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Federal broadband subsidies boosted rural internet, but service faded once funding ended, researchers find

A federal multibillion-dollar effort that subsidized internet service providers to bring broadband to underserved areas has provided much-needed high-speed internet to some of the country's remote and rural areas. However, according to UC Santa Barbara researchers, once the federal subsidies ended, so did much of the service.

"We wanted to study how effective such an approach of directly subsidizing the ISPs to operate as regulated monopolies is in these rural areas, versus the ones that are served by regular monopolies, or compared to competitive markets," said Arpit Gupta, an assistant professor in UCSB's Computer Science Department and co-author of a paper presented in August at conference hosted by the Association for Computing Machinery's (ACM) Special Interest Group on Data Communication (SIGCOMM). "If you look at the data the regulators had on paper, the program looked like a great success, which amounts to something like six million addresses served and everybody compliant with what the FCC's rate and service quality requirements were," he continued. "But when we started digging in, we realized that was not the case, and people are actually not receiving service as is being certified by the ISPs."

Bridging the digital divide

Everyone should have access to high-speed internet service. That's the concept behind digital inclusion, an effort to bring internet connectivity to remote populations in an increasingly online world.

"Everybody needs internet access now, especially in the post-pandemic world," said computer science professor and paper co-author Elizabeth Belding. "So much of what we do is online and all of the easiest places to reach have internet access." Urban areas are the likeliest places to have good internet access, thanks to their infrastructure and their population density, which can guarantee enough subscribers to generate a return on the internet service providers' investment into covering these areas.

The areas often left out of coverage are predominantly rural, Belding added. "It costs more to bring access there; they're harder to reach," she said. "The terrain is difficult, and the population density is much smaller, so you get fewer people covered for the same cost of infrastructure, or perhaps a greater cost."

To help bridge that gap, the Federal Communications Commission (FCC) in 2011 launched the Connect America Fund (CAF), a program to ensure high-speed internet in remote areas by allowing eligible carriers to recover some of their costs of deploying new infrastructure in these places. In exchange, the ISPs had to satisfy certain rate and service conditions: minimum 10Mbps download/1Mbps upload speeds at rates that were comparable to those charged in urban areas. The program came in two parts: a smaller CAF I support period followed by a larger CAF II support period in 2014, which ended in 2021. The ISPs were required to certify the addresses served through the program.

To see whether the ISPs' self-reported data were accurate, the researchers deployed their broadband plan querying tool (BQT), which allowed them to gather information about the broadband plans on offer, as well as their availability, performance and distribution for a given region, and at a scale of thousands to millions of addresses. Created for a previous project that allowed them to survey the value of broadband plan offerings across the country, BQT was now being used to sample the service areas supported by CAF funding and to see how they matched up with the certified reports.

The UCSB researchers, working with colleagues at UC Berkeley and broadband analytics company Ookla, Inc., narrowed their field of inquiry to the three ISPs that

received the most significant amount of CAF funding: AT&T, CenturyLink (now Lumen) and Frontier, which collectively received 37.5% of the total $10 billion to serve just more than half of the total 6.13 million CAF addresses spanning 43 states. They also added a smaller ISP, Consolidated Communications, which received $193 million in CAF funding. Additionally, they narrowed their address selection to where the selected providers were dominant, as well as where multiple ISPs in the same region provided service to equal numbers of addresses. They were also careful to sample from a wide variety of population sizes.

“We did expect that things should not be perfect, that there should be some gaps between what ISPs are telling to the regulators,” Gupta said. “That could be because of noise and how the reporting works. We were expecting discrepancies of maybe 5% here and 10% there.”

The need for independent evaluations

What they found was a 55% serviceability rate — that is, little more than half of the sampled addresses certified as served by the selected ISPs were now being served by them. They also found a 33% compliance rate, meaning that only about a third of the sampled locations that were certified met the requirements for upload/download speeds. In some cases, CAF-served addresses did receive higher download speeds than their monopoly-served neighbors, but “overall, the CAF program has largely failed to achieve its intended goal, leaving many targeted rural communities with inadequate or no broadband connectivity,” according to the study.

In their comparison of the CAF-funded regulated monopoly against regular monopolies or competitive markets, the researchers also found that some competition is necessary to improve consumer value; improvements in broadband service were inconsistent where the CAF-funded ISP operated without competition.

The takeaway, according to the scientists, is that for large-scale interventions such as the CAF program, objective, data-centric post-hoc evaluations are needed to assess the true efficacy of the intervention and to provide transparency. These evaluations are also necessary to keep the targeted rural populations from falling through the cracks.

“To live in an unserved area that is said to be served means not only is there no internet, it’s also a challenge to get it because to the FCC, the area doesn’t look

unserved.” Belding said. Without independent evaluations of service and price, she added, underserved customers — those who receive internet but at speeds too low or prices too high to be competitive — can also find themselves on the wrong side of the digital divide.

Such oversight will be crucial as momentum builds for the federal Broadband Equity Access and Deployment (BEAD) program, a $42.5 billion expansion of high-speed internet across the U.S. and its territories by paying for planning, infrastructure deployment and adoption programs.

“Now that we are in the process of starting with this $42.5 billion investment, we should be thinking about how to assess its efficacy,” Gupta said, adding that BEAD “could have a transformative effect in terms of fighting digital inequity.

“But if we don’t do it right, a lot of money could be wasted.”

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