California Solar Initiative. (2006).

¹¹ Assembly Committee on Utilities and Commerce. (2006) Policy Committee Analysis. Senate Bill 1 California Solar Roofs Initiative. Analysis Written by Edward Randolph, Chief Consultant. Published April 17, 2006.

¹² CalWatchDog. (2015). Feds, CA clash over funding private water projects. Retrieved from <https://calwatchdog.com/2015/01/19/feds-ca-clash-over-funding-private-water-projects/>

- In 2008, the California Advanced Services Fund was created specifically to offset the higher costs of broadband infrastructure deployment in unserved and underserved rural areas.

Economic Impact of Broadband Adoption

- Individuals who use the internet to search and apply for jobs find employment more quickly and stay employed longer than similarly situated individuals who do not.¹³
- Between 1970 and 1990, one third of per capita GDP growth was attributable to telecommunications infrastructure investments.
- As of 2006, the shift from dial-up internet access to broadband internet access accounted for \$14 billion in U.S. gross domestic product. And broadband overall accounted for \$28 billion.¹⁴
- A report on the benefits of broadband in the health care industry found that the US healthcare industry was able to save \$6.9 billion in 2005.
- Causal evidence shows that expanding access to broadband providers, from zero providers to 1-3 providers, positively impacted employment growth and establishment growth in the US by 6% and 5%, respectively, over the seven-year period from 1999 to 2006. These impacts were higher for less densely populated areas.
- A 2016 report estimated the impact of increased broadband penetration on GDP per capita in OECD countries found that, over the period 1996-2012, a 1% increase in the broadband penetration rate led to short run (1 year) and long run (2-5 years) benefit to per capita GDP of between \$391-\$1,474 and \$1,682-\$4,192.
- Applying the coefficients developed by Castaldo, Fiorini, and Maggi in 2016, show that a 1% increase in broadband adoption would lead to a short-term impact of \$475 to \$1,789 in California's GDP per capita.
- **CASF has an extremely high benefit to cost ratio** -- Scaling up the CASF **adoption** program to reach 1% of Californian households would cost approximately \$1.2 per capita, and the digital literacy training program would cost \$0.62 per capita. The lower end estimate indicates a \$475 per capita growth in GDP.
- Using CASF funds to increase **access** by 1 percentage point would cost approximately \$3.17 per capita to obtain the projected \$475 in increased per capita GDP.

Policy Recommendations

- Have the CPUC administer a program to obtain and invest public funds in deployment and adoption initiatives (including assistance with devices and digital literacy training).
- Further policies that change laws and regulations to promote sustainable deployment and adoption.
- Require significant public benefits as a condition of mergers and acquisitions.
- Have other branches of government and community anchor institutions include broadband adoption and digital literacy in the continuum of care and services they can provide.

¹³ United States. Executive Office of the President. Council of Economic Advisors. (2016). The Digital Divide and Economic Benefits of Broadband Access. Washington, D.C.

¹⁴ Greenstein, S. and McDevitt, R. (2011) The Broadband Bonus: Estimating Broadband Internet's Economic Value. Telecommunications Policy 35(7): 617-632