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How Can California Develop Policies that May Help to Mitigate Impacts of the Digital Divide for Rural Communities?

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# **Executive Summary**

This policy paper reviews previous literature which analyzed the impacts of the digital divide on rural communities. The literature review provides information from analyses that focus on seven key issue areas. Findings suggest that increasing network provider competition appears to be one of the more essential requirements for increasing broadband access but may be most difficult barrier to overcome. Expanding broadband will only be useful if it is affordable for rural populations and can potentially create economic growth for the community. There may also be physical barriers related to rural terrain which makes it expensive and challenging to expand this access as well as local resistance from communities. Digital literacy is important to keep in mind since expanding access will only be useful to various rural populations if the community understands how to make use of technologies. It will also be difficult to expand access due to inaccurate broadband mapping and regulatory capture, which favor provider networks as opposed to the communities that should be adequately served.

This paper also assesses various state and federal initiatives that attempt to close the digital divide for rural communities. The Governor’s approach has mainly focused attention on one-time funds to enable unserved students to receive devices and hotspots, which may not create sustainable impacts. The California Broadband Action Plan discussed many of the key findings mentioned previously including increasing internet speeds and analyzing federal mapping and data collection issues, but further consideration regarding provider competition should be made to expand access. State legislation was introduced this session attempting to ensure collaboration occurs across state and federal entities and discussed deployment milestones for providers. However, it would allow providers to dictate their own milestones which may not create the proper oversight necessary to appropriately expand access. Several federal initiatives provide small pots of funding for states but continue to allow providers to increase access in areas that will be more profitable. Federal issues such as this will likely impact statewide and local efforts to support rural communities. Finally, the paper suggests that California consider a more systemic approach opposed to piecemeal, one-time funding allocations to mitigate the digital divide in rural communities. Policymakers could develop legislative packages that are linked to one another to create change by operationalizing the broadband action plan. On-going and dedicated funding sources would need to be identified specifically for these purposes through the budget in a manner that can truly bring change for rural communities to access necessary and modern technologies.

# **Introduction to the Digital Divide**

When people speak about the digital divide, they are typically referring to the gap between those individuals who have access to the internet and devices (computers, cellphones, etc.) and those who do not have this access or have limited access. The digital divide is not a new concept and has become an increasing issue in the last several decades as people have become more reliant on technology to access information and manage their daily lives. However, this issue has been exacerbated due to implications of the COVID-19 pandemic, which has forced a large shift and reliance on telecommunication to mitigate spreading of the virus. Telecommunication is becoming the new standard practice across California as many organizations are shifting their operations to telework, students have shifted to distance learning to receive their education, and many people are accessing healthcare through virtual platforms.

The digital divide impacts communities differently. There is reason to think that those who live in rural areas across California may be especially vulnerable to its ill effects. According to Turner-Lee (2018), an estimated 55 million people lack access to broadband connection in the United States; around 25% of them live in rural areas. The costs to increase this access is high and it has been estimated by the Federal Communications Commission (FCC) that expanding broadband access to 98% of the country could total around $40 billion. Expanding access in rural areas is especially expensive mainly due to the varying physical landscape and proximity to telecommunication facilities.

In California, approximately 837,000 people live in rural areas and the poverty rate in these areas is 14.6%. Additionally, around 11.9% of the rural population in California has not completed high school, which is about 5.3% lower than those living in urban areas (California State Office of Rural Health, 2020). To frame the policy problem and identify appropriate policy considerations, it is important to keep in mind the demographic data regarding those who may be living in rural communities in addition to those who may be most heavily impacted by the digital divide. Minority populations, low-income individuals and those with lower educational attainment have limited access to technology and limited internet access.

Low-income households have lower rates of in-home internet connectivity compared with higher-income groups. Often, low- income households are more likely to depend exclusively on smartphones and other handheld devices to access internet in the home and have indicated that costs associated with internet access is a barrier (U.S. Department of Housing and Urban Development, 2016). As it relates to racial disparities, 82% of White adults in the U.S. reported owning a desktop or laptop computer, whereas 58% of Black adults and 57% of Hispanic adults in the U.S. reported owning a similar device. Additionally, 79% of White, 66% of Black and 61% of Hispanic adults in the U.S. reported having broadband internet access (Pew Research Center, 2019). This also aligns with findings stated above that rural areas in California have lower educational attainment and have higher rates of poverty than those living in urban areas.

Rural residents are also less likely to have multipledevices or services that enable them to go online than urban residents. Rural residents go online less frequently and survey respondents in rural areas were more likely to say that getting access to high-speed internet is an issue. Both low-income and higher-income rural residents shared concern about accessing high-speed internet as well as those that had varying educational attainment. Research continues to show that substantial segments of rural America lack the infrastructure needed for high-speed internet. Even with access in rural areas it is much slower and is not high-speed internet. Interestingly only 36% of rural adults say the government should provide subsidies to help low-income Americans purchase high-speed home internet service (Perrin, 2019).

Decreasing the digital divide for rural communities across California will likely require a multipronged approach. Research on this topic has identified several themes which include: (1) lack of provider competition; (2) economic impacts for rural communities; (3) broadband affordability; (4) rural terrain barriers and community resistance; (5) digital literacy; (6) mapping broadband issues; and (7) regulatory capture. The remainder of this paper will further articulate the various themes and issues to bridge the digital divide for rural communities. It will also discuss policy considerations and tradeoffs to consider, including evidence and criteria to determine the optimal path forward.

# **What Does Existing Research Indicate about Key Options to Lower the Digital Divide in Rural Areas?**

The use of technology itself creates wider gaps between higher and lower income groups since various forms of technology are often designed for higher-income individuals. For example, early adopters of technology are typically younger and have higher incomes than those who adopt technology later (Douglas, 2000). The differences in the use technology for rural versus urban communities at times shows that social status appears to be related to early adoption of technology. Those who adopt technology early on typically have higher educational attainment and findings show that one's income, age, and education are more strongly associated with the use of information technologies than geographical location (Douglas, 2000). However, rural communities have a wider gap in the use of technology regardless since access to high-speed, broadband is limited (Douglas, 2020).

## *Lack of Provider Competition*

The rate at which broadband access is available and dispersed across rural versus urban areas is not equal and the availability of high-speed internet is much lower in rural areas (Prieger, 2013). According to Parker (2020), creating competition or a potential threat of competition in the market is one way to bring service providers to rural areas and expand access. One significant issue in expanding access in rural communities is that the demand may not be sufficient to ensure it is economically viable for providers to make investments in the area (Parker, 2020). Government agencies will also need to cooperate for investments to be made in these areas. For example, if government networks in rural areas are only serving government users, then the remaining sectors will be too small to incentivize investments into the community. Therefore, Parker (2020) concludes that all government agencies will need to develop shared broadband networks in a manner that will create incentives as well as serve the government needs in the area. The Telecommunications Act of 1996 allowed for large company mergers which created less competition among companies.

The federal provisions allow companies to provide services based on competitive business decisions and therefore do not need to provide services in some communities. For example, companies that provide high speed internet understand that they will have a greater return on investment if they provide services in more populated areas opposed to rural communities (Hindman, 2020). According to Prieger (2013), in the United States, greater competition and the number of providers in an area leads to higher quality speed and lower prices, even after controlling for other factors. Interestingly, the study also found that slow forms of fixed broadband are relatively well established across rural areas and that mainly it is high-speed broadband access that is lacking (Prieger, 2013). Across the United States, rural areas have fewer high-speed fixed and mobile providers but do have more slower-speed fixed providers than in urban areas. The gaps in broadband access were much greater for low-income households. Additionally, mobile broadband appeared to be filling gaps for rural areas where there may have been slower fixed broadband access.

## *Economic Impacts on Poverty and Monopolies*

According to Henry (2019), the advancement in technology more broadly has created space for the development of monopolies which has concentrated access of technology for those in larger urban areas. In an attempt to narrow income gaps, it would be important to spread advancement in technology to rural communities which could also help to reduce poverty (Henry, 2019). Rural businesses that may not have (or have limited access) to technology are not in a great position within a market that often relies on speed and adapting to changes based on demand. Rural communities could use technology to mitigate issues related to limited retail, education, and employment options. As it relates to retail options, in rural communities, local businesses have been replaced by larger conglomerates, such as Wal-Mart. Rural residents who may be unable to access those larger corporations could make purchases via internet, if, of course, they had internet access and devices. Available technologies could also help provide rural communities with news and other information to stay informed. However, some argue that mitigating gaps in the digital divide in rural communities may result in additional businesses moving out of the community. Hindman (2020), indicated that other researchers argue that expanding access in rural areas may create different forms of inequality like large corporations replacing local businesses. However, to participate in society today, access to technology is vital and internet may ultimately become the only way to access information including finding employment, communicating, purchasing decisions, and obtaining public information more broadly (Hindman, 2020).

According to LaRose et al., (2007), decreasing the digital divide in rural communities can increase social interaction and may reduce the number of individuals and businesses leaving the community. Increasing broadband access could generate economic opportunities by helping increase the number of businesses that operate in rural areas. Increasing rural broadband could mitigate negative impacts of rural life, such as increasing access to health care and education. There is some evidence that indicates broadband access had increased the utilization of online classes compared to those living in urban locations (LaRose et al., 2007). Broadband expansion in rural communities will inevitably help to sustain these areas but companies typically identify areas to invest that are higher income and urban to maximize their earnings. Broadband providers identify whether there will be a high rate of adoption before they invest in the area (LaRose et al., 2007).

In places like Colorado, shifting industries like coal to fiber brought back jobs in the area (Stauffer et al., 2020). Two coal mining companies had closed and around 1,000 people lost their jobs, adding to an already economically hard-hit area. Delta County, CO. had previously seen a large population decrease as residents attempted to find employment in other locations across the state. Additionally, because these areas also lacked broadband access there was limited economic growth as new businesses established their operations elsewhere. Delta County began to implement a broadband project that brought in a local couple who had started a fiber company several years prior and worked with a local electric cooperative. The companies began to hire and train local coal miners who had previously lost their jobs and were now tasked with installing fiber-optic cables across underserved communities. The broadband project was successful in increasing broadband access in the area and there was significant population growth over time in community (Stauffer et al., 2020).

## *Broadband Affordability*

Affordability of broadband remains an issue in rural communities which are disproportionately low income. Early research had shown that individuals would often indicate that one of the biggest barriers to accessing broadband was how expensive the service was; however, newer research has indicated that affordability is not as significant as it once was. This may be due to universal service support programs that help subsidized broadband for low-income earners. Low-income citizens can receive about ten dollars per month to help pay for broadband access either wired or wireless. Almost eleven million households in 2017 were accessing subsidies through the Lifeline Program. Additionally, some internet providers like Comcast are offering various packages to low-income households to make internet access more affordable. However, this could increase costs that taxpayers make for those individuals that are uninterested in adopting various forms of technology. It could be more economically viable to ensure that people who do not believe there is value in internet access have the skills to adopt and utilize technology (Levin and Downes, 2019). According to Hindman (2020), research indicates there are increasing gaps over time with metropolitan and non-metropolitan residents using technologies except for those who own home computers. This may mean there has been a decrease in prices for computers and more widespread adoption of various technologies. On the other hand, evidence suggests that there continues to be growing gaps for those who access internet to view the news or to purchase goods and services. (Hindman, 2020).

Although there are various programs that subsidize broadband access for low-income individuals, it is not clear whether these subsidies are enough to support access. According to Wheeler (2020), affordability continues to be a problem for low-income Americans to access internet in urban areas as well as in rural communities. Currently, our phone bills include an increasing monthly fee which is intended to support broadband expansion. The revenues from these fees are declining because the internet is replacing many telephone services that are no longer in everyday use and are becoming relatively old fashioned in the current age. This may mean that the revenues from phone bill monthly fees cannot support realistic subsidies to increase access so low-income individuals can pay for the appropriate level of internet access.

## *Rural Terrain Creates Physical Barriers to Increase Broadband Access & Rural Community Resistance*

As previously discussed, lower density rural areas often de-incentivize providers to expand access because they will accrue less profits in those areas. The greater distance and less density also creates issues when physically installing fiber lines in rural communities. It is typically much more expensive and difficult to install these technologies in areas that are embedded in or have surrounding mountains and areas that that are also heavily forested. Additionally, there are costs associated with connecting and installing a dedicated line that is intended to transmit a signal to and from an internet backbone which is usually located in or near urban areas (Congressional Research Service, 2019). For example, in places across West Virginia, one would not expect to find high-speed internet. There are areas that are surrounded by rocky, mountainous terrain with incredibly small populations. However, these areas have begun to have fiber-optic cables installed for the rural community’s residents to be able to access high-speed internet. Even though expansion of broadband access has begun, getting residents to adopt internet when they have not needed it before is a barrier (Maciag, 2018).

Some research argues that the majority of people in the United States who do not have broadband service could have it today, but they simply do not want it; it may be the case that resistance is especially strong in rural areas. According to Levin and Downes (2019), the main issue when attempting to decrease the digital divide is convincing those who are offline the value of various technologies. Those who may be unable and/or unwilling to utilize various technologies may contribute to their isolation from new ways of communication and financial dealings. There are national policies administered by the U.S. Department of Agriculture and the FCC to help expand internet access in rural areas across the nation. While these programs are intended to decrease the digital divide in communities it might only be appropriately implemented if individuals are both able and willing to help increase this access in their homes. However, other research indicates that policy solutions addressing broadband adoption in rural communities need to be reevaluated. Direct personal experience with internet is often a precondition for individuals to become willing to acquire broadband access in their homes. Therefore, LaRose et al. (2007) argue that promoting public access could help but may not be productive policies. Wireless services such as satellite systems may make the lack of infrastructure less of an issue when expanding access for rural communities but the emphasis on tradition rather than innovation could lead to resistance to ideas that are forced upon communities. The culture of resistance would be expected to persist as a barrier to adoption and use of information technologies (Hindman, 2020).

Issues related to broadband resistance may be unique to individual communities. For example, a report issued by the California Center for Rural Policy indicated that it took time to mitigate fear from marijuana growers in the Humboldt County area when expansion of broadband efforts had taken place (Hight, 2014). The Internet Provider Network staff were, “encouraged to talk with local residents at grocery stores and restaurants” (Hight, 2014, p.10). This provides an example of local resistance towards physical access to roads and properties when companies are installing fiber-optic links. Although growers in the Humboldt County area took some convincing, this may be an issue in other communities when attempting to access roads and property to expand broadband for the community. People may simply not want to provide access to their property to link other households and communities to higher-speed internet access.

## *Digital Literacy*

As a society we have become more reliant on various technologies and innovation in this sector has enabled individuals to use technology much more easily. However, digital literacy could still be an issue for different populations, including rural residents who may not have had increased access prior to broadband expansion. Digital literacy is defined as the ability for an individual to use technology to find, evaluate, create, and communicate which requires cognitive and technical skills. Vaughn et al. (2015), conducted a qualitative study with a relatively small sample size of several women who lived in the rural South to identify how the research participants obtained access and learned skills to utilize digital technologies. The research indicated that the participants had sponsors by which they learned how to use various technologies together and the participants showed a willingness to learn. “Sponsors of Literacy” as described by Deborah Brandt can help shape literacy through the relationship between learners and the individuals who may be helping them (Vaughn et al., 2015). The participants in this study had fewer formal sponsors but were developed naturally through their willingness to learn and resourcefulness to access and utilize devices in their daily lives. This research implies that even with access to technology individuals may not have the skill to use its benefits.

## *Mapping Broadband Issues*

According to Ali (2020), the FCC collects data to determine which areas of the country have broadband access. Data is collected twice a year from Internet Service Providers (IPSs) who submit this information themselves on a form to the FCC. However, the form submitted to the FCC is said to have three core issues that would not present accurate data related to broadband mapping. The first issue is that the data is represented by each census block opposed to specific households. In rural communities a single census block is significantly longer than it is in urban areas. Therefore, the ISP can provide data that indicates an entire block had broadband. The second issue is that the data is self-reported by ISPs and there are no audit procedures to ensure accuracy. This self-reported data is only based on the ISPs advertised speed instead of the actual speed that is being provided in the area. Lastly, the FCC considers satellite broadband fixed, but this form of broadband often struggles to meet the needs of rural communities (Ali, 2020). These issues have significant implications when attempting to identify and define broadband access for rural communities. If there are no checks and balances in place and ISPs are able to self-report data, the gaps in broadband access will look much smaller. If mapping does not properly present the areas are that are truly lacking for rural communities, policymakers will not prioritize this issue. There are also little incentives for the FCC to change their mapping forms or procedures since they can argue that the FCC and ISPs are meeting the needs of Americans (Ali, 2020).

## *Regulatory Capture or Policy Failure Impacting Broadband Advancement in Rural Communities?*

Simply put, regulatory capture means that the entity in charge of oversight may no longer serve the public interest and instead acts in a manner that benefits the entity they are intended to be regulating. For several decades, scholars have indicated that the FCC has protected the interests of telecommunication companies, such as AT&T (Ali, 2020). Although scholars have noted that the FCC has not been protecting the public’s interests, it has been difficult to prove direct causal links and regulators are able to deny these claims rather easily. Ali (2020) began to analyze some of the more significant policies that the FCC developed to enhance rural broadband to determine the level at which these policies failed rural communities. For example, the FCC defines broadband as always being “on” with a minimum download speed of 25 Mbps and an upload speed of 3 Mbps. However, this definition has been critiqued as much too slow to be helpful for communities. Additionally, the FCC defines internet access in a variety of ways including but not limited to fiber, fixed wireless, and satellite. The various ways to access internet are not equal but it is believed that policies cannot favor a certain technology to protect innovation. Therefore, the issue with slow speeds and various forms of technologies that may not adequately meet the needs of communities allows policymakers to be complacent and accept this level of limited access (Ali, 2020).

Other policies and programs were also developed which essentially gave the largest corporations funding without strings attached or promoting competition. The Universal Service Administrative Company (USAC) is a vehicle for rural broadband subsidies. Companies provide funds to enable broadband subsidies for low-income individuals and schools (among others). One of the programs that was developed to distribute these subsidies paid some of the largest companies who had been identified as serving rural areas and incentivized them by giving them money to build out their networks instead of creating competition. The service providers had the autonomy to request the amount of money that they needed and the had the autonomy to identify the area that they intended to serve. The companies chose to serve more populated areas to ensure additional profits and many companies failed to meet the limited requirements attached to these funds. The remaining money was put into a reverse auction for all eligible providers, but there was unequal distribution of funding and the largest providers were given funding without competition and minimal requirements to build out networks in rural communities (Ali, 2020).

# **Summary of Literary Findings**

The themes outlined above highlight key areas that will need to be considered and will help identify the appropriate policies that may mitigate impacts of the digital divide for rural communities across California. Increasing network provider competition appears to be one of the more essential requirements for increasing broadband access but will be relatively complex given the market structure in the United States. Expanding broadband will only be useful if it is affordable for rural populations and can potentially create economic growth for the community. There may also be physical barriers related to rural terrain which makes it expensive and challenging to expand this access as well as local resistance from communities. Digital literacy may not be as much of an issue in this era; however, expanding access will only be useful to various rural populations if the community understands how to make use of technologies. Lastly, it may be difficult to expand access due to inaccurate broadband mapping and regulatory capture, which favor provider networks opposed to the communities that should be adequately served.

# **Review of Various State and Federal Policies Aimed at Decreasing Gaps in the Digital Divide for Rural Communities**

## *Governor Gavin Newsom’s Approach*

The California 2020-21 Budget was enacted on June 26, 2020 and discussed the California Public Utilities Commissions’ (PUC) actions related to broadband expansion mainly focused on ensuring underserved students had access to necessary services and devices to enable distance learning. In April of 2020, the PUC allocated $25 million from the California Teleconnect Fund for hotspots and internet service for student households, while prioritizing rural, small, and medium school districts. The Budget also indicated that the PUC previously made $5 million available from the California Advanced Services Fund (CASF) to help cover costs for computing devices and hotspots. It appears that these funds were used for low-income communities and those who were English language learners. The 2020-21 Budget included $2.8 million to map areas that have limited or no broadband access and funded three positions for the PUC to carry out these activities.

The proposed January 2021-22 Budget highlighted the need for expanding broadband access to rural communities, indicating that approximately 33% of rural households in California do not have internet access. The Budget also critiqued the California Lifeline Program stating that it cannot meet the needs of those living in poverty throughout the state. To that end, the Budget touches on a five-year coordinated plan that will be conducted and implemented through state, federal, private sector, and regional organizations. The plan itself was not specified but the Budget reiterated directives made by the Governor in 2019-20 which ordered various state agencies to bridge gaps in the digital divide and began the California Broadband Action Plan initiative. The plan was finalized in 2020 and focuses on broadband availability, reliability, and affordability. The Governor’s executive orders prioritized vulnerable students to receive computing devices and hotspots. In 2020, the state had delivered approximately 73,000 devices and 100,000 hotspots to school districts across the state, prioritizing rural communities and underserved students. The order directed state agencies to increase broadband speeds in addition to accelerating mapping and data collection, funding, deployment, and adoption ~~​~~of high-speed internet. Some state departments were directed to provide an inventory of state property for possible use for broadband infrastructure based on criteria provided by relevant agencies to accelerate broadband deployment (Executive Order N-73-20).

## *The California Broadband Action Plan Initiative*

The plan was developed by the California Broadband Council (Council) and highlighted key areas and actions for California to conduct to expand broadband access and infrastructure. The Council is made up of key statewide representative including the Department of Technology, the California State Senate, the California State Assembly, the Superintendent of Public Instruction (among many others). The plan included modernizing broadband speeds and performance standards through various means including analysis of federal data issues to ensure accuracy. Funding was also suggested to be braided across state, federal and private sectors as a way to properly build out broadband infrastructure. Leveraging existing assets by improving permitting processes for projects may be accomplished through reoccurring meetings with local government agencies and service providers, as suggested by the Council (Tong et al., 2020). The Council acknowledged that reliability standards should be set for rural communities which would include analyzing gaps as a way to set standards and deployment timeframes. These standards would also include protecting consumers by analyzing telecommunication fees to minimize charges for the end user. The plan discussed convening relevant stakeholders to identify ways to overcome challenges, including key representation from libraries, schools, community organizations, and governmental and private sectors.

The Council made various recommendations. It suggested that the state increase broadband access by improving the California Lifeline Program which provides discounted services to eligible residents and increase participation from ISPs as well as leveraging existing broadband subside programs for residents. The Council highlighted the need for additional provider competition through developing parameters for communities to inventory infrastructure assets and make available template lease agreements (Tong et al., 2020). To ensure increased digital literacy skills, the Council recommended creating a stakeholder engagement process to include representation from different sectors as a way to identify needs and share resources. An additional recommendation related to digital literacy included the build out of a digital skills training program for those who may lack the ability to effectively use technologies. Improving broadband data and mapping was discussed in the plan as well as increasing appropriate transparency of data and mapping. The Council recommended collecting more specific household data to build out a public California Interactive Broadband Map. This recommendation also included the establishment of a statewide portal showing accurate broadband access data in an easily accessible manner. Other key areas for potential improvement outlined in the plan include providing technical assistance for entities attempting to deploy broadband when faced with various challenges in addition to bolstering partnerships for broadband infrastructure planning (Tong et al., 2020).

## *Functions of the California Public Utilities Commission (PUC) & the California Advanced Services Fund (CASF)*

The PUC administers the CASF which was established to help fund costs to bring broadband and high-speed internet throughout California. The PUC established the CASF in 2007 to meet California’s goals of closing the digital divide (Kinney, 2013). The CASF program was established to expand the work of both state and federal universal service programs. These service programs are intended to help cover expenses in more high-cost areas so that communities are connected to various technologies. The PUC indicated that there are high-cost areas that have no broadband due to terrain and low population density and the CASF program was intended to cover costs to expand this access (Kinney, 2013). In 2008, legislation was enacted to authorize the PUC to collect additional consumer fees on their telephone services to fund CASF grants to pay for broadband expansion projects. Initially grant eligibility was restricted solely to telephone companies, but in 2012, legislation was enacted to expand the eligibility criteria, including Wireless Service Providers who showed interest in providing broadband to rural areas (Kinney, 2013).

## *California Enacted Policies – Senate Bill (SB) 740*

In 2013, the State Legislature passed SB 740, major telecommunications legislation authored by then State Senator Alex Padilla. That bill broadened eligibility for the California Advanced Services Fund. Padilla indicated that the intent of the bill was to modify the CASF program and allow PUC to provide grants to entities that could expand broadband access in rural areas (Kinney, 2013). The bill specified that the CASF program would approve funding for infrastructure projects that would provide broadband access to no less than 98% of California households and it required PUC to give priority to projects that would expand service for unserved/underserved broadband providers. The bill expanded grant eligibility criteria for companies to participate in the CASF program for the purpose of expanding broadband access for these communities.

## *Newly Introduced California Policy Proposal – Senate Bill (SB) 4*

California State Senator Lena Gonzalez recently introduced another major piece of telecommunications legislation that could affect rural broadband access. SB 4, if enacted, would require the Governor’s Office of Business and Economic Development (GO-Biz) to coordinate with state, local and national agencies to facilitate streamlining of local land use approvals and construction permit projects related to the expansion of broadband infrastructure. The PUC, when approving CASF projects, would be required to prioritize projects intended to serve areas where there may be little to no internet connectivity, including internet with slow upload and download speeds. The funds allocated from the CASF would be used to leverage federal funds to expand internet access and the PUC would be required to ensure that each service provider pays revenues from a monthly customer fee to deposit into the fund. This bill would also require that the PUC establish an additional fund within the CASF to receive the consumer fee to pay for broadband bond financing and securities. Reports and audit findings would be submitted to the PUC and California Legislature.

Although SB 4 has not yet been analyzed by various legislative committees, it appears that the bill has a unique provision which will require the convening of key local and federal stakeholders to identify the ways in which broadband access and infrastructure can be expanded across California. However, the bill does not appear to specify the core areas that the working group and stakeholders should discuss to better address broadband expansion in rural areas. The bill intends to increase internet speeds in addition to increased grant/project oversight related to audits and findings which would be reported to the Legislature. Additionally, the bill is intended to utilize the CASF program which may build upon universal services that could enable affordable broadband. Other considerations should take place to identify whether discussions regarding local land use approvals and construction permit projects could create provider competition in unserved/underserved areas. The bill could also consider including core areas to be discussed within the workgroup, such as digital literacy, and mapping and regulatory capture issues.

## *Newly Introduced California Policy – Senate Bill (SB) 28*

Senator Ana Caballero has introduced another relevant piece of legislation: SB 28, the “Rural Broadband and Digital Infrastructure Video Competition Reform Act of 2021.” If passed, the bill would require that the Department of Technology in collaboration with other stakeholders to compile state owned resources and devices that are available for broadband networks in rural communities (among others). The bill would also forbid a provider from discriminating or denying access to any group of potential residential subscribers regardless of their income. The bill would require providers to meet specific milestones to expand broadband in rural communities and would require PUC to audit providers and submit specified information regarding compliance.

SB 28 has also not been analyzed by the appropriate legislative committees but appears to be focused on tangible resources and/or devices for rural communities across the state. The bill if enacted is intended to create oversight by prohibiting service providers from selecting access based on residential income. The bill includes required audit reporting and milestones that would need to be met to receive funding to expand broadband in rural areas which may help with continued oversight. Additional consideration may need to take place to ensure those receiving digital resources have the skills to utilize various technologies that are provided to them. The specific milestones are also not clearly identified in the bill. Although service providers could be held in violation, it appears that the provider can dictate the rate at which they expand access within underserved areas. Allowing service providers to dictate their own milestones was highlighted as a key issue in the literary review related to funds associated with the USAC. This bill also does not appear to enable the creation of provider competition as a way to increase broadband access.

## *Federal Communications Commission (FCC) - Broadband Deployment Advisory Committee (BDAC)*

Similar to California’s Broadband Council, in 2017 the BDAC was established to provide recommendations and advise the FCC on expanding high-speed internet access across the United States. The BDAC also provides information to help limit barriers for broadband infrastructure and investment. Stakeholders are able to participate to help with the development of various recommendations for the FCC to carry out their role and mission of broadband expansion and oversight (FCC, 2020). In 2020, the BDAC released a report and recommendations regarding increased investment for low-income communities to access broadband which also touched on rural impacts. The report provided an initial recommendation to incentivize providers through a supply and demand approach. To incentivize provider broadband supply, the BDAC recommended reducing costs and removing barriers for broadband expansion and demand incentives would be aimed at devices and services. According to the BDAC, these incentives would improve the profit and return on investment made by service providers which would reduce costs, such as grants, loans, tax incentives and eliminating regulatory issues. Incentivizing demand would include efforts related to subsides to reduce costs for consumers (FCC BDAC, 2020b) . However, incentivizing providers would not necessarily create provider competition to expand access for residents and providing more funds and reducing their costs may not be the appropriate method to ensure the deployment of broadband in rural communities.

Other recommendations outlined in the report included enhancing facilitation at local levels which may help to identify and mitigate regulatory barriers, such as fees or ordinances that disincentivize providers from broadband deployment. The BDAC highlighted the need for public and private sector partnerships to build networks and leverage resources and expertise across these entities. Cross agency collaboration was also recommended to leverage various funding streams and programs to expand broadband access and deployment. The report also mentioned the need for broadband expansion specifically for rural health care programs and better data and workforce training were also discussed (FCC BDAC, 2020b).

A second report was completed in 2020 by the BDAC which discussed a gap in the skills related to the workforce that deploys broadband in addition to minimal training programs to meet workforce and employment needs. The BDAC recommended a targeted workforce expansion approach by forming a coalition in order to enhance a coordinated effort in addition to promoting initiatives to coordinate standardized workforce/skills training programs across the country. The report included proposed metrics to determine whether various training programs would be effective including matriculation, completion, cost, employment retention, gained skills, productivity, and turnover. The workgroup highlighted that there is a need for various stakeholders to further identify training programs that can provide employment opportunities to ensure there is a skilled and reliable workforce who can carry out complex broadband deployment planning and other efforts (FCC BDAC, 2020a).

## *FCC – Three Rural Initiatives*

The FCC is an independent federal agency that is overseen by Congress and is tasked with regulating and implementing laws that are related to various communications including, radio, television, wire, satellite, and cable across the United States. The Commission has various initiatives aimed at decreasing gaps in the digital divide. In 2019, the FCC established a $20.4 billion fund that would help to expand broadband access for rural areas including households and small businesses. The funds would be provided through a reverse auction to those providers that may cover certain areas that are unserved. The funds would be used to increase broadband speeds, ensure homes and businesses are eligible including those entities that may not have any broadband access and the FCC would expect funds be used wisely by the providers (FCC, 2020).

However, it is unclear whether this type of program will make the necessary changes to expand and provide broadband access for rural communities. For instance, the proposal discusses raising standards from 10Mbps/1Mbps to 25Mbps/3Mbps and as previously noted these speeds are not sufficient to enable meaningful access for unserved, rural areas. There is a two-phased approach that was outlined in the proposal which indicated that providers would need to target unserved census blocks and the second phase would target areas by utilizing more specific data. The existing federal mapping standards do not appear to accurately identify the areas that are truly unserved because the data does not include specific households. Additionally, accountability measures were previously critiqued, favoring providers who managed to expand services in more populated areas to ensure profits (Ali, 2020).

A second initiative overseen by the FCC would authorize $4.9 billion over 10 years to enhance rural broadband across the United States. The funding would be provided to maintain, improve, and expand broadband for 455,344 homes and businesses served by 171 providers across 39 states. Carriers in California would receive a little over $13 million to improve broadband access in a 10-year timeframe for approximately 1,300 locations. The funding would target homes and businesses where populations are thinly dispersed and the costs to expand broadband in these areas would be relatively high (FCC, 2020). Providers again would be required to have a 25Mbps/3Mbps download and upload speeds and would be obligated to deploy broadband on a specified schedule with an initial standard requirement by 2022. Similar critiques apply to this proposal as discussed. It is unclear how providers will be held accountable for these requirements and it is difficult to measure change when current mapping and data is relatively flawed.

Lastly, in 2018, the FCC allocated $1.5 billion to close the digital divide and expand broadband to 700,000 home and businesses. This is also a 10-year initiative which is intended to expand high speed internet with download speeds of at least 100 Mbps. California had five winning bidders to expand access to 51, 682 locations and was provided a total of $150 million for these purposes. The FCC provided funds to service providers who indicated that they would enhance higher internet speeds and gave providers the flexibility to deploy any type of broadband technology. Providers are expected to deploy broadband technologies to 40% of their assigned homes and businesses within three years of the funding authorization and they must also increase assigned access by 20% in each of the following years until deployment is complete. It also appears that the FCC attempted to reduce costs for service providers by removing various regulatory barriers which was intended to expand wireless broadband (FCC, 2020). Although this initiative would increase internet speeds to a more desirable rate, providers are able to expand using a variety of technologies. However, not all technologies are created equal for rural areas and often many forms may not be suitable for these communities to access the service even once established. Additionally, the FCC established a timeframe and rate of deployment, but it is not clear the type of oversight or accountability that would ensure compliance from the selected providers.

## *Other FCC Broad Initiatives that May Impact Rural Communities*

The FCC has also established a data and mapping initiative to collect information to appropriately and accurately identify broadband coverage gaps (FCC, 2020). The intent of the initiative is to collect geospatial data which is typically used to describe specific locations of features or objects on the surface of the earth. Fixed broadband coverage maps would be developed to help target specific areas that do not have fixed service. The initiative also describes a public process to provide input and a portal would be developed to gather information from the public in addition to state and local governments. Changes would also be made to the current reporting form that providers submit to the FCC to limit burdensome reporting requirements for providers (FCC, 2020). Although it is important to gather accurate data to determine rural areas that lack broadband access, this initiative does not necessarily solve the issue of self-reporting data in the providers’ favor. The initiative also proposes to eliminate usage of the reporting form to solely rely on geospatial mapping data to identify location specific information. However, it is important that the data remains accurate and should be ultimately collected by a third party to ensure service providers are not overestimating their current coverage.

The FCC also has two initiatives that were proposed due to the COVID-19 pandemic. The $3.2 billion Emergency Broadband Benefit Program, established in early 2021, would help pay costs for providers who served low-income households during the pandemic. Service providers that participate in the program are required to provide discounted rates for low-income homes and would therefore be reimbursed through the FCC program. The program also encourages service providers to supply households with devices and technologies, such as laptops, desktops, and tablets, but households could only receive one device. For service providers to be reimbursed for the specified devices they are required to submit information to the FCC. The FCC also established auditing protocols for these purposes. The second proposed initiative is related to distance learning during the pandemic. The FCC proposal requests to utilize the E-rate program (which provides discounts to eligible schools and libraries) to help assist students who were distance learning and would enable them to access internet and devices during the pandemic (FCC, 2020). This effort is intended to help with issues during the pandemic, but the pandemic highlights the need to extend access to broadband more significantly opposed to piecemeal funding solutions.

# **Summary of State and Federal Policy Findings**

The last two California budgets focused on funding for distance learning for low-income students and schools that were in small or rural areas to ensure access to devices and hotspots. The existing enacted budget highlighted the need for rural broadband expansion and directed agencies to develop a rural broadband action plan in addition to directing agencies to conduct better mapping and data collection and use agency funds to increase high speed internet. The California Broadband Action Plan highlighted many of the key literary findings including increasing internet speeds and analyzing federal mapping and data collection issues. The plan discussed blending and braiding funding sources across state and federal programs and leveraging statewide assets. The plan recommended the creation of specific rural broadband standards and provide proper oversight of broadband deployment timeframes. Lastly, the plan touched on improving subside programs to ensure access and affordability for low-income citizens living specifically in rural areas and to create provider competition.

The PUC oversees the CASF program which was initially established to close gaps in the digital divide and previous enacted legislation (SB 740) attempted to modernize the program by and broadening eligibility criteria to fund high-cost programs for service providers. SB 4 which was newly introduced intends to require the convening of various agencies to streamline processes to expand rural broadband and would require CASF projects to target unserved or underserved areas with slow internet speeds. Service providers would also be required to allocate consumer fees into the fund. SB 28, if enacted, would focus on compiling state-owned devices and resources and would forbid a provider from denying access to areas based on income. Service providers would have to meet self-proclaimed deployment milestones.

The FCC has also established an advisory committee which provides broader recommendations regarding broadband expansion. One of the reports discussed incentivizing providers through a supply-demand approach by reducing provider costs and mitigating regulatory barriers. The report discussed levering partnerships across sectors to expand funding sources. The second report mainly discussed increasing workforce skills of those who deploy broadband. There are three core rural initiatives that the FCC has proposed, and funding was provided to expand broadband access to rural homes and businesses. A 10-year initiative would give providers in California $13 million to target areas that are thinly dispersed and costly to deploy broadband. Another 10-year plan would provide high-speed internet for rural areas in California and providers would receive $150 million to deploy broadband in specified timeframes. Several other FCC initiatives provided funding as it related to COVID-19 impacts.

**Conclusion and Next Steps**

The COVID-19 pandemic highlights the need for rural communities across California to have access to reliable broadband and devices. Low-income households, minorities and those with less education are even more susceptible to negative impacts of the digital divide and when coupled with living in rural communities this could create significant issues when attempting to access information, employment, education, etc. There are many federal and statewide policies that are intended to decrease gaps in the digital divide for rural communities, but the policies must be effective and mitigate a variety of issues plaguing broadband expansion and access. Policies must have a multipronged approach to address issues related to provider competition, broadband affordability, physical/terrain barriers, local resistance, digital literacy, and broadband mapping and regulatory capture. The remainder of this section of my report identifies policies that may be effective in addressing rural broadband issues in addition to next steps that California can take to move forward on these efforts.

## *Fund and Establish Specific Deliverables as Described in the CA Broadband Action Plan*

Policymakers should strongly consider developing a comprehensive package of legislation that can work hand in hand and allocate funds to carry out the deliverables and planning activities outlined in the California Broadband Action Plan. These deliverables should be tailored to specifically meet the needs of rural communities across the state. State legislation should consider federal programs to leverage federal funds from those initiatives that have been proposed specifically for rural communities. Although the federal initiatives provide smaller pots of funding for states, it will be important to braid these funds into California’s efforts due to the overall expense of rural broadband expansion. SB 4 and SB 28 may include provisions that could enable expansion for rural communities, but additional amendments could build upon the comprehensive plan that has been outlined. SB 28 includes rather weak benchmarks regarding milestones since the service providers are able to self-identify their timeframes and may not have the necessary provisions to make meaningful gains in California.

The California Broadband Action Plan touches on many of the issues described in my literature review, such as ensuring there are proper internet speeds that are meaningful for rural communities in addition to analyzing some of the federal mapping and data collection issues to ensure accurate coverage maps. The plan discussed creation of specific rural broadband standards and providing the appropriate oversight of broadband deployment timeframes. Changes to subsidy programs could help provide additional access and affordability for low-income citizens living specifically in rural areas. The Plan also discussed programs to enhance digital literacy skills especially for those individuals and communities that have typically lacked expansion of various technologies.

The Plan needs additional analysis of whether and how the recommendations would increase provider competition. Provider competition appears to be one of the core issue areas that would enable rural broadband expansion, but this may be the most difficult hurdle to overcome. Funding has continued to be allocated to incentivize service providers to expand their footprint in rural areas, but providers have continued to provide services in more populated areas to maximize profits. There also appears to be rather weak oversight capabilities at the federal level which may trickle down to state initiatives. The FCC made recommendations related to increasing supply through eliminating barriers and costs for providers which is one initiative that would potently make matters worse. There would not be an incentive for the company to expand in rural areas, but it would provide additional funds for them to provide access where there would be profits. Federal initiatives such as this may also impede California’s efforts; however careful consideration and policies that ensure greater competition could mitigate top-down issues. Mapping issues related to rural terrain may help planning activities and efforts to identify areas that would be difficult to deploy broadband and this should be planned for accordingly. The specific terrain issues could be further discussed in the action plan since this issue will create significant barriers.

The next Governor’s Budget should take a comprehensive approach when funding rural broadband initiatives. The proposed 2021-22 budget simply highlighted the Action Plan but did little to explain how funding would be allocated for these purposes. The budget included the allocation of hotspots and devices, mainly for distance learning, which is helpful, but a more comprehensive approach could enable long-lasting and effective broadband deployment across communities. Additional directives by the Governor enforce specific tactics for various agencies, but additional funds were not necessarily provided to agencies for these purposes. Piecemeal and un-funded approaches may work in the short run but to ensure sustainable broadband deployment in rural communities, it will take a comprehensive effort and will need to be funded accordingly. Therefore, careful consideration should take place to develop legislative packages and budgetary estimates to implement recommendations outlined in the California Broadband Action Plan. Additional recommendations could also include planning related to challenging rural terrain and the creation of provider competition.

The literature analysis I conducted indicates that closing the digital divide for rural communities will take a multi-pronged approach and presents interconnected issues. Since the COVID-19 pandemic California has attempted to allocate resources for this purpose but would benefit from a more systemic and comprehensive approach opposed to piecemeal, one-time funding allocations. Policymakers should consider legislative packages that are linked to one another to create change by operationalizing the broadband action plan. On-going and dedicated funding sources would need to be identified and utilized specifically for these purposes through the budget in a manner that can truly bring change for rural communities to access necessary and modern technologies.

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# **References**

California. Governor’s Office. Governor’s Budget Summary. Sacramento: State of California, Governor’s Office (2020). Statewide Issues and Various Departments. <https://www.ebudget.ca.gov/budget/publication/#/e/2020-21/BudgetSummary>.

California. Governor’s Office. Governor’s Budget Summary. Sacramento: State of California, Governor’s Office (2021). General Government and Statewide Issues - Broadband. <https://www.ebudget.ca.gov/budget/2021-22/#/BudgetSummary>.

Ali, Christopher. "The Politics of Good Enough: Rural Broadband and Policy Failure in the United States." *International journal of communication* [Online], 2020, p. 5982+. *Gale Academic OneFile*,link.gale.com/apps/doc/A644959526/AONE?u=csus\_main&sid=AONE&xid=e7bbae43. Accessed 6 Mar. 2021.

Caballero, A. (2021, February 10). Senate Bill 28 Rural Broadband and Digital Infrastructure Video Competition Reform Act of 2021. <https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202120220SB28>.

California State Office of Rural Health. (2020, November 18). Rural health Information Hub: Rural Health>Topics & States>State Guides. Rural Health Information Hub. Retrieved February 14, 2021,from <https://www.ruralhealthinfo.org/states/california#:~:text=California%2C%20the%20most%20populous%20U.S.,California%20(USDA%2DERS)>.

Congressional Research Service: Informing the Legislative Debate since 1914. (2019). Broadband Internet Access and the Digital Divide: Federal Assistance Programs (RL30719). <https://fas.org/sgp/crs/misc/RL30719.pdf>.

Douglas, B. H. (2000). The rural-urban digital divide.*Journalism and Mass Communication Quarterly, 77*(3), 549-560. <http://proxy.lib.csus.edu/login?url=https://www-proquestcom.proxy.lib.csus.edu/scholarly-journals/rural-urban-digital-divide/docview/216929456/se-2?accountid=10358>.

Executive Department State of California. (2020). Executive Order N-73-20. <https://www.gov.ca.gov/wp-content/uploads/2020/08/8.14.20-EO-N-73-20.pdf>.

Federal Communications Commission (FCC). (2020, September 25). Bridging the digital divide for all Americans. <https://www.fcc.gov/about-fcc/fcc-initiatives/bridging-digital-divide-all-americans>.

Federal Communications Commission (FCC) Broadband Deployment Advisory Committee (BDAC). (2020)a. Broadband Infrastructure Deployment Job Skills and Training Opportunities Working Group. <https://www.fcc.gov/sites/default/files/bdac-job-skills-training-opportunities-approved-rec-10292020.pdf>.

Federal Communications Commission (FCC) Broadband Deployment Advisory Council (BDAC). (2020)b. Increasing Broadband Investment in Low-Income Communities Working Group. <https://www.fcc.gov/sites/default/files/bdac-low-income-communities-approved-rec-12172020.pdf>.

Gonzalez, L. (2021, March 25). Senate Bill 4 Communications: California Advanced Services Fund. <https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202120220SB4>.

Henry, L. (2019). Bridging the uran-rural digital divide and mobilizing technology for poverty eradication: challenges and gaps. Department of Economics, University of the West Indies, St Augustine, Trinidad and Tobago. <https://www.un.org/development/desa/dspd/wp-content/uploads/sites/22/2019/03/Henry-Bridging-the-Digital-Divide-2019.pdf>.

Hight, J. (2014). A Tale of Two Rural Broadband Victories: How broadband advocates in Humboldt and Del Norte counties overcame financial, political and geographic challenges to achieve route diversity. California Center for Rural Policy. <https://ccrp.humboldt.edu/sites/default/files/humboldt-del-norte-broadband-case-studies.pdf>.

James E. Prieger. (2012). The broadband digital divide and the economic benefits of mobile broadband for rural areas, Telecommunications Policy, Volume 37, Issues 6–7, 2013, Pages 483-502, ISSN 0308-5961, <https://doi.org/10.1016/j.telpol.2012.11.003>.

Kinney, J. (2013). Senate Energy, Utilities and Communications Senate Bill 740 Analysis. <https://leginfo.legislature.ca.gov/faces/billAnalysisClient.xhtml?bill_id=201320140SB740>.

Levin, B., & Downes, L. (2019, September 13). Cities, not rural areas, are the real Internet Deserts. The Washington Post. <https://www.washingtonpost.com/technology/2019/09/13/cities-not-rural-areas-are-real-internet-deserts/>.

Maciag, M. (2014, November 1). Broadband expands into rural America, but how many will adopt? Governing: State and local government news and analysis. <https://www.governing.com/archive/gov-broadband-rural-expansion.html>.

Office of Governor Gavin Newsom. (2020, August 14). Ahead of new school year, California schools receive critical funds to support distance learning and governor Newsom signs executive order directing state agencies to bridge digital divide. California Governor. <https://www.gov.ca.gov/2020/08/14/38666/>

Padilla, A. (2013). Senate Bill 740 Telecommunications: universal service programs: California AdvancedServicesFund. <https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201320140SB740>.

Parker, E. B. (2000). Policy forum: Closing the digital divide in rural America (24). Elsevier ScienceLTD. [http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.456.2070&rep=rep1&t pe=pdf](http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.456.2070&rep=rep1&t%20pe=pdf).

Perrin, A. (2020, August 21). Digital gap between rural and nonrural America persists. Pew Research Center. [https://www.pewresearch.org/fact-tank/2019/05/31/digital-gap-between-rural and-nonrural america-persists/](https://www.pewresearch.org/fact-tank/2019/05/31/digital-gap-between-rural%20and-nonrural%20america-persists/).

Robert LaRose, Jennifer L. Gregg, Sharon Strover, Joseph Straubhaar, Serena Carpenter, Closing the rural broadband gap: Promoting adoption of the Internet in rural America, Telecommunications Policy, Volume 31, Issues 6–7, 2007, Pages 359-373, ISSN 0308-5961, <https://doi.org/10.1016/j.telpol.2007.04.004>. <https://www.sciencedirect.com/science/article/pii/S0308596107000444>.

Stauffer, A., Wit, K., Read, A., & Kitson, D. (2020). How states are expanding broadband access: New research identified tactics for connecting unserved communities. The PEW Charitable Trusts. <https://www.pewtrusts.org/en/research-and-analysis/reports/2020/02/how-states-are-expanding-broadband-access>.

Tong, A., Hueso, B., Gipson, M., Thurmond, T., Winkler, J., Batjer, M., Ghilarducci, M., Medigovich, M., Kim, D., Kim, D. S., Lucas, G., Ross, K., Snider, C., & Wright-McPeak, S. (2020). Broadband Action Plan 2020: California Broadband for All. <https://broadbandcouncil.ca.gov/wp-content/uploads/sites/68/2020/12/BB4All-Action-Plan-Final.pdf>.

Turner-Lee, N. (2018, November 5). Closing the digital and economic divides in rural America. Brookings. <https://www.brookings.edu/longform/closing-the-digital-and-economic-divides-in-rural-america/>.

Vaughn, J., Harrell, A., & Dayton, A. E. (2015). Digital Literacy in Rural Women’s Lives. Community Literacy Journal, 9(2), 26–47. https://doi org.proxy.lib.csus.edu/10.1353/clj.2015.0010.

Wheeler, T. (2020, May 27). 5 steps to get the internet to all Americans. Brookings. <https://www.brookings.edu/research/5-steps-to-get-the-internet-to-all-americans/>.