

GETTING TO UBIQUITY:

The urban and rural digital divide



SPONSOR

A10

The past three years have placed unprecedented demands on fixed and mobile broadband networks and underscored broadband as a necessity: A “seismic shift in broadband from being access to entertainment to becoming mission critical for work-from-home, online education, remote healthcare, economic development, and overall quality of life,” as Gary Bolton, president and CEO of the Fiber Broadband Association, wrote in the foreword of a recent report it commissioned on the state of U.S. broadband.

Local, state and federal agencies have doubled down on their efforts to close what is commonly called the “digital divide”, which refers to the gap between those who have high-quality internet access and digital devices, and those who do not – typically because they live in a geographic area that is remote, rural or poor, where network operators have not built out due to a lack of compelling business case/return on investment. Those efforts include subsidies for network infrastructure build-outs to such areas, as well as measures meant to focus on affordability, digital equity and digital skills acquisition.

Quantifying the digital divide: Four perspectives

What does the digital divide actually look like? It depends on how you look at the problem, whether through the lens of whether households have any internet access, how many options

they have, the underlying technology type, the speeds available to them, affordability, or demographics such as whether school-age children have internet access at home, among many aspects of the digital divide.

Here are four assessments of the state of the digital divide in the United States.

1 The Fiber Broadband Association has been conducting ongoing consumer surveys related to broadband since 2006, and also includes direct sampling of respondent’s actual experienced speed, latency and jitter. RVA, which has conducted the research, estimates that approximately 92% of U.S. households have Internet access at home, including 77% with wired service and 15% with wireless service. The majority of people with wireless internet service access it via mobile phones, as opposed to Fixed

Wireless Access home broadband.

While average speeds have risen over the years and average cost per Mbps has dropped, RVA did find that there are still significant differences between service levels for low-income households and wealthier consumers, as well as a gap between service levels to high-density and low-density population centers.

Areas with low income also typically have the lowest available broadband speeds, which is attributable both to availability of service as well as adoption of lower-cost (and lower performance) service tiers, the report said. RVA found that households with incomes less than \$20,000 tended to have average “blended” (average of tested upload and download speeds) of 55 Mbps compared to 77 Mbps for households with incomes above



\$150,000. The highest blended speeds were actually found in households with an income between \$60,000-\$74,000, at 86 Mbps.

There was a more sizable gap in performance between zip codes with the lowest population density compared to high-density areas. RVA found that the blended speeds in zip codes with a population density of 0-9 people per square mile ran at a mere 28 Mbps (right at about the FCC minimum for broadband), while speeds in zip codes with a population density of 5,000 people per square mile were nearly three times that, at 79 Mbps.

2 One of the most important assessments of the digital divide is the Federal Communications Commission's annual Broadband Deployment Report to Congress—because the FCC is one of the agencies prioritizing the closing of the access and affordability gap, and it determines where a sizable chunk of federal funding will go to subsidize service extensions and what the performance requirements for such service will be.

In the [14th Broadband Deployment Report](#) (the most recent one available, adopted in January 2021), the Commission said that its “top priority has been closing the digital divide, in recognition that high-speed broadband and the digital opportunity it brings are increasingly essential to innovation, economic opportunity, healthcare, and civic engagement in today’s

modern society. ... The need to deliver broadband connectivity across America has never been greater.”

By the FCC’s reckoning, the number of Americans living in areas without access to broadband speeds of at least 25/3 Mbps (the FCC’s baseline metric for broadband service) was fewer than 14.5 million, as of the end of 2019.

The agency also said that “the rural-urban divide is rapidly closing,” based on its assessment that the 30-point gap between urban Americans’ and rural Americans’ access dropped to 16% as of end-2019. The FCC said in the same report that nearly 83% of rural Americans live in areas with 25/3 Mbps broadband available.

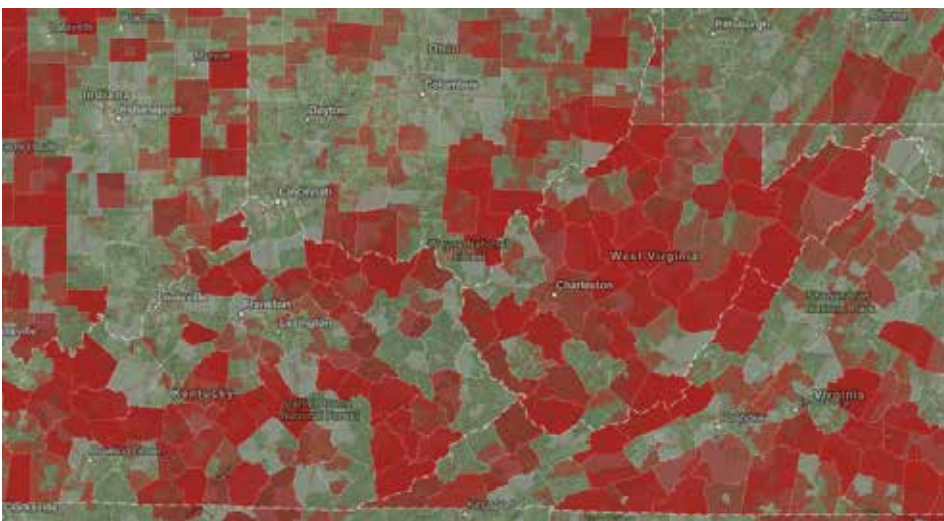
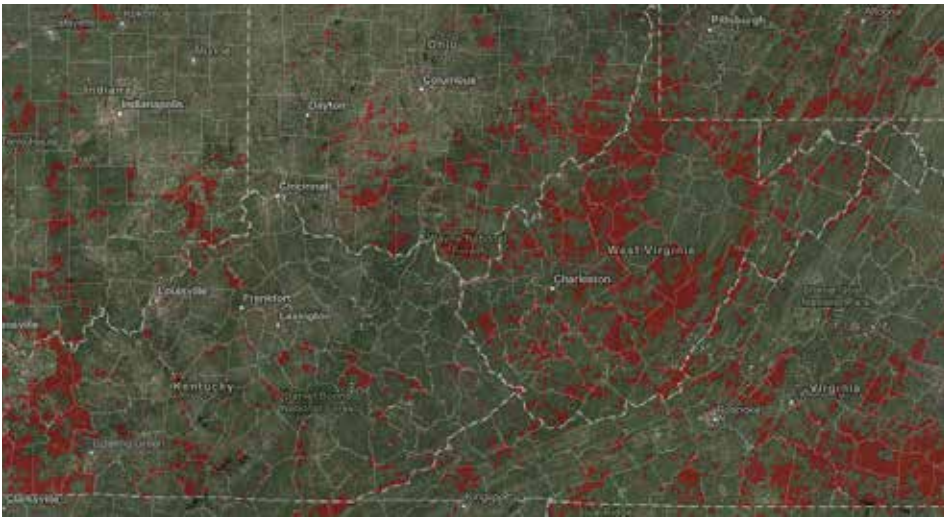
As of the end of 2019, the FCC says, 94% of Americans had access to both 25/3 Mbps broadband and 10/3 Mbps LTE services, and nearly 60% of Americans already had access to 5G networks as well.

3 However, while the FCC has acknowledged the flaws in its data collection and is in the process of improving the census-block-level Form 77 data on which its assessment of broadband availability is based, advocacy group Broadband Now has been spot-checking that data and say it vastly overestimates the real-world availability of broadband services. While that 2021 FCC broadband report concluded that the number of Americans without broadband access had fallen to 14.5

million, Broadband Now said that based on its checks of actual availability across more than 55,000 real-world addresses, it estimates that the number is closer to 42 million.

Broadband Now’s study found that reporting of access for all fixed broadband connections, including DSL, fiber, cable and fixed wireless, were over-reported, and that such over-reporting is happening in cities, rural towns “and everywhere in between.” The “false positive” rate, where the FCC indicated service is available for a particular address but provider-based availability tools say it is not, was, on average, 21%. (In West Virginia, the false-positive rate for Broadband Now’s checks was 36%.)

4 The National Telecommunications and Information Administration’s 2021 Internet Use Survey also was less rosy than the FCC’s most recent assessment. The executive agency, which is tasked with the distribution of the billions in broadband funding for infrastructure and social support of digital initiatives in Tribal and underserved communities, said that the 2021 survey “represents the first comprehensive federal data on how Internet use in America has evolved since the onset of the COVID-19 pandemic. The results make clear that our nation faces substantial challenges to achieving full digital equity.” The November 2021 Current Population Survey of the U.S. Census Bureau included NTIA’s Internet Use Survey



Screenshots from NTIA's "Indicators of Broadband Need" map show the difference between viewing broadband access based on where 25/3 Mbps service is not available as reported to the FCC (top) and when additional data is taken into account, including Ookla and Measurement Lab tests and U.S. Census data.

and resulted in information on nearly 100,000 people living in more than 43,000 households across all 50 states and Washington, D.C.

NTIA explained: "Historically less-connected communities used the Internet and connected devices in greater numbers than they did two years ago. Despite that progress, the substantial disparities that NTIA has

tracked for decades continued to be evident." NTIA estimates that about one in five U.S. households are not online, or about 24 million.

That same survey also pointed to some of the non-infrastructure-related reasons why those households are still not connected. While 18% reported that affordability of broadband service was the primary reason they didn't

have it, the [majority \(58%\) of those households](#) said that they felt no interest or need to be online.

Nearly \$130 billion in federal, state, and local subsidies are being invested from CAA, ARPA, FCC RDOF, Coronavirus Capital Projects Fund, NTIA, USDA RUS RECONNECT and most recently the Investment in Infrastructure and Jobs Act (IIJA).

Show me the money: The biggest broadband investment cycle ever

Broadband funding is, by and large, one of the few issues with reliable, bipartisan support. It has become an increasingly high priority, as evidenced by the nearly \$130 billion in federal, state and local funding that are being invested both in the short term and over the next decade.

It's a long-term boom, not a broadband bubble, says Bolton of FBA. While some of the funds currently being disbursed are still from pandemic relief and/or recovery measures, other programs have funding spread out over five to 10 years.

All of this is being supplemented by private investment, which is also at record levels amid ongoing expansion of both fiber and 5G services from both small and large providers. According to industry group US Telecom's annual report, broadband providers invested at least \$86 billion in capital expenditures in 2021, a "staggering" number

that was up 8.3% from 2020 and tops the previous high-water mark of \$80.8 billion in 2019.

Here is an overview of the major federal funding vehicles for broadband that are helping to fuel the broadband investment cycle and aimed at closing the digital divide so that all Americans have broadband access.

- The **Secure and Trusted Communications Act of 2019**, commonly referred to as the “rip and replace” program, is meant to help small telecommunications companies replace equipment and services provided by Chinese vendors whose products have been deemed a national security risk. Congress allocated \$1.9 billion for the program, but the actual funds requested by providers is more like \$5.26 billion, says the FCC. The federal government has prioritized providers with 2 million or fewer customers, but those providers alone have said that it will take about \$4.46 billion to reimburse their costs—so their requests are being funded at a rate of about 39% of what they asked for. The FCC said in a January 2023 update to Congress that it has disbursed about \$40.9 million in reimbursements thus far.

- **Consolidated Appropriations Act**, 2021 directed NTIA to implement three new grant programs for broadband: \$288 million in Broadband Infrastructure Deployment Grants, to be distributed with a focus on public-private partnerships to serve rural areas;



\$980 million for the Tribal Broadband Connectivity grant program; and a pilot program to connect community institutions that traditionally serve minorities, such as Historically Black Colleges and Universities (HBCUs).

- **American Rescue Plan Act (ARPA)**, a coronavirus relief package. ARPA allocated just over \$65 billion in direct aid to counties, boroughs and parishes across the country and gave them several options on how to spend the money to assist in recovery from the impacts of Covid-19. That included the option to invest in infrastructure, including water systems or broadband. Analysis of ARPA plans by the National Association of Counties found that 33% of counties planned to spend some of their ARPA funds on broadband, compared with 79% intending to make expenditures related to health programs and 57% planning to make investments in water, sewer or transportation infrastructure. NACo cited the examples of Dallas County, Texas, using \$35 million in ARPA funds to make sure its

residents had access to a minimum of 100 Mbps upload/download speeds, and El Paso County, Colorado investing \$6 million in ARPA funding toward “middle-mile” infrastructure that would enable local providers to expand “last-mile” connections.

ARPA also included the **Coronavirus Capital Projects Fund**, with \$10 billion in direct payments to government entities through the U.S. Treasury Department for projects including broadband. According to Treasury, the fund has awarded nearly \$4.5 billion to states for broadband infrastructure that, it is estimated, will reach more than 1.2 million home and businesses. Some of the most recent awards include state plans to support broadband deployments of at least 100/100 Mbps speeds. Awards (as recently as last month) include \$794 million to Alabama, Kentucky, Nevada, and Texas to increase access to “affordable, reliable high-speed internet” to more than 292,000 homes and businesses. Other awards include \$90 million to connect



IPv4: Running Out of Capacity?



Bridge the Digital Divide without IPv4 Exhaustion

- Expand IP capacity quickly and cost efficiently
- Avoid IPv4 acquisition headaches
- Create a plan for IPv6 transition
- Meet regulatory compliance with Advanced Logging
- Consolidate and simplify operations
- Protect against DDoS attacks



Sign up today to start your 30-day free trial at
A10networks.com/free-trial



nearly 14,000 locations in Vermont, and about \$444 million to connect more than 170,000 locations in Illinois, Indiana and North Carolina.

• **The ReConnect Program through the U.S. Department of Agriculture.**

This program awards both grants and loans for broadband projects in rural areas, and it has boosted its required minimum speeds in a major way. Prior to 2020, ReConnect projects focused on areas where most people didn't have access to network speeds of just 10/1—but the IIJA brought a refreshed stream of \$2 billion for loans and grants to the program and shifted to funding focus on where most people don't have 100/20 Mbps service. Applicants now also have to commit to building out infrastructure that will support symmetrical 100/100 Mbps speeds (something that can only currently be achieved via wired infrastructure) and to participate in the Affordable Connectivity Program. Among the recent grants: \$17.5 million to connect 100 businesses, 76 farms and 22 educational facilities in Halifax and Warren counties in North Carolina; \$12.6 million to deploy fiber to 171 farms, 103 businesses and an educational facility in Douglas, Otter Tail, St. Louis, Stearns and Todd counties in Minnesota; and \$18.7 million for a fiber network to connect 898 farms, 110 businesses and 17 educational facilities in Colorado's Adams, Arapahoe, Cheyenne, Crowley,

Elbert, Kiowa, Kit Carson, Lincoln and Washington counties. The USDA says that during the course of 2022, it announced \$1.6 billion from the third round of Reconnect funding.

• **Rural Digital Opportunities Fund,** finalized in early 2020, a \$20.4 billion program over 10 years to bring fixed broadband service to rural homes and small businesses that lack it. The FCC recently awarded nearly \$792 million through RDOF to six providers to fund new broadband deployments to over 350,000 estimated locations in 19 states. The top three states receiving funding include Illinois, \$212 million, Arizona, \$140 million, and Iowa, \$113 million. "This funding will connect more households throughout the country with high-speed broadband as part of our ongoing work to close the digital divide," said Chairwoman Rosenworcel. "We are confident these

projects can bring quality service to currently unserved areas." This round of funding supports projects using a range of network technologies, including gigabit service hybrid fiber/fixed wireless deployments that will provide end-user locations with either fiber or fixed wireless network service using licensed spectrum. To date, the program has provided more than \$6 billion in broadband deployment to 47 states. Up to \$16 billion will be made available for Phase I of the Rural Digital Opportunity Fund auction, and the remaining Phase I budget, along with \$4.4 billion, will be awarded for Phase II of the auction. While the minimum service tier for RDOF is 25/3 Mbps, there are three faster tiers which are also covered: Baseline, with speeds of at least 50/5 Mbps; "above baseline" at 100/20 Mbps and Gigabit, with speeds of at least 1 Gbps/500 Mbps.



• **Broadband Equity, Access, and Deployment (BEAD) Program:** This is a result of the Infrastructure Investment and Jobs Act of 2021 (IIJA) and appropriates \$42.45 billion for states, territories, the District of Columbia (D.C.), and Puerto Rico (P.R.) to utilize for broadband deployment, mapping, and adoption projects. Each state, D.C., and P.R. will receive an initial allocation of \$100 million -- and \$100 million will be divided equally among the United States Virgin Islands, Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands -- to support planning efforts including building capacity in state broadband offices and outreach and coordination with local communities. States, territories, D.C., and P.R., leveraging initial planning funds that will be made available through the program, will submit a 5-year action plan.

The National Telecommunications and Information Administration (NTIA) is overseeing the BEAD program, which is essentially the centerpiece of the effort to finally close the digital divide and connect every American. Not only is it the largest program, dollar-wise, that is dedicated solely to broadband, but it is funding that is almost entirely ahead of the industry. While some funds have been disbursed to the states for planning purposes and to bolster their broadband offices, the state-level awards are not slated to be announced until

June of this year. The states have to then take that money and go through their own processes to award it, in order to get it into the hands of the companies that will actually build the networks—a process that will take at least a year. Each state will then work its way through the five-year action plan—meaning that some of the most sustained local and regional spending has yet to even be tapped.

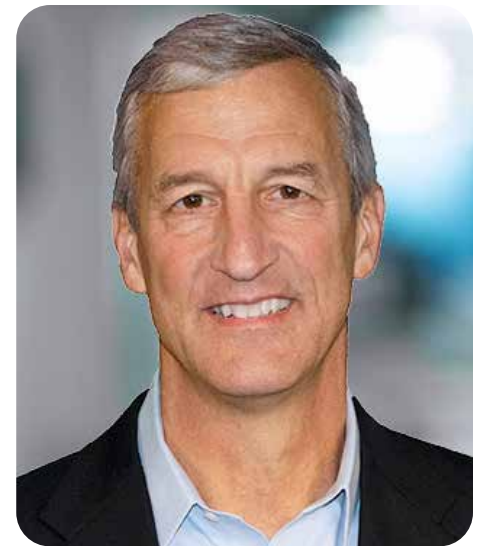
Deployment challenges

Extending broadband access has to be the baseline effort to close the digital divide in whatever form it takes, so that the most basic question of, “Is broadband internet service available?” can be answered with a “yes.”

The funding that is pouring into broadband by and large focuses on providing sufficient subsidies so that network build-out becomes financially feasible when it otherwise would not be. But in the end, that might be one of the easier problems to solve – and money for infrastructure doesn’t necessarily address all of the hurdles involved in actually connecting every American. Some of those include:

- **Understanding program requirements to get the necessary funding.** There are always bureaucratic hoops to jump through to receive taxpayer dollars, both in proving that they are necessary and that the recipient will make the most efficient use of them to actually provide the promised service.

But Dave Stehlin, CEO of the Telecommunications Industry Association (TIA), says that for BEAD in particular, there are program requirements that have never been part of previous, similar programs: Cyber and supply chain security requirements, for instance, that tie into executive orders or work by the National Institute of Standards and Technology; or requirements to build climate-related resiliency into new infrastructure deployments. Stehlin said TIA has heard from ISPs both large and small that they need help understanding the stipulations



“Nobody wants to waste \$42 billion. ... The longer we wait to make this happen, the less value that \$42 billion has. So how do we get this thing up and running as fast as possible?”

Dave Stehlin, CEO, TIA

How many digital divides are there?

The simplest and most obvious definition of the “digital divide” is a binary one: Either you have internet access, or you don’t. But that simplistic approach doesn’t capture the nuances of *why* an individual or household doesn’t have internet access and whether availability is their only barrier to adoption.

“There are many ways to measure the divide. In fact, there are multiple divides,” says the Internet Society, which offers up a number of ways to assess the digital divide. Availability is the first one, and is related strictly to whether connectivity infrastructure is present to be able to connect the end-user household to the internet. While improving availability is the obvious starting point for defining and mapping the digital divide, it isn’t the only factor in play to actually close the gap. Other aspects of the digital divide are:

Affordability, including the cost of broadband service compared to other essential goods and services, and what percentage of a user’s income has to go toward paying for them. Affordability came into sharp focus during the Covid-19 pandemic, first leading to the Emergency Broadband Benefit program that helped subsidize the cost of broadband services for low-income households with a \$50-per-month credit (\$75 per month if the household was on Tribal lands). Congress eventually replaced the EBB with the new, \$14 billion Affordable Connectivity Program, which offers a \$30-per-month subsidy of broadband services for non-Tribal households and maintains the \$75-per-month subsidy on Tribal lands.

Quality of the service. How much speed is available to a given household, and is it enough for what they need? As RSV found in its report, low-income areas of the country tend to also have the lowest available service speeds. And this goalpost is constantly moving, with networks in high-density areas more likely to receive privately financed upgrades to support additional capacity and performance. The Federal Communications Commission still defines “broadband” service as one that meets minimum speeds of 25 Mbps in the downlink and 3 Mbps in the uplink. But the FCC’s 12th Measuring Broadband America report on fixed (wired or wireless) internet access, meant to be an annual “ongoing rigorous nationwide study of consumer broadband performance in the United States,” found that as of late 2021, ISPs were advertising service tier download speeds ranging from 100 Mbps to 1.2 Gbps, up 59% from the previous report – and they were meeting or exceeding those advertised speeds, the majority of the time.

The underlying technology is also a huge factor in the performance of the service. The FCC’s report found that the weighted mean advertised

speeds for DSL connections were 24 Mbps, compared to 305 Mbps for cable and 510 Mbps for fiber-based connectivity.

Relevance to the end-user and/or community. Is there content that the end-users are interested in, are there locally available apps, and is the content in a language or mode that the end-user can understand? What kind of learning curve do users face in picking up new digital skills in order to use the internet? This can be particularly challenging for users whose primary language is not English, who have a disability, or who are disinclined toward new technology adoption. Do users think that the internet will be useful for them—useful enough to pay for it and learn how to make use of it?

A recent analysis of data from the National Telecommunications and Information Administration’s Internet Use Survey showed that a significant majority—58%—of an estimated 24 million offline households, reported that their main reason for not using the internet at home is that they had no need or interest in doing so. The respondent with this point of view was likely to be around 60 years old and white, with no postsecondary education.

Access to equipment. While it may seem like smartphones are ubiquitous, they aren’t necessarily always the best option for accessing, interacting with and relaying information for work, school or services like telemedicine. NTIA has noted that a “computer with a relatively large screen and appropriate input methods ... is typically considered the superior tool for important tasks like doing homework and working remotely.” NTIA’s Internet Use Survey noted that while wealthier households may have both mobile data and fixed home internet service, people in lower-income households are more likely to rely exclusively on mobile data plans. And there were notable disparities in device use. Laptop use by children was up from 2019 in the survey, likely due to remote learning. But only 54% of Americans with disabilities reported using a PC or tablet, compared with 70% who did not report having a disability. The gap in PC and tablet usage between white Americans and Hispanic or black Americans narrowed from 2019 to 2021, NTIA said. More than 70% of white, non-Hispanic Americans reported that they used a tablet or PC to access the internet in 2021, while 57% of black Americans reported the same (up from 55% in 2019) and 54% of Hispanic Americans (up from 50% in 2019).

The Internet Society also pointed to security/privacy and digital literacy as additional gaps that can widen digital disparities, so that individuals and communities can’t take equal advantage of the economic, health and educational opportunities afforded by internet access.

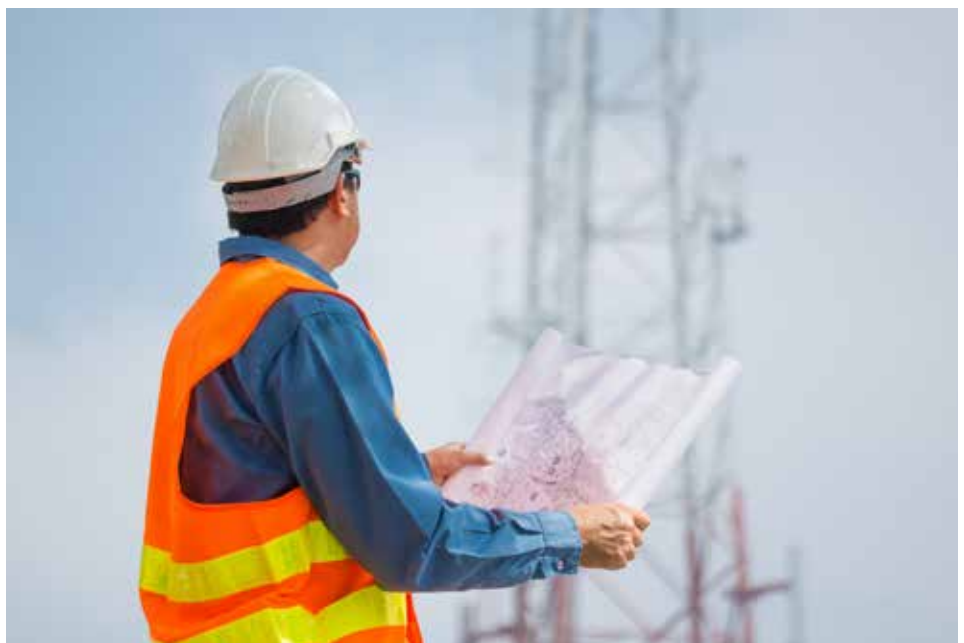
that Congress has placed on the BEAD funding; the organization is planning a two-day, in-person event in late April, with state and federal representatives as well as network operators and vendors, to collaboratively hash out how to bring BEAD to fruition. “Nobody wants to waste \$42 billion,” says Stehlin. And with rising inflation, he points out, “the longer we wait to make this happen, the less value that \$42 billion has. So how do we get this thing up and running as fast as possible?”

• **Supply chain issues.** Gary Bolton of the Fiber Broadband Association is just leaving a tour of an expanding fiber manufacturing facility in Hickory, North Carolina when reached by RCR Wireless News to talk about closing the digital divide. Stehlin, too, made such a tour recently, and says that the capacity upgrades being made to such facilities make him confident that fiber availability won’t be a bottleneck to deployments. He sees a bigger challenge in the lack of U.S.-based semiconductor components and manufacturing capability and capacity, something that last year’s CHIPS and Science Act was supposed to address with tens of billions of dollars in incentives and tax breaks to build up American semiconductor manufacturing. Indeed, several chip manufacturers such as Intel, Micron and Qualcomm and GlobalFoundries have already announced new plants or expansions of existing facilities. But those can take

years to be up and running, and Stehlin says that semiconductors make up between 45-75% of the bill of materials for electronics related to fiber broadband deployment—meaning, he says, that a waiver for requirements on buying American-made products is going to have to come into play for at least near-term federal funding for network builds.

• **Workforce.** There may be plenty of funding at the ready, but if there aren’t enough skilled workers, networks still won’t be deployed quickly. Both wireline and wireless industry groups have been sounding the alarm for several years that there aren’t enough installers, tower climbers, fiber technicians and other crucial workers available to support the deployment of fiber and 5G. While community colleges, apprenticeship programs and training

programs are working to fill the gap, it still looms. A report published this month that looked at a single state, Maine, and its broadband workforce and strategy, said that the state faces “significant workforce gaps which are likely to impede investment and development of ... broadband network[s].” Maine’s is already projected to have a shortfall of 3,240 workers in the top broadband occupations (half of which are related to physical construction, installation or maintenance of networks) even without additional investment in broadband. More broadband funding actually makes the problem worse: With another \$100 million in broadband funding (the minimum of what Maine will get from BEAD, with zero private investment), the shortfall increases to 3,624 workers. If Maine were to garner \$350 million in broadband



investment, the gap widens to 4,531 workers. And that's just a snapshot of one state.

- **Scaling.** Bolton of FBA believes there won't be a fiber bubble, but a sustained investment cycle due both to the cadence of programs and also because the industry simply can only consume so much capital at a time. Still, the scale of deployment ahead is significant: He expects more fiber to be deployed in the next five years than has been deployed in history so far.

Meanwhile, on the wireless broadband side, one of the cases for choosing to deploy 5G is the ability to connect people both with fixed and mobile broadband, points out Peter Linder, head of 5G marketing for Ericsson North America. The customer growth in Fixed Wireless Access (FWA) connections that T-Mobile US and Verizon in particular, saw during the course of 2022 has prompted some more serious consideration of the role that FWA will play in broadband deployments, he adds. "If you're going to say, 'We are going to dig ourselves out of the digital divide' [by deploying fiber] and see that as the only mission, it's a steeper mountain to climb than if you would leverage the wireless infrastructure as well," Linder continues. Linder says that as more midband spectrum comes online across the U.S., that opens up the opportunity for 5G FWA to scale up even further. Ultimately, he sees three factors intersecting to determine the

scale of FWA: Innovation and economies of scale on the terminal side offering even better customer experience at a lower prize; the depth of midband spectrum and massive MIMO deployment for coverage and capacity; and the extent to which "pure" FWA use cases evolve from, say, a utility deploying FWA for its own connectivity purposes, to serving external end-users and potentially adding mobile connectivity as well.

But scaling a network doesn't only mean adding on to the access network, whether wired or wireless. Operators also have to think about a myriad of other systems, from customer care to OSS/BSS to network security and basic networking—and some of those things can sneak up on providers.

"For different ISPs that are expanding their networks, when they add subscribers or they add a lot more traffic or are planning to in their future with [federal or private] funding ... they have to make changes to their core network as well," says Terry Young, director of service provider marketing at A10 Networks. That can be to augment capacity, but also because due to past budget constraints, ISPs may simply not have had the ability to make upgrades or architectures changes that they would have liked to. "They have to make sure that the network they're building will meet future growth requirements as well," Young said. "Building out access consumes the majority of budget and



"If you're going to say, 'We are going to dig ourselves out of the digital divide' [by deploying fiber] and see that as the only mission, it's a steeper mountain to climb than if you would leverage the wireless infrastructure as well."

Peter Linder, Head of 5G Marketing, Ericsson North America

resources and so, essential long-term network upgrades like carrier grade networking and security can initially get overlooked."

Young said that scaling can be particularly challenging for the small broadband providers who tend to serve rural and remote communities. Adding 10,000 customers may not be a big deal for a network operator with millions of customers—but for an ISP with 5,000 customers, that means tripling its user base. "There are a lot of ISPs that are pretty small, under 2,000

subscribers, and they are walking into carrier-grade expectations that they really didn't have to meet in the past," she says. Suddenly, providers may find themselves scrambling to scale up DDoS protection and firewalls for new and potentially vulnerable connections, such as crucial rural healthcare facilities; or, for enough IP addresses for new customers, especially when small companies have to compete with the likes of web-scale giants AWS, Alibaba and Tencent for the dwindling supply of IPV4 addresses.

"These capabilities that you're building into your data center and your core network, your cybersecurity and your carrier-grade networking, are key capabilities that will make a difference in your subscriber availability, long term, as well as your ability to grow in a cost-effective manner," Young says.

The affordability factor, and others

And who, exactly, are those customers who have yet to be connected? According to the FBA/RVA 2022 report, among those who have begun using the internet in the past four years, 37% were non-white and 58% had household incomes below \$50,000 per year.

Affordability is the biggest factor in whether or not a household has broadband, according to research by the Pew Research Center. Across a variety of factors—race, ethnicity, gender; across urban, rural or

suburban locations—household income was the strongest indicator of whether or not the household had internet service. Pew found that while only 8% of adults with annual incomes of more than \$75,000 do not have a home broadband connection, that figure is 43% for adults with annual household incomes of less than \$30,000 per year.



"These capabilities that you're building into your data center and your core network, your cybersecurity and your carrier-grade networking, are key capabilities that will make a difference in your subscriber availability, long term, as well as your ability to grow in a cost-effective manner."

Terry Young, Director of Service Provider Product Marketing at A10 Networks

While some estimates have pegged the average monthly internet bill at around \$50-\$70 per month, Parks Associates found in 2022 that US households with internet service pay an average of \$116 per month for home internet, a figure which included both standalone and bundled internet services.

Pew found that 45% of people who don't have broadband cite the high cost as the primary reason that they don't have it; 37% also cite the cost of a computer. (It should be noted that 45% say that they don't have home internet because their smartphone connection allows them to do everything they need to.)

The federal funding aimed at closing the digital divide is taking aim at the affordability gap as well, through aforementioned efforts to connect community and educational institutions that serve minority communities and Tribes, as well as the establishment of the Affordable Connectivity Program that makes a monthly service subsidy something that is available on a long-term basis, not only during the pandemic emergency. But some of the work here will be on providers to provide less expensive, competitive offers to attract customers who are often hit the hardest by inflating costs—and also to convince people that home internet service is worth the time and expense, when their smartphones are already so capable.

There is a persistent and well-known



gap of about 6-9% between rural and urban populations in terms of their internet usage. But when you look at sheer numbers, the number of unconnected urban/metro-area users is about three times the number in rural areas—which has policy implications for how funds should be used to actually connect Americans who do not have home broadband service.

What are the different root causes of being unconnected from home broadband in rural areas vs. in urban areas? The Bipartisan Policy Institute, a Washington think tank, breaks it down this way: “In rural areas, coverage and affordability are the challenges. In urban and metro communities, digital literacy and education are the principal reasons.” The organization also says

that affordability is a secondary barrier in metropolitan areas because there are more readily available programs to subsidize costs. Instead, it says, “The key challenge with urban adoption rates for broadband is that many households choose not to have it even if it is available.”

This tracks with more recent data from NTIA’s Internet Use Survey shows that a significant majority—58%—of an estimated 24 million offline households, report that their main reason for not using the internet at home is that they have no need or interest in doing so. The respondent with this point of view was likely to be around 60 years old and white, with no postsecondary education. Another 18% said that they don’t

have broadband service because it is too expensive, so presumably programs focused on affordability can make a dent in the usage divide, but probably not close it completely.

And some data suggest that there are additional disparities in service that have yet to fully come to light, even for metro users in the same geographic area using the same service. In a data project focused on assessing aspects of the urban digital divide and equity, researchers from the University of Chicago compared the service experienced by two households in different Chicago neighborhoods that were subscribed to the same service plan from an ISP. Comparing Ookla test data and network performance data that was collected via in-home devices that plug

into an individual home's network, the researchers found that during a month-long period from July 2021 through August 2021, the wealthy household consistently saw both lower latency and speeds that were about 100 Mbps faster than the household located in a poorer neighborhood. "Even if we can achieve equity in availability and adoption, we will still be left to ensure that the Internet is empowering communities with equal opportunity and connectivity for all," the project concludes.

There's also a larger question of national competitiveness that broadband also attempts to answer. "My personal opinion is that I hope we don't build out a network with this type of cost and have people sit around watching one-minute-long videos," said TIA's Stehlin. "This is to help the country become more competitive, and help the country innovate." Uneven digital skills across the American workforce, even as enterprises push digitalization

as a primary focus, affects competitiveness. The federal funding going into closing the digital divide also attempts to address this skills gap, through a provision called the Digital Equity Act that puts \$2.75 billion in grants to states in play over five years to, among other things, help workers and businesses adapt to the increasing need for basic digital literacy as well as support the development of industry-specific digital skills.

So, does the influx of federal funding mean that the digital divide will finally be closed? FBA's Bolton, TIA's Stehlin and Ericsson's Linder all seemed confident that the infrastructure gap will indeed be essentially erased by the end of the decade through a combination of private and public funding—although the goalposts are always moving on speed and whether equivalent services are ubiquitously available. And it seems likely that human adoption and the accompanying skills acquisition may, in the end, be the tougher challenge.

Key takeaways:

- While the typical primary focus on the digital divide is one of access to infrastructure, the gap can be measured in a variety of ways, including affordability and quality of service.
- The Covid-19 pandemic has been an unprecedented driver of public broadband funding, because broadband increasingly enables not just "nice to have" entertainment and shopping, but essential access to remote work, telehealth and educational access.
- More than \$100 billion in federal funding over the next five to 10 years, along with tens of billions more in private investment, are expected to drive broadband expansion to new reach, speeds and scale.
- Throwing that much money at closing the digital divide will probably close the infrastructure gap, but it doesn't necessarily solve all the associated challenges with deployment and operation of the networks, or with adoption by end users who face affordability issues. ((...))

Featured Companies



A10 Networks

A10 Networks (NYSE: ATEN) enables service providers, cloud providers and enterprises to ensure their 5G networks and multi-cloud applications are secure. With advanced analytics, machine learning and intelligent automation, business-critical applications are protected, reliable and always available. Founded in 2004, A10 Networks is based in San Jose, Calif. and serves customers in 117 countries worldwide. For more information visit: a10networks.com or tweet @A10Networks.

Need guaranteed leads? Thought leadership? Incremental content marketing opportunities?

Sponsor an *RCR Wireless News* multi-platform, editorial program and receive the following benefits:

Editorial Webinar – sponsorship includes 250 guaranteed leads, participation as sponsored guest and recognition as sponsor in all promotional materials. Sponsors will receive webinar registration and attendee list, responses to pre and post surveys and polling responses gathered during webinar.

Editorial Feature Report – in addition to recognition as sponsor in program promotion, sponsorship includes 250 guaranteed leads, distinct from webinar leads, one-page ad spread or advertorial in feature report, and responses to lead capture survey questions.

For information contact sales@rcrwireless.com

Fast facts about the *RCR Wireless News* digital network

- 382,000 monthly page views
- 170,000 unique monthly visitors to websites
- 81,000+ opt in newsletter subscribers
- 220,526 monthly video minutes viewed on *RCR Wireless News* Youtube channel
- 45,000 leads generated annually
- Industry leading demand generation programs and results



UPCOMING 2023 EDITORIAL PROGRAMS INCLUDE:

FEBRUARY 2023

- 5G Monetization Forum Key Findings
- Getting to ubiquity: The urban and rural digital divide
- Fighting the newest breed of DDOS attacks on data centers
- What will the wireless workforce look like in 2030?

MARCH 2023

- Private 5G for IoT—plotting timelines, defining applications, and making bets
- Private vs. public vs. hybrid cloud—what's right for operators in the shift to cloud-native?

APRIL 2023

- The evolution of T&M in the move to disaggregated, cloud-native networks
- When will small cell densification happen at scale?

MAY 2023

- How will Open RAN principles inform the development of 6G?

JUNE 2023

- Is fixed wireless the killer 5G use case?
- AI on the edge—when everything is connected to the cloud

Each program is limited to three (3) sponsors