Texas Broadband Plan 2022

TEXAS BROADBAND DEVELOPMENT OFFICE

Texas Comptroller of Public Accounts

BroadbandForTexas.com

TEXAS BROADBAND DEVELOPMENT OFFICE

U.S. Census Bureau data indicate almost 2.8 million Texas households and 7 million people lack broadband access. Twenty-three percent of Texans are unable to attend online classes, see a healthcare provider from their living room, fill out a job application online, start a business or access online marketplaces from their kitchen table. These barriers negatively affect Texans' quality of life and limit economic opportunities for people and the state overall.

According to a 2016 Federal Reserve Bank of Dallas report, this problem disproportionately affects rural communities, communities of color and low-income families. Since that report's publication, the COVID-19 pandemic has accelerated the adoption of technology for some but expanded the digital divide for others. The digital divide refers to the gap between those with broadband access and those without, whether caused by a lack of infrastructure, digital literacy, affordable service or access to devices.

In an effort to close this divide, the 87th Texas Legislature created the Broadband Development Office (BDO) at the Texas Comptroller of Public Accounts. The BDO is charged with broadband expansion, which includes establishing an official statewide plan for expanding access. The Legislature appropriated $5 million to the Comptroller to administer the program. Additionally, the American Rescue Plan Act enacted by the federal government has allocated $500.5 million to Texas for broadband expansion, while the Infrastructure Investment and Jobs Act will allocate at least $100 million.

These combined state and federal dollars comprise a valuable resource, and our office is committed to using these funds as efficiently and effectively as possible. In March 2022, we launched the Texas Broadband Listening Tour, conducting regional town halls in 12 Texas communities so we could hear directly from Texans about their experiences with broadband. These stories, some of which appear in this report, are powerful and moving. Additionally, we issued an open invitation to all Texans to participate in a public broadband survey — available online, in print and via telephone in both English and Spanish. At the time of publication, more than 16,000 Texans have used our survey to share their broadband experiences.

Sentiment has been consistent: slow data speeds, unreliable access, affordability and coordination are critical areas of concern for Texas families, businesses, educators and farmers. An important, recurring theme has been the reminder that though high-speed internet may once have been a luxury, it is now a necessity. Texans need reliable, high-speed connectivity for public health, safety, education and modern agriculture.

We compiled lessons learned from the Texas Broadband Listening Tour, survey responses, analysis of results and staff recommendations to create this initial Texas Broadband Plan. We hope you find this plan useful, insightful and sound, as a road map for improvement. This is a monumental task, and we must work together to accomplish it. Expanding broadband access will require collaboration and partnerships between local governments and private entities, across counties and among residents.

We invite you to learn more about the BDO and our mission to connect Texas at BroadbandForTexas.com.

Sincerely,

Glenn Hegar
Texas Comptroller of Public Accounts

Table of Contents

Glossary of Terms

GOVERNMENT

ACS **American Community Survey**	Demographics survey program conducted by the U.S. Census Bureau
ARPA **American Rescue Plan Act**	Federal bill signed into law on March 11, 2021, authorizing approximately $1.9 trillion in economic stimulus
BDO **Broadband Development Office**	Created by the 87th Texas Legislature within the Texas Comptroller of Public Accounts (CPA) to focus on broadband challenges
BEAD **Broadband Equity, Access & Deployment**	Federal funding program under the IIJA
CPA **Texas Comptroller of Public Accounts**	Led by Texas Comptroller Glenn Hegar, oversees and provides direction to the Broadband Development Office
CPF **Capital Projects Fund**	Federal funding program under the ARPA
FCC **Federal Communications Commission**	Federal government agency regulating communications by radio, television, wire, satellite and cable across the U.S.
HIFLD **Homeland Infrastructure Foundation-Level Data**	Database of geospatial information across multiple domains
IIJA **Infrastructure Investment and Jobs Act**	Federal bill signed into law on Nov. 15, 2021, authorizing approximately $1 trillion in infrastructure investment
LODES **LEHD Origin-Destination Employment Statistics**	U.S. Census database focused on workforce dynamics (LEHD stands for Longitudinal Employer-Household Dynamics)
NTIA **National Telecommunications and Information Administration**	Federal agency focused on telecommunications and information policy issues to expand broadband access and adoption

Glossary of Terms

TECHNOLOGY

DOCSIS3+ **Data over cable service interface specification**	Telecommunication standard that allows the addition of broadband data transfer to an existing cable television system
FTTH **Fiber-to-the-home**	Broadband network architecture using optical fiber to provide all or part of the local loop used for last-mile telecom
HSBB **High-speed Broadband**	Per FCC guidelines, an internet connection that supports 25 Mbps download and 3 Mbps upload speeds
ISP **Internet Service Provider**	Company that provides subscribers with access to the internet
Mbps **Megabits per Second**	Measure of speed an internet plan offers

MISCELLANEOUS

ARPU **Average Revenue per User**	Measure used by communications companies defined as total revenue divided by number of subscribers
B2B **Business to Business**	Transaction conducted between one business and another (e.g., ISP to retailer)
B2C **Business to Consumer**	Transaction conducted between one business and direct consumers (e.g., ISP to households)
B2G **Business to Government**	Transaction conducted between one business and a government agency (e.g., ISP to a state agency)
MSA **Metropolitan Statistical Area**	Geographic region with high population density and close social and economic ties throughout the area

Executive Summary

Affordable, high-quality internet service has become an essential part of daily life, driving education, health care, job training, economic development, agriculture and so much more. The Texas Broadband Plan provides a road map to expand broadband availability and close the digital divide in Texas.

Broadband expansion has been a focus of the Texas Legislature for many years, gaining momentum in 2019 with the establishment of the Governor's Broadband Development Council through the passage of House Bill (HB) 1960 of the 86th Legislature, Regular Session. Momentum accelerated throughout the COVID-19 pandemic and generated an unprecedented demand for connectivity. Remote learning, access to telemedicine, economic development and other facets of life all hinge on the availability of quality high-speed internet.

Gov. Greg Abbott prioritized expanding broadband access as one of five emergency items for the 87th Legislature in his State of the State address on Feb. 1, 2021. In response, the Legislature passed HB 5, a landmark bill to help close the digital divide and ensure that every resident can take full advantage of the economic and social opportunities afforded by broadband access. HB 5 also created a state Broadband Development Office (BDO) under the Texas Comptroller of Public Accounts (Comptroller or CPA) to promote the expansion of broadband access across Texas.

Because potential federal funding and additional state funding are yet to be determined, this initial statewide plan is based on several guiding principles that will create the foundation for future federal and state funding. The plan will become more defined over time as federal agencies finalize program guidance and funding allocations. In addition, more detail will be added if the Texas Legislature appropriates additional state funding for new programs for broadband expansion. Lastly, as the BDO creates a more granular address-level broadband availability map, those data will help quantify the digital divide in ways that are impossible at the drafting of this initial plan and will allow the BDO to operate with greater precision moving into the future.

The guiding principles included in this initial plan include:

- Use both existing and emerging funding sources and investments toward areas unserved or underserved by broadband service.
- Encourage connectivity for anchor institutions, including schools, libraries, hospitals and other medical providers, public safety entities, institutions of higher education, community/region support organizations and local governments.
- Promote coordination, cooperation and communication among private and public infrastructure owners; communities; schools; nonprofits; project partners; and local, regional, state, tribal and federal governments.
- Remain technology-agnostic while embracing all avenues to quality broadband service for Texas residents, businesses, institutions and communities.
- Remove barriers to residential, business and institutional broadband adoption in coordination with infrastructure investments.

This plan contains observations from outreach conducted, background on broadband terminology and technology, and areas of focus to close the digital divide in Texas. This important assessment of the current state of broadband in Texas creates a framework for establishing grant programs that reach the areas of greatest immediate need and establish a possible framework for future funding opportunities. The state of Texas, federal government and broadband industry partners are taking steps to improve the quality of data to understand the current state of broadband at a local level and help prioritize efforts across Texas' 12 Comptroller economic regions.

Next steps are organized into three areas of focus aimed at maximizing the use of available funding, providing for transparency and accountability, and understanding and overcoming barriers. By early 2023, the BDO will:

- Establish a broadband-focused, federally compliant grant program,

Executive Summary

- Publish a broadband availability map, and
- Manage recurring coordination and communication opportunities across stakeholder groups.

This plan is a living document that captures what is known at the time of publication. For example, the recently released guidance from National Telecommunications and Information Administration (NTIA) includes specific acceptable uses and restrictions tied to the Infrastructure Investment and Jobs Act (IIJA) funding. The BDO is exploring how these federal restrictions could constrain broadband expansion efforts in Texas, including putting added pressure on an already strained supply chain by prioritizing a single broadband technology (fiber optic) and asking local governments to contribute a 25 percent match to access funding. The BDO will review and revisit this initial plan to account for updates to available funding, limitations in federal guidance and increasing broadband availability, and to reflect changes to the law and program guidance.

Texas faces a monumental task: Connecting over 1 million households to high-speed broadband, improving connectivity for over 5.6 million households, improving affordability of broadband for 3.6 million households and assisting 3.8 million Texans with digital literacy challenges. This plan is a foundation upon which the Texas Legislature, the BDO and other stakeholders can build actionable programs.

2022 Broadband Plan Summary

Fact	Observations	Actions taken to date	Future Area of Focus	Target Completion Date	Anticipated Outcome
2.8 million Texas households do not have access to high-speed broadband. **5.6** million households do not have quality internet.	36% of statewide survey respondents reported a lack of high-speed broadband at their residence. 78% of surveyed elected officials ranked access as the top priority for their community. FCC maps are not an accurate representation of the served, underserved and unserved areas in Texas; however, as of June 2022, this data remains the most universally accepted.	The BDO established an interagency council of state agencies to coordinate broadband initiatives across state government. State agencies developed capital development plans to expand broadband access through their networks. The BDO solicited feedback from local communities, local officials and ISPs through surveys, roundtables and regional townhalls. Since May 2022, the BDO has hosted monthly ISP roundtable discussions to help ISPs understand federal funding requirements, facilitate mapping data requests, expand community involvement, encourage Affordable Connectivity Program (ACP) enrollment information and provide a platform for industry to report areas of concern to the BDO.	Establish federally-compliant grant programs, including advocating for capital projects proposed by other state agencies.	Late Summer 2022	The BDO will request application approval from U.S. Department of Treasury for broadband grant program. If approved, Treasury will distribute $500.5 million in CPF funds for use in Texas. However, Treasury recently updated its CPF guidance which includes significant restrictions and limitations on eligible projects. The BDO is exploring how federal restrictions related to CPF and IIJA could constrain broadband expansion efforts in Texas, including putting added pressure on an already strained supply chain by prioritizing a single broadband technology (fiber optic) and asking local governments to contribute a 25 percent match to access funding. If the certain agency plans are not eligible for federal funding, these plans could establish a framework of shovel-ready programs for state funding.
			Develop a map identifying broadband availability to Texas households and businesses.	January 2023	Publish the Texas Broadband Availability Map to provide more accurate and timely data on broadband access in Texas to inform future funding decisions by the BDO and state policymakers.
3.8 million Texas residents face digital literacy challenges. **4.9** million Texas residents over 25 do not have a high school diploma. **3.8** million Texas adults are over the age of 65.	Low digital literacy is more common in elderly individuals and those in communities with lower educational attainment. A sizeable portion of this population may need mentoring to improve digital literacy.	Comptroller Hegar and the BDO developed a partnership with AARP to provide older Texans with connectivity and digital literacy support. Comptroller Hegar participated in a tele-townhall with AARP members to discuss the BDO's efforts. Comptroller Hegar and the BDO partnered with First Lady Cecilia Abbott to promote the R.E.A.L. Friends Don't nationwide campaign; Using awareness and education, the campaign focuses on protecting children from harmful online content. Understanding that communities in unserved and underserved areas may not have access to online media, the BDO deployed local radio spots, newspaper advertisements and direct mailers to reach unconnected Texans.	Develop additional partnerships with state agencies, nonprofits and associations that service residents with digital literacy challenges.	Ongoing	By identifying key stakeholders with existing networks to reach communities in need, the BDO can expand its digital literacy outreach efforts and identify new opportunities for federal and state support.
			Request federal funding to develop a digital equity plan	July 2022	
			Develop a State Digital Equity Plan.	Summer 2023	
			Utilize Digital Equity funding to implement the state plan.	January 2024	

2022 Broadband Plan Summary

Fact	Observations	Actions taken to date	Future Area of Focus	Target Completion Date	Anticipated Outcome
3.6 million households may experience affordability challenges with HSBB services. **4.4** million households in Texas are served by only a single internet provider.	54 percent of statewide survey respondents reported that their internet connection is not affordable. ISP competition contributes to high-quality internet and service affordability. Lack of competition impacts access in many regions in the state. Half of the Texas Comptroller economic regions have a median household income of less than $55,000. For those families, an internet bill of $70 a month can be unaffordable.	The ACP, which was created under the bipartisan infrastructure bill signed in November 2021, provides eligible households a discount with participating providers of up to $30 per month toward internet service for eligible households and up to $75 per month for households on qualifying Tribal lands. The BDO has made available information about the initiative through various outreach efforts.	Work with the BDO Board of Advisors to define "low cost service", which is a requirement for entities to participate in federal funding programs.	July 2023	Affordability is a barrier to adoption in both served and underserved communities. Developing programs to assist residents with the greatest need will improve access to and adoption of broadband services.
			Develop additional partnerships with state agencies, nonprofits and associations that serve residents with affordability challenges.	Ongoing	
			Identify opportunities for additional state support for communities in need.	Ongoing	
The digital divide prevents Texans from accessing services necessary to health, education, employment and safety.	Broadband access drives opportunities for nearly all Texans – opportunities for education, health care, workforce and business development, infrastructure, public safety and much more. General lack of awareness about local, state and federal opportunities to expand and improve broadband access.	The BDO developed a Broadband Toolkit for local community leaders to engage in broadband expansion planning and development. The BDO will continue to expand the toolkit as additional needs are identified or greater awareness is required. Since January 2022, the BDO has published a monthly newsletter to push direct updates and other news to stakeholders, promote transparency, and generate awareness of the BDO's mission to close the digital divide. As of May 2022, the newsletter serves more 4,200 subscribers. The BDO staff frequently attend engagements around the state to provide information and updates to local communities. The BDO has a dedicated outreach coordinator who works with stakeholders and local communities.	To close the digital divide, promote resources to expand access to and adoption of broadband to communities in need.	Ongoing	IIJA funds will require states to conduct extensive outreach and coordination with local communities. Broadband offices must demonstrate that state and local plans are aligned. Local communities expressed significant concern about barriers to broadband expansion, including limited resources and staff expertise. By promoting available resources and developing new ones, BDO can support local communities in developing local plans, launching partnerships and increasing broadband access in unserved and underserved areas across the state and close the digital divide.
			Execute a technical assistance contract to facilitate low-cost technical services for local community leaders to support the development and implementation of local broadband action plans.	Summer 2023	
			Continue to publicize the resources available to eligible entities via staff outreach, the BDO website, digital media and other distribution channels.	Ongoing	

2022 Broadband Plan Summary

Fact	Observations	Actions taken to date	Future Area of Focus	Target Completion Date	Anticipated Outcome
Unknown amount of federal funding available to Texas	Only 11% of elected officials surveyed indicated that they have the financial resources necessary to meet their community's broadband needs.	BDO established weekly coordination meetings with federal agencies to better understand the complex federal requirements for programs under both CPF and IIJA. BDO participates in a national network of state broadband offices to learn from and coordinate with other state offices on program development and implementation.	Submit plans and other necessary deliverables required to access federal broadband funding.	Late Summer 2022	The first step to access federal funding is submitting a successful application. The BDO is working closing with Treasury and NTIA to craft plans that conform to strict federal requirements and state law.
			Identify where state legislative action is recommended.	January 2023	If it becomes clear that federal and state compliance requirements are not compatible, the BDO may recommend legislative action on how to improve access to and use of federal funding.
Additional state funding is needed.	49% of elected officials who responded to the survey indicated that their entity has a broadband plan in place or is currently developing one. The IIJA requires matching funds of not less than 25 percent of project costs to be provided by eligible entities, subgrantees or provided in concern with its subgrantees.	The BDO is evaluating potential funding needs based on regional observations, future broadband availability mapping and federal funding restrictions.	Identify opportunities for additional state funding to support local communities and maximize access to available federal funds.	February 2023	The digital divide is great and will require continued financial support from the state legislature, including assistance with the IIJA match requirement.
		The BDO is gathering broadband expansion plans and programs developed by state agencies, counties, cities and other local entities to understand the framework of plans and proposals.	Improve coordination and partnering with state agencies, local communities and stakeholders to identify future funding opportunities. Solicit input from the BDO Board of Advisors regarding the expansion, adoption, affordability, and use of broadband service and the programs administered by the office.	Ongoing	State, local and business plans are the framework upon which development decisions can be prioritized and funded. IIJA funds will require states to conduct extensive outreach and coordination with local communities. Broadband offices must demonstrate that state and local plans are aligned.

Outreach

Texas spans 268,596 square miles and has a population that is expected to reach 30 million residents in 2022, making it the second-largest U.S. state by both area and population. The 12 economic regions defined by the Comptroller were used to inform outreach efforts and identify the unique challenges and opportunities within each region. In March 2022, the BDO began to gather input from citizens across the state. The BDO provided multiple platforms for Texans to share perspectives on broadband in their communities, including:

- 12 in-person regional community forums.
- A public regional survey distributed online, in print and via telephone in both Spanish and English.
- 66 virtual stakeholder roundtables, including regional and statewide options.
- 70 one-on-one interviews.
- A survey of public officials.

These efforts were designed to foster the BDO's understanding of the challenges that Texans face in regard to broadband access. Input from citizens, business owners and community leaders was critical in developing this plan.

Discussions

Listening Tour – Texas Comptroller Glenn Hegar and BDO staff conducted town hall forums in each of Texas' 12 Comptroller economic regions. During these stops, Comptroller Hegar and BDO leadership heard testimony from Texans regarding broadband access in their communities.

Participants included:

- Taxpayers
- Community advocates
- Students
- Educators
- Public officials
- Agricultural producers
- Nonprofit representatives
- Internet service providers
- Industry leaders
- Senior citizens
- Healthcare providers

12 Public Town Halls Across Texas

209 Testimonials Given

998 Attendees

Outreach

These insights informed the contents of this report and are shared throughout.

60 Roundtables

631 Texans Registered to Attend

Regional Roundtables – The BDO facilitated 60 virtual regional roundtable discussions – five in each economic region of the state. Roundtable participants engaged in in-depth conversations on specific broadband topics. The discussions were open to the public.

Topics Included:

- **Education** – The digital divide's impact on educators and students in the region. Participants included representatives from schools, school districts, community colleges, technical colleges and universities.
- **Public Sector** – How the public sector is addressing the digital divide. Participants included representatives from city government, county government, regional councils of government and economic development organizations.
- **Public Health and Safety** – The digital divide's impact on public health and safety. Participants included hospitals, police departments, fire departments, emergency services, clinics, mental and behavioral healthcare providers and nonprofits.
- **Business and Industry** – Understanding the relationship between broadband service and the business community in each region, including access, adoption, construction and operation challenges; how existing local, state and federal programs are being utilized; and opportunities to better support businesses. Participants included ISPs, chambers of commerce, business owners, utilities, electrical cooperatives and construction groups.
- **Community Organizations** – Understanding impacts on underserved communities and efforts to improve access, adoption, affordability and digital literacy, and other concerns. Participants included librarians, nonprofits, community foundations and social workers.

6 Roundtables

70 Interviews Conducted

54 Texans Registered to Attend

Statewide Roundtables – The BDO facilitated six virtual, public forums to accommodate participation for those citizens unable to attend in person. These events covered the five topics from the regional roundtable discussions plus a general statewide roundtable that summarized each topic. These forums provided additional opportunity for Texans across the state to participate and provide testimony.

Direct Outreach – The BDO sought direct input from individuals and organizations with unique perspectives as well as those with oversight roles at Texas state agencies. Direct outreach included in-person interviews with individuals and groups. Contributors included state agencies, educational institutions, nonprofits, ISPs, military installations, public safety organizations, commissions, councils and state associations.

Outreach

Public Survey – Alongside the Texas Broadband Listening Tour, the BDO published a survey seeking feedback from Texans about broadband issues in their communities. The surveys were available in both English and Spanish and accessible online, via a toll-free phone number and in paper form at public libraries throughout the state and at Texas Broadband Listening Tour events. Additionally, surveys were distributed through targeted email and social campaigns to communities throughout the state. Participants were encouraged to distribute the survey through their social and real-world networks. A toll-free number was created to accommodate respondents who lacked online connectivity. At the time of publication, more than 16,000 respondents completed the surveys, including 147 in Spanish. Copies of the public survey and elected officials' survey questions are included in Appendix D of this report.

16,241
Survey Responses

Elected Officials Survey – In addition to the public survey, the BDO shared a survey directly with locally elected officials to gather their insights on broadband-related topics. This information was gathered separately from the public to distinguish between perspectives.

47
Survey Responses

Outreach Observations – Community outreach informed every section of this plan. Summarized below are key takeaways and observations from specific outreach efforts.

Of the 16,241 public survey respondents:

45%
have a wired internet connection at home.

36%
reported a lack of high-speed broadband at their residence.

54%
reported that their internet connection is not affordable.

Of the 47 elected official survey respondents:

78%
ranked access as the top priority for their community.

49%
have a broadband plan in place or are currently developing one.

11%
reported that they have the financial resources necessary to meet their community's broadband needs.

Outreach

Texas Broadband Listening Tour – Comptroller Glenn Hegar and BDO officials heard from Texans about their broadband experience and subsequent impacts on their lives and businesses. Accessible, affordable high-speed broadband is a critical need for all communities – rural, urban and suburban. Broadband access drives or hinders opportunities for nearly all Texans – opportunities for education, for healthcare, for careers, for business development, for infrastructure, for public safety and much more. While many Texans shared their stories of need, others shared their success. Across the state, public organizations, private businesses and nonprofits are coming together to understand and address the broadband needs of their communities. For example, the Connect Brownsville plan was recently recognized by IDC Government Insights as the winner in the Digital Equity and Accessibility category of their annual Smart Cities North America Awards. This is a comprehensive broadband plan that seeks to utilize public-private partnership to build a fiber-optic network, focusing on middle and last mile service. In March, Sabine County won a $12.7 million award from the National Telecommunications and Information Administration to build a new fiber-optic network in partnership with Kinetic by Windstream. The network will eventually serve over 5,000 additional county residents. These stories of collaboration provide models for how Texas can close the digital divide through partnership and solutions tailored to each community and its geography, demographics, assets and challenges. This plan lays a foundation by which the state can help bring communities together and advance solutions to the diverse broadband needs and opportunities statewide.

Roundtables and direct outreach – Representatives from each region of Texas shared perspectives on broadband needs and opportunities. Each story provided unique perspectives and reinforced common themes across the state.

Education – Texas educators and students shared some of the most powerful testimony. High-speed internet access is critical to educational success. This was never truer than during the COVID-19 pandemic, when students across the state engaged in distance learning. Millions of students had limited or no access to broadband or devices at home. Texans repeatedly shared stories of using school and restaurant parking lots to access nearby Wi-Fi networks to complete homework, an unsustainable situation that puts significant strain on families, students, and schools alike.

Public sector – Local governments in Texas have varied capacity to address broadband issues. Some cities, counties and councils of government are collaborating closely with neighboring communities, regional ISPs and other public and private organizations to create broadband plans, build infrastructure and deploy technological solutions. Many lack the financial and technical capacity to initiate such plans. Common barriers include lack of financial capital and technical assistance needed to develop plans and apply for and manage state and federal funding. Concerns about the long-term maintenance of broadband systems were frequently raised. Public testimony highlighted the importance of regional collaboration to pool resources, increase efficiencies, avoid redundancies and streamline processes. Many successful public-sector entities rely on public-private partnerships to establish models for construction and long-term operations and maintenance.

Public health and safety – For many Texans, especially people who are elderly, immobile and rural, accessing quality healthcare is an ongoing challenge. Telemedicine is dependent on patients' access to reliable high-speed internet access and a foundation of digital literacy. Broadband also contributes to the health and safety of all Texans by providing a reliable backbone for emergency communication and coordination, including day-to-day public safety operations and emergency response following natural disasters. Limited broadband access in many regions of the state limits public health and safety.

Business and industry – Broadband access is increasingly a criterion for businesses seeking to move to or expand in Texas. Lack of high-speed internet may make communities less attractive to locate to for businesses and industrial entities. For individuals seeking to startup a business, broadband access and affordability often impact its success. Similarly, the founder's digital literacy drives the viability of the business (e.g., website development, online sales, marketing and customer service).

Outreach

Community organizations – Limited access, adoption, affordability and digital literacy have the greatest impact on low-income communities. Those individuals and families with the least economic capacity face the greatest hurdles to education, business, health and other needs. Texans called for affordability, digital literacy, access and adoption to be considered throughout planning efforts to ensure that historically underserved communities are not left further behind.

Continued awareness, outreach & participation mechanisms

Stakeholder engagement will continue to be a key area of focus for the BDO. Toolkits, newsletters, recurring outreach and reference materials will continue to build awareness, support coordination and inform decisions made by the BDO.

Recognizing that some cities and counties may need additional support, the BDO created a toolkit to help communities:

- Find and determine their eligibility for federal funding
- Assess their needs
- Identify who will best be served by broadband projects
- Perform an inventory assessment
- Locate existing middle mile
- Identify leadership and partnership opportunities

The Broadband Toolkit will continue to be expanded as additional needs are identified or greater awareness is required. It can be accessed at comptroller.texas.gov/programs/broadband/toolkit/.

Since January 2022, the BDO has published a monthly newsletter to push direct updates and other news to stakeholders, promote transparency, and generate awareness of the BDO's mission to close the digital divide. As of May 2022, the newsletter serves more than 4,200 subscribers.

Since May 2022, the BDO has hosted a monthly ISP roundtable discussion. ISPs play a vital role in closing the digital divide in Texas and the BDO must frequently engage with these key stakeholders. These monthly roundtables help ISPs understand funding requirements, facilitate mapping data requests, expand community involvement, encourage Affordable Connectivity Program (ACP) enrollment information and provide a platform for industry to report areas of concern to the BDO.

Both federal programs, the American Rescue Plan Act of 2021 (ARPA) and the Infrastructure Investment and Jobs Act (IIJA), have funding specifically designated for tribal nations in the state to expand broadband. The BDO plans to engage Texas' three federally recognized tribal communities through frequent roundtable discussions, direct outreach, digital equity and opportunities and helping guide federal requirements related to this funding.

Moreover, the BDO intends to involve Texas educators to study the connectivity needs of rural and urban classrooms. Attending the annual Texas State Teachers Association meeting, hosting K-12 teacher roundtables and direct contact with local education agencies are among the continued outreach plans in this sector.

The BDO recognizes the importance of gathering input and perspectives through a public survey. It is anticipated that the public survey will be available year-round as a tool of continuous feedback and engagement. Surveys will be used to measure the progress of broadband initiatives and ensure projects are being completed regionally. One opportunity for BDO will be to ensure surveys are available in other languages, including Vietnamese.

Social media campaigns have helped drive survey participation. Understanding that communities in unserved and underserved areas may not have access to social media, the BDO deployed local radio spots, newspaper advertisements and direct mailers to reach unconnected Texans. BDO will continue these modes of outreach to ensure that all Texans are involved in expansion efforts.

Transparency is important to the BDO. Accordingly, staff will continue its "open door" approach so that stakeholders and communities can discuss their broadband needs, connect to available resources and seek guidance. The BDO will

Outreach

continue to create education and outreach materials, including infographics, flyers, mailers, and presentations to promote funding opportunities.

The Affordable Connectivity Program is an FCC benefit program that helps ensure households can afford broadband. The benefit provides a discount of up to $30 per month toward Internet service for eligible households and up to $75 per month for households on qualifying Tribal lands. Eligible households can also receive a one-time discount of up to $100 to purchase a laptop, desktop computer, or tablet from participating providers if they contribute more than $10 and less than $50 toward the purchase price. More information about the ACP can be found at fcc.gov/acp. The BDO has made available information about the initiative through various outreach efforts.

In October 2021, the BDO established an informal interagency council on broadband expansion. This group, composed of state agencies who manage broadband infrastructure projects and digital literacy programs, was designed to reach a diverse and large stakeholder group. The interagency council ensures the state of Texas continues to be in sync with the mission of closing the digital divide and explores opportunities for collaboration.

The BDO will continue to partner with the Texas Association of Counties (TAC) to engage communities on a regional basis while also ensuring thorough geographic representation. Furthermore, the BDO will host "Broadband 101" meetings to engage stakeholders and provide guidance on funding opportunities. These meetings will include the 24 councils of government, as well as healthcare providers, teachers, community leaders and advocates.

Thank you to all Texans who contributed to this plan. We called on you to help us and you answered the call! Without your testimonies, information and guidance we could not have identified the true connectivity needs of Texas.

Understanding Broadband

What is Broadband?

Broadband often refers to "high-speed access to the internet." Broadband also refers to bandwidth — the amount of data that can be sent through a connection that provides access to the internet. The more bandwidth, the more information a user can send or receive at any given time. Quality broadband is both high-speed and high bandwidth. The definition of high-speed internet (and, hence, of broadband) has evolved as applications demand faster speeds, throughput and resiliency.

Broadband Speed

There are two measures of internet speed and capacity: download and upload. Download refers to the speed and capacity at which a computer can receive data from the internet, such as when accessing a website, receiving an email, retrieving a file or streaming a video. Upload speeds refer to how fast data is sent from a device to the internet, such as sending an email, inputting information to purchase a product online, uploading content on social media or participating in a video conference call.

Transmission of information over the internet is digital, meaning that text, images and sound are transmitted as "bits" of data, which are the base unit of information in computing. Internet speed is therefore measured in Megabits per second (Mbps, or million bits per second) that transmit between the web and a device. Internet speeds are often represented as a fractional number with the download speed over the upload speed (e.g., the FCC has until now defined basic broadband as transmission speeds of at least 25/3 Mbps, meaning 25 Mbps download speed and 3 Mbps upload speed).

Internet speeds are also either symmetrical or asymmetrical. A connection is symmetric when upload and download speeds are comparable. Certain technologies, such as digital subscriber line (DSL) and cable, are often asymmetrical as they have significantly slower upload speeds than download speeds. This imbalance impacts businesses and people who need to send data as quickly as they receive it to maximize productivity.

Broadband speed is generally seen as the best proxy for internet quality, but it is not the only measurement. Latency is also considered an important factor in determining the quality of broadband service. High latency means "delay" in the back and forth of signals, which makes voice conversation awkward and causes pauses in video. Broadband infrastructure ideally should provide low enough latency to enable seamless voice and video conversations.

GENERAL USAGE	SPEED (Mbps)
General Browsing & Email	1
Streaming Online Radio	<.5
VoIP Calls	<.5
Student	5-25
Telecommuting	5-25
File Downloading	10
Social Media	1

WATCHING VIDEO	SPEED (Mbps)
Streaming Standard Definition Video	3-4
Streaming High Definition (HD) Video	5-8
Streaming Ultra HD 4K Video	25

Understanding Broadband

Broadband Coverage

Broadband coverage refers to how a population is served, underserved and unserved. These definitions are closely related to the concept of broadband speed but are not uniform across the public sector. BDO is tracking these definitions closely, and Texas is in the process of revising its own definition.

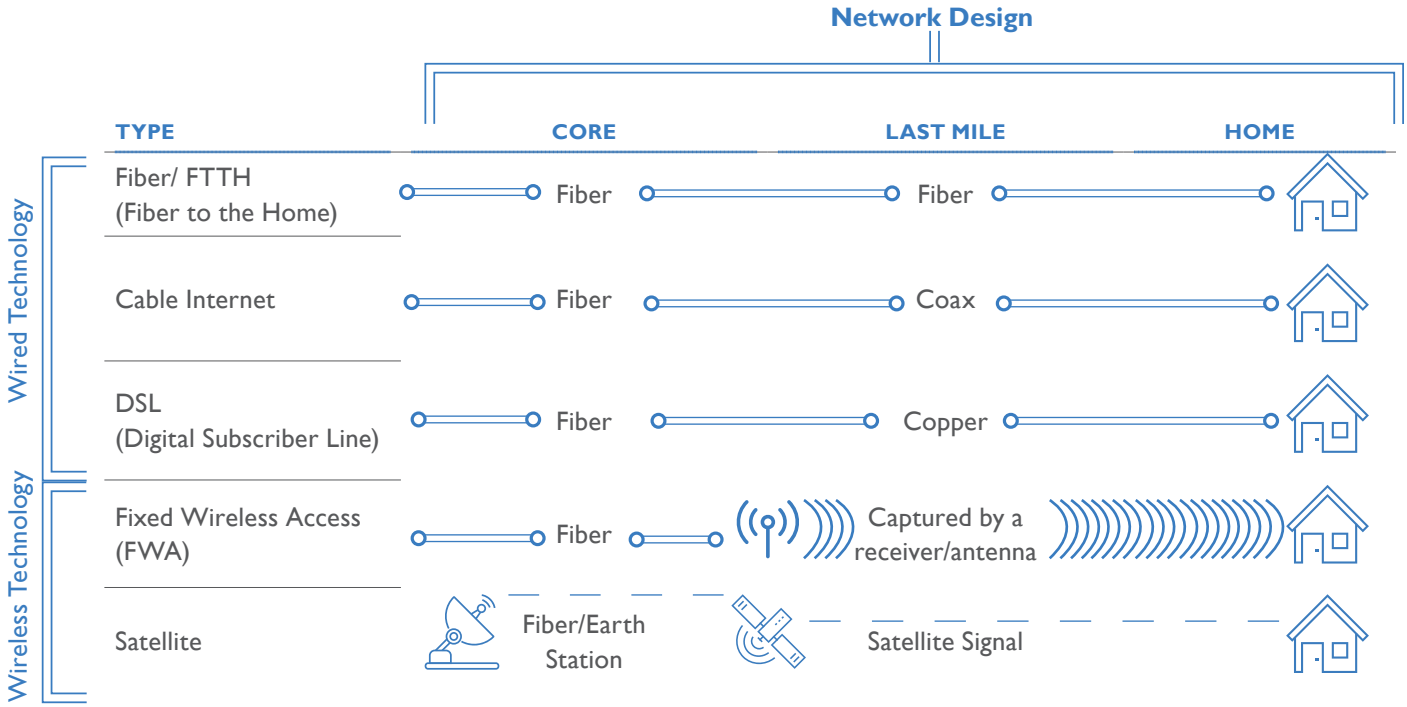
Until recently, the FCC has defined served areas as those census blocks receiving 25/3 Mbps service and where at least one user receives that service. It has defined unserved areas as those census blocks where no user receives 25/3 Mbps service.

The FCC defines unserved areas as those census blocks where 80 percent or more of the end-user addresses either have no access or lack access to reliable broadband service as determined using FCC criteria.

At the state level, the Texas Public Utility Commission defines underserved areas as those census blocks where 80 percent or more of end-user addresses lack access to 100/20 service.

Broadband Technology

Broadband is delivered by two groups of technologies: wired and wireless. These speeds may be delivered to the end user in a variety of formats, including fiber optic, co-axial cable infrastructure, DSL, fixed wireless access (FWA), cellular or satellite. Descriptions of the technologies were adapted from the FCC's "Types of Broadband Connections" online article, last updated June 23, 2014.



Understanding Broadband

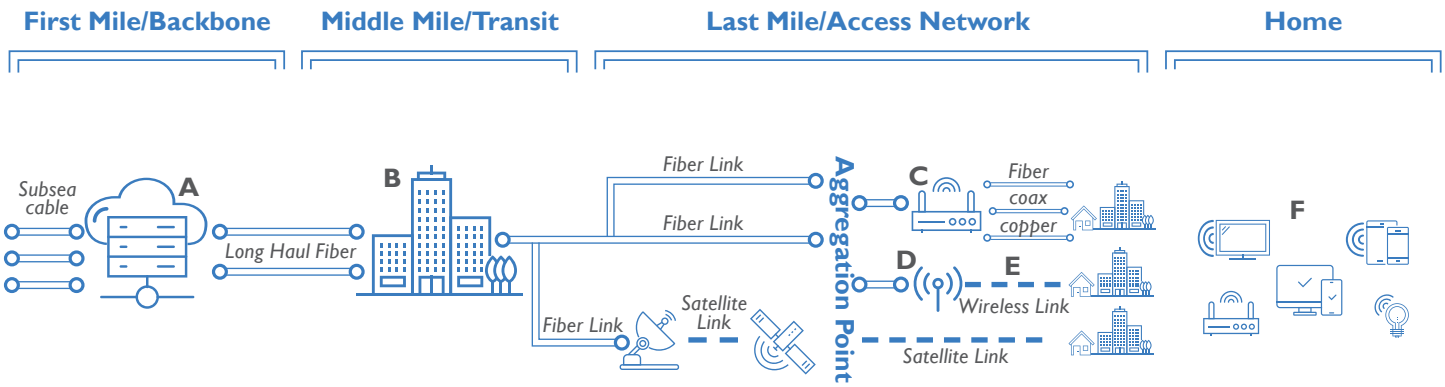
	TYPE	DESCRIPTION
Wired Technology	Fiber/FTTH (Fiber to the Home)	Electrical signals are converted into light by opto-electronic equipment, and it is this light flowing through transparent glass fibers that carries the data. The industry typically distinguishes between "dark fiber" – connection cables that are installed but not hooked up yet to opto-electronics – and "lit" networks that have light signals going through them and are completed and fully functional. Fiber companies often invest in dark fiber, which they "light" only once they have a customer.
	Cable	"Coax" transmits data using the same coaxial cables that generate pictures and sounds on cable TV-connected television sets. Like DSL, subscribers access their "cable modem" service by simply turning on their computers without dialing up an ISP. Transmission speeds vary depending on the type of cable modem, cable network and traffic load.
	DSL	DSL is a wireline transmission technology that transmits data to homes and businesses over traditional copper "twisted pair" telephone lines already installed in the majority of homes. The availability and speed of DSL service may depend on the distance from a home or business to the closest telephone company facility.
Wireless Technology	Fixed Wireless Access (FWA)	In rural areas not served by wireline broadband networks, Wireless Internet Services Providers (WISPs) provide fixed wireless broadband at low speeds. Fixed wireless broadband is the wireless transmission of data between a wireless transmitter (i.e. an antenna) and a receiver at a home or business, often requiring a direct line-of-sight between the wireless transmitter and the receiver.
	Satellite	Satellite broadband is provided by satellites orbiting the Earth. Historically, these satellites were orbiting very far in space, which caused network latency issues and required large earth antennas to send and receive the signal. Today, low earth orbit system satellites, also called LEOs, have significantly less latency, but the physics of these orbits require very large networks of satellites to provide reliable coverage. Satellite internet has proven useful in serving remote or sparsely populated areas.

Understanding Broadband

What is Wi-Fi?
Wi-Fi is a wireless networking technology that uses radio waves to receive and send information. Wi-Fi allows devices such as computers (laptops and desktops), mobile devices (smart phones and wearables) and other equipment (printers and video cameras) to interface with the internet without needing a physical connection. Wi-Fi refers to either wireless internet delivery or internet access in the home or office. Wi-Fi and broadband are not two mutually exclusive ways of accessing the internet. Instead, Wi-Fi can be used to access broadband.

The Broadband Network "Highway"

Like a car on the road system, data that originate in one's home or business computer must use the broadband network to reach other computers, whether another home computer for email or video conferencing or a large data center server that provides for online shopping, streaming or web browsing.



A : Data Centers

B : Backhaul/Transit

C : Primary Wireline Operators

D : Tower Companies

E : Fixed Wireless Operators

F : Equipment & Devices

Understanding Broadband

Backbone or first mile

In this analogy, the backbone is the Interstate Highway System. The backbone includes connections between large cities, major towns and major data centers. These are usually very large fiber-optic cables, with thousands of fiber strands each, and the associated routing electronics.

Middle mile

Middle mile is analogous to state and county roads. It links smaller towns and neighborhoods between cities. Middle mile is composed of large fiber cables but is smaller than the backbone. Having a middle-mile connection nearby is necessary to enable last-mile connections.

Last mile

Last mile is akin to local roads. It is the connection that goes to every house, business and apartment. Depending on data needs, last mile can be provided through a number of technologies explained above.

Several types of networks can serve users and communities. For example, the needs of residential households vary from the needs of enterprises and first responders. As such, they are served by distinct networks, which can be grouped into three major categories.

Residential

Network serving regular households, bandwidth is generally shared with other customers using the same line.

Business

Network serving businesses with dedicated bandwidth; public service facilities such as hospitals and schools can be served by this network.

FirstNet

Network dedicated to emergency responders and the public safety community, includes fire stations and law enforcement centers.

Understanding Broadband

Broadband Providers

In Texas, similar to other states and countries, communication infrastructure is primarily provided by the private sector. Commercial telecommunications companies typically provide some combination of last-mile, middle mile and/or backbone to serve their customers. The standards that rule interconnections are established by several international and national bodies, among them the International Telecoms Union (ITU) and the FCC. Protocols for interconnections use acronyms such as IP (Internet Protocol), HTTP (Hypertext Transfer Protocol), HTMS (Hypertext Messaging System) and FTP (File Transfer Protocol).

In addition to commercial telecommunications companies, several other types of providers are active in Texas. Some rural cooperatives, which were originally established to provide electricity to farm areas, are also active in providing broadband services. Some municipalities have created municipal networks, although Texas state law (Texas Utility Code §54.201) currently prohibits the establishment of most forms of municipal broadband services to their residents. Texas Utilities Code §54.201, which prevents a municipality from operating as a telecommunications provider, was originally enacted in September 1997, when municipal broadband as a concept was just beginning to take shape.

Most users are familiar with the company that provides the last-mile connection to their home. These companies are often large, corporate brands that were historically in the telephony or cable television business. But not all ISPs fit this description. Some are small, local providers. Some are satellite-based companies. Some are fixed-wireless or wireless cellular companies. All of these providers aim to connect consumers and businesses with broadband using different delivery mechanisms and can be more or less effective based on an area's population density, morphology (e.g., desert, mountains), cost, and service level needs.

The Digital Divide

What is the Digital Divide?

The digital divide is the gap between those who have access to broadband and those who do not. It affects all generations – in both rural and urban communities – and a wide variety of industries and sectors. The word "access" is referred to here in its widest terms, meaning access not only to the technology but to quality internet, affordable service and proper training. Texans should be able not only to connect to the internet but to connect to high-quality internet at an affordable rate, leveraging the technology to its full potential.

Why Does it Matter?

Broadband touches nearly every industry and policy area. It is an underlying driver to economic development, education, public safety, healthcare and agriculture. As the technology supporting broadband connectivity continues to grow, so do the benefits of getting connected. The BDO received feedback that confirmed the importance and extensive use of broadband in daily life. Understanding the areas of impact supported the development of required actions and priorities.

The following key areas of application were discussed as part of outreach efforts:

Economic Development

Broadband provides local communities, regions and nations with the opportunity to develop and expand businesses and institutions. It also improves productivity and profitability of businesses and allows them to compete in local, national and global markets. Broadband is essential to the conduit of business, even in so-called "lower-tech" industries, as it facilitates connection among suppliers, customers, collaborators and employees.

Digital technologies anchored by high-speed internet can help businesses generate revenues, expand their reach and participate in larger vendor networks. Increased access to digital tools over three years could generate nearly $6.7 billion in increased annual sales for rural Texas businesses while creating more than 23,000 additional Texas jobs.[1]

> ***"Businesses want to locate in cities with good internet access for themselves and employees. We're already a competitive state for business, being a connected state would take it to the next level."***
>
> *– Legislative Manager, Alamo Region*

Agriculture

Farmers depend on broadband. Autonomous machinery, data-driven irrigation sensors and web-enabled sales platforms are just a few of the tools of modern "precision" agriculture, which apply high-tech processes to improve the efficiency and effectiveness of planting, nutrient and pest management and harvesting. Precision agriculture can reduce fuel usage by 40 percent, decrease water usage by 20 to 50 percent, and reduce chemical applications by up to 80 percent. According to the U.S. Department of Agriculture, in 2019, 25 percent of Texas farms did not have internet access.

> ***"Dairies might have a fixed wireless connection but require significant bandwidth as each cow has RFID (radio-frequency identification) transmitting data. The same is true for wind farms where remote monitoring depends on broadband access."***
>
> *- Rural Internet Service Provider, Central Region*

1. Unlocking the Digital Potential of Rural America – C_TEC American Innovation (americaninnovators.com)

The Digital Divide

Telework

Broadband allows teleworkers to live and work in locations of their own choosing. As a result, lack of high-quality broadband deprives workers of the ability to compete for job opportunities outside of their geographic area. Public libraries and other Wi-Fi-enabled locations have experienced increases in the use of their space by remote workers.

> ***"There is an increasing number of job postings online where if you don't have internet you can't apply."***
>
> *– Economic Developer, Capital Region*

Education

Students need to be technologically equipped for success in today and tomorrow's workforce. Broadband can help them maintain an advantage in finding jobs and developing career skills. Broadband is essential for distance learning — from kindergarten to graduate school.

Texas' rural leaders shared concerns about the existence of a "homework gap" and the subsequent lifelong implications for students and communities. Large percentages of rural and low-income students are unable to access the online resources needed to participate. In many areas, the student population relies on mobile internet service for homework. Many students are forced to sit in library parking lots after hours to complete homework on the library's Wi-Fi network.

> ***"Despite an internet company setting up hotspots all over town, a lot of the kids live so far out and don't have vehicles, or parents work late and weren't able to travel to the hotspot locations."***
>
> *– Technology Director, Independent School District, Northwest Region*

Healthcare

Broadband enables remote access to clinical services for patients and provides improved, cost-effective access to healthcare. It also allows physicians to monitor patients through home health devices to avoid costly house calls as well as provide patients real-time feedback.

Similarly, the use of online disease management services, electronic health records, home monitoring and other applications can assist Texans who don't have easy face-to-face access to healthcare.

Without sufficient broadband to support telehealth services, many rural hospitals and anchor institutions will be at a disadvantage serving Texans.

> ***"There is a real need for mental healthcare in rural communities where it is a challenge to deliver — videoconferencing would be a big help in allowing more practitioners the ability to provide care."***
>
> *– Foundation Representative, High Plains Region*

Public Safety & Emergency Management

Broadband, particularly wireless broadband, is increasingly indispensable to the interoperability of police, fire, health and other government services. This includes rapid disaster response systems, effective early-warning and public alert systems, disaster preparation programs, remote security monitoring and backup systems for public safety communications networks. As new technologies are implemented, such as digital e911 systems, sufficient wireless and wireline bandwidth is necessary to enable the sending of pictures and videos and video chats between a dispatch, first responders, and the public (e.g., through the Emergency Services IP Network or ESInet).

A lack of sufficient broadband limits training opportunities. For example, during outreach it was shared that volunteer firefighters and correctional officers often struggle to attend required online training programs.

The Digital Divide

> ***"During COVID, the Bastrop Fires and the Winter Storm, emergency staff were disconnected and couldn't respond to calls. They didn't know where tragedies were. Even during boil water notices, residents without connection weren't aware until hours later."***
>
> *– Emergency Services Coordinator, Capital Region*

Government Services

Broadband service helps government agencies improve quality, lower costs and increase transparency by enhancing internal operations and making it easier for residents to interact with them online. Most state agencies have undergone or are undergoing modernization to automate processes and provide lower-cost and higher-quality services to citizens. For example, the Texas by Texas platform provides an easier, faster and more secure way for Texans to obtain driver license and vehicle registration renewals.

> ***"Everything is online. People were willing to help seniors, but many didn't have a device and would drive their grandma to the library to fill out an online form."***
>
> *– Employee, County Emergency Management Operations, Gulf Coast Region*

Quality of life and Entertainment

Home access allows for the streaming of videos, social media and online gaming. Technology supports connection between families and friends. Access to broadband can allow people to "age in place," live in their hometowns and be and stay connected with loved ones.

> ***"There is a reluctance to get on the internet in many disenfranchised communities. We need education around why people would want to adopt the digital lifestyle in the first place."***
>
> *– Nonprofit Employee, Metroplex Region*

The Digital Divide

How Can We Measure the Divide?

Framework of analysis

The digital divide analysis assesses five areas of the digital divide: digital literacy, devices, affordability, coverage and quality. The analysis focuses on defining the specific challenge and providing a preliminary measurement and assessment within the defined Texas regions. This preliminary set of analyses focuses on a specific set of indicators but recognizes that a deeper analysis can be performed to more accurately assess the dimensions of the digital divide.

	What is the challenge?	How can we measure it?	Which preliminary indicator do we use?
Digital Literacy	• Users do not know how to take advantage of broadband or do not understand its value	• Certain age cohorts and population below certain educational attainment level may not be digitally literate	• Populations 65 years and older and population over the age of 25 without a high school diploma[1]
Devices	• Users do not own the necessary devices to access broadband	• Population without certain devices cannot easily access the internet	• Households without any computing device or only with a smartphone or tablet
Affordability	• Users cannot afford broadband service	• Population below certain income level may not be able to afford broadband services in full[2]	• Households with income <$50,000
Quality	• Broadband infrastructure exists but is poor quality	• Only certain technology provides the highest quality internet, being both fast, reliable and future proof	• Households served with FTTH[3]
Coverage	• Broadband infrastructure is not available	• Only households served by a network that provides internet at high enough speed are "covered"	• Only households served by FTTH or DOCSIS3+ provide broadband-like speeds[4]

Potential Federal Funding

- Digital Equity Grant Program ($1.5b)
- ACP ($1.4b)
- CPF ($10b)
- BEAD ($42.5b)

1. A recent Pew Research Center survey on "tech readiness" indicates that around two-thirds of the age cohort over the age of 75 have low tech readiness, which is the highest of any age cohort. The analysis performed within this broadband study takes a conservative approach and lowers the age to 65 given "tech readiness" is considered a scale rather than a binary metric and those that are between 65 and 74 may also be considered low tech readiness relative to younger cohorts.

2. Based on a designed maximum household spend on broadband equal to other utilities such as water/wastewater, which is approximately 2 percent of household income (i.e., approximately $80 a month for a household earning $50,000).

3. Only households served by FTTH or DOCSIS3+ ensure speeds above 25/3 Mbps, the FCC standard to qualify as high-speed broadband.

4. Only FTTH technology provides the highest-quality internet, meaning speeds of 100/10 Mbps or faster, which is considered necessary to satisfy current broadband demand needs and is future-proof.

The Digital Divide

Key Assumptions

Population and household density are key drivers of the digital divide, as the cost per household of broadband deployment is much lower in higher-density areas compared to more remote locations. Therefore, this analysis identifies urban, suburban and rural areas for each of the 12 Texas Comptroller economic regions and assesses the divide across all three morphology types. This assumption is in line with telecom industry standards.

Urban

Greater than 7,500 people/square mile; includes 4.4 million people (15 percent of the population) who live in major cities across Texas

Suburban

Between 600-7,500 people/square mile, includes more than 18.5 million people (63 percent of the population) who live in areas surrounding major cities

Rural

Less than 600 people/square mile, includes 6.5 million people (22 percent of the population) who live in small towns across the state

Understanding the Data

Indicators are built from publicly available data from different sources, one of the most critical being broadband coverage data provided by the FCC.

Under the current FCC methodology, if one household in a census block is served by a technology, then the entire census block is marked as having that technology's service. This creates the potential for overestimating broadband coverage as one household in the census block is served by the technology, but all others may not be. This specific limitation is especially profound in rural areas where a census block can be particularly large. Therefore, when the FCC data claims 100 percent broadband coverage by a technology for a certain area, it is possible that not all households in the census block are actually covered by that service. The BDO is aware of known inaccuracies with the FCC maps and is working to develop a state broadband availability map to ensure accuracy.

Similarly, a list of ISPs deployed in a region does not necessarily reflect the number of choices available to all household or business locations in that region. Rather, those ISPs serve at least one household or business in the applicable census block. Therefore, the number of ISPs in the region is only a proxy to measure competition, as actual competitive tension may not exist between such ISPs. Additionally, not all broadband providers report to the FCC as required, so coverage and competition may be understated.

Despite these limitations, the broadband industry continues to use FCC data as the common source for broadband coverage data. Moreover, the FCC is updating its maps and definitions, and new maps are expected to be published in late 2022. Those maps will rely on a more accurate methodology and will reflect a different set of standards for the characterization of speeds.

The BDO is aware of the limitations presented by the FCC's broadband coverage data. However, as of June 2022, this data remains the most universally accepted.

The analysis performed for this report will serve as an initial baseline until more thorough data becomes available.

The Digital Divide

SOURCE	DESCRIPTION
FCC	Twice a year, ISPs are required to file FCC Form 477 with the FCC to register a list of census blocks they serve. The FCC then uses this information to map broadband coverage.
US Census	The U.S. Census conducts the American Community Survey (ACS) on an ongoing basis to collect national demographic information.
S&P Market Intelligence	S&P Global Market Intelligence provides financial and industry data, which; can also be used to track the number and type of businesses by region.
HIFLD[1]	Homeland Infrastructure Foundation Level Data (HIFLD) is an online portal hosting geospatial datasets on critical infrastructure, including healthcare and public safety facilities.
TEA	The Texas Education Agency (TEA) Public Open Data Site provides geospatial datasets of schools across the entire state.

1. Geospatial data for public healthcare and public safety facilities across Texas were not readily available from state databases. As a result, these data points were generated from federal sources such as HIFLD, which may not match state records. However, these datasets provide a standard sufficient for the purpose of this report.

Observations

2.8	1.1	5.6	3.6	1.0	3.8
million households without broadband access	**million households potentially without HSBB coverage[1]**	**million households potentially without quality internet**	**million households potentially with affordability challenges**	**million households potentially without proper devices[2]**	**million residents facing digital literacy challenges[3]**
While HSBB services are available to 89 percent of Texas households, 2.8 million households do not subscribe to HSBB. A combination of lack of coverage, low affordability and digital literacy challenges are factors driving this metric.	Texas households are generally well covered, with all but three regions seeing coverage rates above 80 percent. However, 1.1 million households are without high-speed broadband internet coverage at 25/3 Mpbs speed.	Texas' last-mile broadband network relies heavily on technology other than fiber, often resulting in low-quality broadband across the state. Fiber technology is available to less than 50 percent of households, and in some regions to just above 10 percent.	More than 3.6 million households earn less than $50,000 a year, making high-speed broadband a significant percentage of their expenditures. Affordability may be further impacted by ISP pricing, especially in areas with limited competition (~4.4 million households are served by one ISP).	1 million households are unable to connect to the internet due to lack of devices. An additional 2.5 million households have only a smartphone or portable computing device to access the internet.	Low digital literacy is more common in elderly individuals and those communities with lower educational attainment. In Texas, 3.8 million adults over the age of 65 and 4.9 million residents over 25 are without a high school diploma. A sizeable portion of this population may need mentoring to improve digital literacy.

Texas Morphology

More than 20 percent of Texans live in rural areas, with some regions being more than 50 percent rural. These regions have by definition a very low population density, making broadband deployment considerably costlier on a per-household basis. Higher costs inevitably hinder broadband expansion and directly contribute to the digital divide. In Texas, where 63 percent of the population lives in suburban areas, household density is a key driver of the divide. Texas regions with lower suburban household density are more vulnerable to this divide.

Broadband Market

The largest providers in Texas are generally historic corporations that continue to rely on legacy networks, limiting the quality of service offered. Among the top 10 providers in the state by household coverage, only AT&T and Frontier provide fiber to a meaningful share (approximately 50 percent of the households they cover) of their networks. Others rely on DOCSIS 3+ and legacy technology, which may meet current government speed standards but are not future-proof. Similarly, there are 4.4 million households in Texas that are served by only a single internet provider. This lack of competition contributes to poor-quality internet and service affordability.

Texas Demographics

Median household annual income in Texas is $69,000 a year. However, half of the Texas Comptroller economic regions have a median household income of less than $55,000. For those families, an internet bill of $70 a month can be unaffordable. Similarly, while the median age in Texas is relatively young at just over 34 years, a sizable subset is 65 years old or older. Regions with a larger share of older populations are more vulnerable to the digital divide.[4]

1. Number of households without HSBB coverage is based on coverage at 25/3 Mbps and not whether a household chooses to subscribe to provided services. Households without coverage is assumed to be higher than 1.1 million based on current limitations presented by the FCC's broadband coverage data.

2. Reflects only households without any computing devices; households with only portable devices would add another 2.6 million households and could also be considered under this category.

3. Reflects only the population over 65 years old; adults over 25 without a high school diploma comprise 4.9 million people across the entire state and could also be considered under this category.

4. These factors are closely related. Rurality tends to be linked to lower income and older population cohorts but also to lower competition levels, as internet in these areas is provided by regulated Incumbent Local Exchange Carriers (per the Telecommunications Act of 1996) that are forced to provide service to an entire region where no other provider exists.

Observations

Regional Outlook

At the regional level, the digital divide can be measured in relative or absolute terms. Vulnerability reflects the share of a region's population that is impacted by digital divide challenges relative to other regions in the state. Impact reflects the absolute number of households in a region that is impacted by the divide. By this standard, the 12 Comptroller economic regions can be grouped into three categories:

	REGION	VULNERABILITY	IMPACT[1]
1	High Plains	M	L
2	Northwest	M	L
3	Metroplex	L	H
4	Upper East	H	M
5	Southeast	H	L
6	Gulf Coast	L	H
7	Central	M	M
8	Capital	L	M
9	Alamo	L	M
10	South	H	M
11	West	M	L
12	Upper Rio Grande	M	L

[1] L Low vulnerability / impact

M Medium vulnerability / impact

H High vulnerability / impact

- **High-need regions:** The most vulnerable areas in Texas include border regions in the southern and eastern parts of the state, namely the Upper East, South and Southeast regions. These regions are predominantly rural or with very low suburban household density, their populations are older or have very low incomes, and they have high numbers of households served by only one ISP.
- **Differential-impact regions:** The lowest-vulnerability regions in Texas include the large population and very-high-density regions in the state, namely the Metroplex and the Gulf Coast regions, closely followed by the Capital and Alamo regions. These regions are generally the least rural, the youngest or the wealthiest by median income, and have a lower share of households that are only served by one ISP. They perform better from a vulnerability standpoint, but also make up more than 70 percent of the state's population. In these regions, a low share of households impacted by the divide (e.g., low vulnerability) represents millions of Texans impacted by the divide. Any initiatives to fight digital divide challenges in these areas will have the biggest impact on overall statewide performance.
- **Ongoing support regions:** The remaining regions are "middle-of-the-pack" regions, and they fall somewhere in between the other two groups in terms of rurality, household density, age, income and competitive tension. They include the High Plains, Northwest, Central, West and Upper Rio Grande regions. While they are affected by the divide, they are not the most vulnerable nor the highest-impact regions.

1. The high/medium/low-vulnerability and impact labels aggregate high/medium/low scores across all five digital divide dimensions; regions scoring "high" across multiple dimensions are tagged as high-vulnerability/impact versus regions scoring "low" across multiple dimensions, which are tagged as low-vulnerability/impact. Scoring for specific dimensions is further described in the next section. Vulnerability scores are attributed based on the share of households or residents affected relative to the average, median or state rate for each dimension; impact scores are assigned based on the number of households impacted as they relate to the top/middle/bottom third between the minimum and maximum number of households impacted by a given dimension.

Observations

High-need Regions

The most vulnerable regions in Texas appear to be those that combine key morphology, market, and demographic attributes that directly contribute to the digital divide.

Upper East (Tyler, Longview)

The Upper East region is small by area with a medium-size population and medium household density. It is the most rural region in Texas, and its density is specifically low in suburban areas. Upper East residents have a low median household income of $52,000 and include the largest share of older adults in Texas.

These factors contribute to the Upper East region having the lowest coverage rates in Texas. ISPs in the Upper East offer HSBB to less than two-thirds of households, and fiber technology is only available to a small fraction of them — just over 10 percent. Coverage in schools is also low. These challenges are further intensified by the lack of competition, as more than half of households are served by only one ISP.

These factors contribute to the high share of Texans lacking proper devices to connect to the internet and who are in need of digital literacy training, making the Upper East one of the most vulnerable regions in the state.

Southeast (Beaumont)

The Southeast region is one of the smallest regions in Texas and the second most rural region. It has a small population and is denser than half of the regions in Texas, but its suburban household density is also one of the lowest across the state. The population of the Southeast region has a low median income and includes a large share of older Texans.

These factors are associated with very low coverage rates, as more than 25 percent of households do not have access to HSBB. Similarly, 75 percent of households do not have access to fiber, which currently provides the best-quality internet. Coverage in schools is also low. Like in the Upper East region, these challenges are further intensified by the lack of competition, as half of the households in the Southeast region are served by only one ISP.

These factors contribute to the high share of Texans lacking proper devices to connect to the internet and who are in need of digital literacy training, making the Southeast one of the most vulnerable regions to digital divide challenges in the state.

South (Laredo, McAllen, Corpus Christi)

The South region is one of the largest in Texas. It has a large population of people living predominantly in suburban areas. The South is a medium-density region but has a very low urban and suburban household density. It is also the poorest region by household income and has the highest share of adults over 25 without a high school diploma.

Unlike the Upper East or the Southeast regions, the South does not necessarily lack coverage, as more than 90 percent of households have access to HSBB, and coverage rates are similarly high for schools and hospitals.

The South, however, does have other challenges which the above factors help to explain. The South has issues of service and device affordability, which are further exacerbated by the lack of competition, as the South region has the highest share of households served by only one ISP. This competitive environment is also associated with the South's quality-of-access challenges, as 81 percent of the region's households do not have access to fiber. These factors point to a need for digital literacy training and make the South one of the most vulnerable regions in the state.

Differential-impact Regions

The least-vulnerable regions appear to be densely populated, high-income regions; however, given urban area size, digital divide challenges affect more people.

Metroplex (Dallas, Fort Worth)

The Metroplex region is a small region in size but the largest region by population. It is the second densest by household, being heavily urban and suburban. It is also one of the wealthiest regions by median income, as well as one of the youngest by population age.

Observations

These factors are associated with one of the highest HSBB coverage rates in the state for households but also schools and hospitals. The factors are linked with equally high rates of fiber coverage for households across the region.

The above factors are also associated with a low share of the population facing affordability problems, lacking proper devices to connect to the internet or needing training to understand the value and use of the internet.

The large size of the Metroplex population, however, means all these problems still affect significant numbers of people, hence making it one of the two highest-impact regions in the state.

Gulf (Houston, Galveston)

Like the Metroplex, the Gulf Coast region is a small region by area but a very large region by population size, making it the densest region by household in the state, with most of its population living in urban and suburban areas. It is also the third wealthiest region by median income and one of the youngest by population age.

These factors contribute to one of the highest HSBB coverage rates for households, schools and hospitals in Texas. The factors are also associated with equally high rates of fiber coverage.

The above factors are also linked to a low share of the population facing affordability problems, lacking proper devices to connect to the internet or needing training to understand the value of the internet.

Similar to the Metroplex, however, the large size of the Gulf Coast population means all these challenges still affect very large numbers of people and also make the Gulf Coast one of the highest-impact regions in the state.

Capital (Austin)

The Capital region is the smallest region by area. Its population is considerably smaller than that of the Metroplex or the Gulf Coast, but it is still one of the largest in the state, meaning the Capital also has a very high population density, with most of its residents living in suburban areas. More notably, it is the richest region by median income and one of the most educated and youngest by population age.

These factors illustrate why ISPs offer HSBB to a very high share of Capital households, schools and hospitals, and why FTTH coverage is also high. There is also a low share of Capital households that are only served by one ISP, which further explains this trend.

These factors are also associated with very low shares of the population facing affordability problems, lacking internet devices or needing digital literacy training.

The Capital therefore has very low vulnerability, but its digital divide challenges still impact hundreds of thousands of households across the region.

Alamo (San Antonio)

The Alamo region is a small region by area but a large region by population size. Its household density is below that of the Metroplex, the Gulf Coast or even the Capital region but still much higher than the rest of the regions in the state. Most of its population is concentrated in suburban areas. Its median income is below the state median, but still high compared to other regions. The share of adults without a high school diploma, however, is relatively high.

These attributes are linked with high HSBB coverage rates across the region for households as well as schools and hospitals. They are also associated with equally high rates of fiber coverage – the highest in the state. The Alamo region also has the lowest share of households served by only one ISP, which likely further contributes to this trend.

These factors are also associated with low shares of the population facing affordability problems or lacking internet devices, though digital literacy training may be more relevant than in other regions.

The Alamo region is a low-vulnerability region, but its digital divide impacts a high number of Alamo residents.

Observations

Ongoing Support Regions

The middle-of-the-pack regions seem to combine attributes that both contribute to and limit the digital divide, or which only contribute to a limited extent.

High Plains (Amarillo, Lubbock)

The High Plains region is one of the largest regions in the state by area but is relatively small by population. It is thus a very low-density region, with most of its population living in suburban and rural areas. Median income for the High Plains is above other regions in the state but still below the state's average.

These factors contribute to relatively low HSBB coverage rates for households, schools and hospitals. Fiber coverage rates, however, are relatively high.

Such factors are similarly associated with a relatively high share of the population facing affordability problems (many of them served by only one ISP) or lacking proper devices to connect to the internet.

Northwest (Abilene, Wichita Falls)

Like the High Plains, the Northwest region is a large region by area while also the smallest in population size, making it one of the lowest-density regions across the state. Northwest residents are split between suburban and rural areas. They have a relatively low median income and include a large share of older Texans.

The above factors help to explain ISPs offering HSBB to a relatively low share of the Northwest population and a low share of schools and hospitals. These same ISPs, however, do provide fiber to a good portion of Northwest households.

Such factors are similarly associated with a relatively high share of households facing affordability problems, lacking proper devices to connect to the internet, or needing training to understand the value that the internet can bring to their lives.

Central (Waco, College Station)

The Central region covers a small area but has a medium-size population. It has a medium household density, and most of its residents live in suburban and rural areas. Median income for the Central region is relatively low, although the population is relatively young.

These factors are associated with very low HSBB coverage rates and likely make coverage one of the biggest challenges for the Central region. The above factors are equally linked to low rates of fiber coverage.

These factors are linked to a relatively high share of households facing affordability problems, particularly as many of them are served by only one ISP. Device and digital literacy issues are also present in the Central region, but to a lesser extent than in other regions.

West (Odessa, Big Spring)

Like the High Plains and Northwest regions, the West region is a very large region (the largest in the state) but one of the smallest in population size, which in turn makes it the lowest-density region in Texas. The West's population is mostly suburban and rural, but unlike peer regions in this group its median household income is relatively high. There is, however, a very high share of adults in the West without a high school diploma.

These factors help to explain why the West faces challenges across all dimensions of the divide, with service affordability the exception. HSBB and FTTH coverage rates are generally low, and there is a clear need for digital literacy training for many residents in the region.

Upper Rio Grande (El Paso)

The Upper Rio Grande region is a large region by area but a small region by population. It is a relatively low-density region, with most of its residents living in suburban and (unlike its peers in this group) urban areas. The Upper Rio Grande region is one of the poorest regions by household income, and its

Observations

population has a lower educational attainment than most other regions.

These above factors help to explain why the Upper Rio Grande region performs relatively well in regard to coverage and quality for households, schools and hospitals, but does not score as well on affordability, which is the biggest challenge for this region. Affordability issues are further intensified by lack of competition among providers, as a large share of households is only served by one ISP.

These factors are also linked to a relatively high share of households lacking devices or needing digital literacy training.

Areas of Focus

Outlined below are the actions needed to develop plans to maximize available funds, provide for accountability and transparency and create partnerships to develop creative solutions to overcome barriers.

Maximize use of available funding

Provide for transparency & accountability

Understand and overcome barriers

MAXIMIZE USE OF AVAILABLE FUNDING

Establish Grant Programs

The passage of ARPA and IIJA provides Texas with significant funding to support broadband efforts. Texas is responsible for establishing grant programs to oversee the distribution and monitoring of funds to achieve intended impacts. A significant focus of the BDO will be the establishment of grant programs and the ongoing awarding and monitoring of funds.

Below are the three primary programs that will be administered by the state and considerations gathered through public outreach.

ARPA - Coronavirus Capital Projects Fund

The Coronavirus Capital Projects Fund (CPF) provides $10 billion to eligible governments to carry out critical capital projects that directly enable work, education and health monitoring, including remote options. Texas has been allocated $500.5 million. This fund is administered by the U.S. Treasury, and eligible uses include broadband infrastructure projects and digital connectivity technology projects.

The Texas Legislature appropriated all the funding from the CPF for broadband purposes. The BDO will create a competitive grant process to support local broadband projects across Texas. Details will be outlined in a grant plan to be completed by the BDO in September 2022. The grant plan will include allocation tables showing broadband categories of capital projects and other details. Funding will focus on last-mile projects and supporting other state efforts to improve broadband access.

IIJA – Broadband Equity, Access & Deployment (BEAD)

Although the exact amount of funding under the Broadband Equity, Access and Deployment (BEAD) program is yet unknown, each state is slated to receive a minimum of $100 million. Texas anticipates a substantial amount of federal funding for the deployment of high-speed internet throughout the state. In order to participate in the program, the Governor of Texas must submit a Letter of Intent to the U.S. Department of Commerce declaring Texas' intent to participate in the program and naming the BDO as the administering agent for any BEAD program award to Texas by July 18, 2022. The BDO may then request $5 million in initial planning funds from NTIA no later than August 15, 2022, that will be used to develop a Five-Year Action Plan detailing investment priorities and associated costs, as well as alignment of planned spending with policy goals.

Total funding allocations for the BEAD program will be based on the number of unserved locations in the state, as identified in the broadband coverage maps being prepared by the FCC. Participating entities are required to provide matching funds of at least 25 percent of project costs.

Through the Texas Broadband Listening Tour and other engagement efforts, the BDO has already done much of the initial work needed for the action plan and will expand those efforts. Staff plans to engage in outreach to underrepresented communities through the creation of a community task force or advisory board, community-level outreach, and continued work with local governments.

IIJA – Digital Equity Program

The Digital Equity Act provides for $2.8 billion to promote digital literacy. Congress established the Digital Equity Act to promote meaningful adoption and use of broadband

Areas of Focus

services across the "covered populations" in the Act, including low-income households, aging populations, incarcerated individuals, veterans, individuals with disabilities, individuals with a language barrier, racial and ethnic minorities and rural inhabitants.

As part of the Digital Equity Act, the BDO has partnered with digital literacy experts and will build a digital literacy coalition to address substantial barriers to closing the digital divide. Digital literacy plays an important role in closing that gap in Texas. Many Texans have access to the infrastructure needed to connect to the internet but lack the skills and knowledge to do so. The BDO will continue to engage other state agencies and organizations who work with underrepresented communities to identify these areas and their needs. The BDO will also continue to work closely with tribal communities, community anchor institutions, nonprofit organizations, and other stakeholders to ensure diverse stakeholders are involved.

The BDO is committed to ensuring that all voices are heard and understands that Texas' size, diversity and unique geographies present challenges other states do not face. Furthermore, we recognize that broadband disparities must be addressed fairly to ensure that all Texans have quality access to broadband and the services and opportunities that provides.

Considerations

Over the course of the Texas Broadband Listening Tour and related outreach, the BDO heard and collected recommendations to be considered in the establishment of grant programs.

- Maintenance and sustainability: It is important to understand the long-term viability and costs for ongoing maintenance and improvement of infrastructure projects to support the future growth and needs of consumers.
- Burden of the application process: The cities and counties that are most in need of funding are also those that lack resources and experience to complete studies and grant applications. This burden should be considered as the application process is designed.
- Qualifications of ISPs: While preferences related to the use of local workforce for job creation and the ability to implement in shorter timeframes were suggested, it is important that grant criteria are designed to balance the qualifications of ISPs based on their size, history, reach and use of technology.

QUALIFICATIONS	IMPLICATIONS (AS CLAIMED BY ISPS)	
Size	**National providers** have experience across the U.S. and strong balance sheets	**Regional providers** are closer to the community and know their real needs
History	**Incumbents** can cost efficiently expand as they leverage their existing network	**New entrants** foster competition and bring new technology to underserved areas
Reach	**Urban/suburban players** will focus on lower-income areas that were left behind	**Rural players** will address the divide where it is most needed: rural America
Technology	**Fiber providers** provide resilient and future-proof technology	**Satellite and wireless providers** have strong use cases in low-density areas

Areas of Focus

Next steps:

- Develop program strategies and submit materials and plans required to access federal broadband funding as well as apply for funding.
- Design the structure of a broadband grant program compliant with CPF, BEAD and Digital Equity program requirements.
- Establish and publish criteria for grant awards.
- Launch and execute the first wave of grant programs.

Increase Awareness

To promote awareness and keep stakeholders informed, a comprehensive list of funding programs should be made available and updated regularly as part of a consolidated resource center. Several federal programs that are not administered by the state, but that citizens, organizations, cities and counties need to be made aware include:

- Affordability programs that provide subsidies to support broadband affordability and adoption; for example, the IIJA ACP.
- Device programs that support the distribution or loaning of devices to support connectivity at home.
- Digital literacy programs that support residents in becoming more digitally literate through coordinated training efforts.

The BDO must continue to coordinate with political subdivisions and local, tribal, and community-based originations as it develops its plans to initiate funds and implement programs focused on closing the digital divide in Texas. Coordination must include:

- Rural, suburban, and urban areas of the state and offer opportunities for these communities to provide considerations/insight on future statewide planning initiatives.
- A diversity of stakeholders such as other state agencies, non-profits, industry and community anchor institutes.
- Multiple mechanisms to ensure broad awareness and participation such as listening sessions, public meetings and social media.
- Clear procedures to ensure transparency such as websites, periodic reports and in-person meetings.
- Communities that are unserved, underserved and underrepresented such as establishing an advisory board with representatives and surveys to better understand needs.

Awareness of nonprofit and community organization programs will be promoted. For example, R.E.A.L. Friends Don't campaign, an initiative of the McCain Institute for International Leadership at Arizona State University, includes online resources and physical billboards that arm parents and caregivers with simple, actionable tools to help kids navigate their online experiences and protect them from harmful relationships and exploitation.

Next steps:

- Publish a list of funding programs available to organizations and individuals.
- Distribute a recurring newsletter to inform stakeholders.
- Promote transparency in BDO's plans to initiate funds and implement programs through website, newsletter and periodic Board of Advisors public meetings.
- Continue to leverage surveys and toll-free phone lines to assess the needs of unserved and underserved communities.

Share Resources and Toolkits

Cities, counties, regions and other organizations have conducted studies to determine the best way to close the digital divide. Progress has been made to accomplish this goal with the help of public and private stakeholders. Yet other areas struggle with identifying available resources and knowledge. At each town hall, when asked if public leaders had the resources and subject-matter expertise to be successful, it was rare for a hand to be raised in the affirmative.

Areas of Focus

The sharing of resources, insights and toolkits is critical to success. It will also help to ensure equitable deployment of available funding. The BDO could coordinate the development of a centralized broadband resource center designed to build awareness of funding opportunities and identify resources for potential broadband projects. Resources include toolkits with examples of grant applications, templates to support application development, reports and insights from published studies and information on best practices and lessons learned. A broadband resource center will also include contact information for relevant organizations and regional service providers.

Next steps:

- Assess needs and develop a resource center that provides information and materials to support the development of plans and applications to support the sharing of contacts, regional service providers, reports and insights and sharing of lessons learned and best practices. Resources to be developed include toolkits and templates to aid in the development of plans and applications.

Improve Coordination and Partnering

The challenges of closing the digital divide require engagement across multiple state agencies, public and private entities and nonprofits in an effort to avoid overbuilding and to share risks and costs.

Connections should continue to be made to foster partnerships. Partnerships can bridge the gap by bringing multiple assets together to successfully expand broadband access and adoption. A partnership that includes entities of all types – public, private and nonprofit – can address economic challenges by sharing capital costs and enhancing revenue potential. Through partnerships, communities can generate demand for broadband service. Demand aggregation can help build a business case for expansion and improve returns on investment. Community partnerships can identify public and private assets used to help fund or decrease capital costs needed for deployment.

It is important to leverage anchor institutions such as schools, hospitals, libraries and community centers to serve as resource centers as these spaces historically provided citizens with access throughout the state.

Next steps:

- Build on existing communications and outreach strategy to collaborate with key stakeholders.
- Create a task force or advisory board with representatives from communities in need.
- Continue to engage with state, county and municipal associations that may have a greater reach to communities through their local elected official members.
- Continue to engage with other state agencies that regularly serve communities and can help identify and engage with them.
- Utilize broad outreach efforts that demonstrates a targeted focus on communities throughout the state.
- Invest further in surveys, data collection and mapping initiatives to better understand gaps in connectivity and needs.

PROVIDE FOR TRANSPARENCY & ACCOUNTABILITY

Accurate and detailed broadband coverage data is essential to identify unserved and underserved households and to understand the extent and quality of existing networks and the level of competition across each region. As previously mentioned, maps and broadband coverage data provided by the FCC do not provide the level of detail and accuracy to support current efforts. The FCC is updating its maps and definitions, which are expected to launch in late 2022.

The BDO is required to create a broadband availability map indicating eligible versus ineligible areas for financial assistance. The availability map will improve transparency, empower citizens and communities to understand needs and can be used

to dispute inaccurate FCC maps. The broadband availability map is expected to be available in January 2023.

Next steps:

- Establish procedures and a data collection process in accordance with FCC rules to challenge FCC data when made available.
- Create, update annually and publish on the Comptroller's website a broadband availability map.

Set Goals and Measuring Progress

While this document outlines the general direction and required actions, it is important to have action plans, goals, targets and a process to measure progress. Goals serve as a benchmark along the path towards achieving the overarching vision of closing the digital divide. This framework and the measurement of progress will be embedded into grant programs developed. Additionally, targets will be established for other outreach, training and awareness-building programs.

Next steps:

- Establish state-level goals to measure progress against the dimensions of the digital divide: coverage, quality, affordability, devices and digital literacy.
- Embed goals and measures into grant programs established.

Establish Accountability

Accountability, effective oversight and compliance activities are critical to supporting the development of sustainable broadband infrastructure:

- Risks should be evaluated during all stages of the grant program cycle and relevant policies and procedures implemented to mitigate the risk. For example, during the period of performance, grant awardees should be required to report on the project progress, project cost and compliance activities.
- With federal funds, the BDO is the recipient and all grant awardees are considered "subrecipients," as defined by Uniform Guidance (2 CFR 200.1). As a result, both recipients and subrecipients must comply with federal laws and applicable federal program guidance. Grant awardees are eager to build out broadband in their service areas but may lack skills, knowledge and experience to meet compliance with federal requirements which is why oversight is important.
- Procurements are often scrutinized. Failure to properly procure contracts in accordance with 2 CFR 200 is one of the most frequent Office of Inspector General (OIG) findings and can result in the complete claw-back of funding.
- There are unique reporting requirements associated with federal funding programs. An effective framework is required to identify reporting requirements, collect the required data and compile the required reports in a timely manner.
- There is an opportunity to learn "leading practices" implemented effectively in prior federal and state broadband grant programs. Further, the effectiveness of broadband grant programs should be re-evaluated with each grant funding round to provide for continuous improvement to ensure funding is being deployed to meet established broadband goals and the administration process is efficient.

To strategically design and implement a compliant broadband grant program, a Grant Program Roadmap will be developed at the onset so that the relevant guardrails are clearly defined before soliciting potential grant applications. This Grant Program Roadmap will detail the relevant policies and procedures for the lifecycle of grant programs, including the pre-award, award and post-award processes.

Next step:

- Develop a Grant Program Roadmap that embeds accountability, compliance and monitoring into each part of the process from program development, evaluation of applications, grant awards, ongoing monitoring and closeout.

- Execute a technical assistance contract to facilitate low-cost technical services for local community leaders to support the development and implementation of local broadband action plans.

UNDERSTANDING & OVERCOMING CHALLENGES

Identify Where Legislative Changes are Needed

Given the urgent need to improve broadband access, it is important to consider recommending legislative action to increase access to grant funds and streamline the deployment of projects.

Areas of focus may include clarifying which entities can provide broadband (e.g., municipal/locally owned networks) and how entities may access the infrastructure or right-of-way needed to deploy broadband services. Feedback during outreach efforts covered dig-once regulation, streamlining state and local permitting requirements, reducing application and infrastructure use fees, and increasing coordination with TxDOT and other state agencies.

Telecommunications providers, cable networks, electric service providers and others should be leveraged to shape a better policy and regulatory ecosystem.

Next steps:

- Identify cleanup language needed to HB 5 and HB 1505, 87th Legislative Session, to support the administration of ARPA and IIJA grant programs.
- Continue outreach efforts with ISPs, state agencies and local governments to identify potential legislative changes and opportunities to promote faster deployment of projects.

Understand Barriers to Deployment

Supply chain challenges and workforce shortages are top-of-mind issues that will impact the ability to successfully deploy broadband for the foreseeable future. As grant applications are reviewed and awarded, realistic expectations regarding construction times and the availability of materials to support those projects must be considered. The BDO will continue discussions with service providers to understand supply chain and workforce challenges.

Research should be conducted to understand where significant supply shortages exist as well as understand and document costs associated with anticipated projects. For example, make ready costs or the costs associated with bringing telephone poles up to the most current specifications. Pole attachments can be a liability to power distribution thus there is permission required to ensure the safety of the attachment to protect the public and ensure continuous provision of electric service.

Fiber slicers, directional board crews, aerial crews and other technical jobs will be in high demand as projects are implemented across the country. Workforce development programs should be explored and developed where possible to provide training and other opportunities to workers.

Next steps:

- Foster coordination across community colleges, technical schools, universities and organizations to develop workforce development programs.
- Conduct an assessment of supply chain challenges and recommendations to mitigate.

Appendix A: Observations From A Regional Perspective

Appendix A: Observations From A Regional Perspective

Map of Texas Regions

Appendix A: Observations From A Regional Perspective

Introduction: Loop Structure

BDO staff analyzed each of the 12 Comptroller economic regions through a broadband demand and supply loop. Each loop comprises five sections, with each reflecting a distinct step of the analysis of digital divide issues. Underlying the analysis were data gathered through community outreach.

1	2	3	4	5
Baseline Demographics	**Broadband Demand**	**Broadband Supply**	**Digital Divide Indicators**	**Digital Divide Findings**
Gather basic demographic data including population, income and morphology, all of which will serve as an anchor for the subsequent layers	Collect consumption data by end users including consumer (B2C), business (B2B) and government (B2G) broadband demand, specifically as it refers to education, healthcare and public safety facilities	Process provider data on network coverage, technology type and competition levels Initial overlay with demand and baseline demographics data produces preliminary view on coverage, quality and affordability	Build digital divide-specific layers reflecting key leading indicators Additional overlays produce more views on affordability, devices and digital literacy	Develop key findings around each of the five major digital divide dimensions, and potentially assess vulnerability

Qualitative capture (listening tour, 1:1 discussions with stakeholders, etc.)

Demographics layers x ***Demand layers*** x ***Supply layers*** x ***Digital divide layers*** = ***Baseline geospatial tool***

The results of this analysis are provided for each region with high-level observations that will continue to be refined as additional data becomes available. The table below summarizes the key inputs into the analysis.

Appendix A: Observations From A Regional Perspective

Regions	Baseline Demographics				Key Digital Divide Indicators				
					access	*quality*	*afford*	*devices*	*digital literacy*
	Population (millions)[1]	Households (millions)[1]	Household density (per sq. mile)	Median household income[2] ($ thousand)	Share of household HSBB coverage	Share of households with access to FTTH	Share of households with income < $50k	Share of households without any computing device	Share of population 65 years old or older
TEXAS	**29.4**	**10.3**	**39**	**69**	**89%**	**46%**	**35%**	**9%**	**13%**
High Plains	0.9	0.3	8	56	88%	59%	41%	10%	14%
Northwest	0.6	0.2	8	52	81%	43%	43%	13%	18%
Metroplex	8.1	2.9	191	79	92%	57%	31%	7%	12%
Upper East	1.2	0.4	28	52	63%	12%	42%	14%	18%
Southeast	0.8	0.3	26	51	74%	25%	42%	14%	18%
Gulf Coast	7.3	2.5	208	76	92%	48%	32%	8%	12%
Central	1.3	0.5	27	55	78%	25%	40%	11%	14%
Capital	2.4	0.9	105	84	94%	49%	27%	5%	12%
Alamo	2.9	1.0	56	65	91%	60%	36%	10%	14%
South	2.4	0.8	22	45	92%	19%	46%	17%	13%
West	0.7	0.2	6	66	87%	27%	35%	12%	13%
Upper Rio Grande	0.9	0.3	14	49	96%	44%	45%	14%	13%

1. Note that population and household count data is based on FCC staff block estimates, which FCC develops every year for their internal use. Their approach uses county level estimates released annually from the census and uses a mathematical and geospatial information system-based approach to allocate down to census block level, taking several local factors into account. Current iteration used is from 2020.

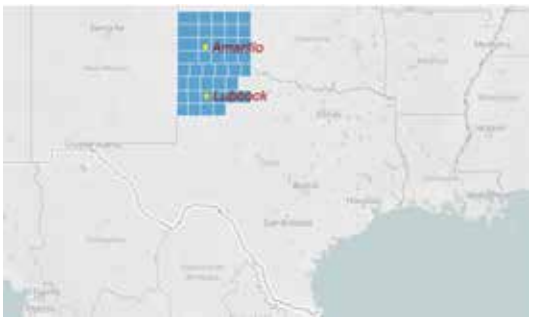
2. Median household income is based on American Community Survey (ACS) data from the US Census, using the 2019 ACS five-year estimates which are the latest available. This is reported at a census block group level (most granular available) and assumed to be same for all households in the census blocks that sit under the census block group.

Region 1 | High Plains

Baseline Demographics

High Plains is one of the largest regions in the state, it has a relatively small population size, and its population earns an income below the state's median.

- Bordered by New Mexico and Oklahoma, the High Plains region is the northwestern-most region of Texas; it includes 41 counties (the most of any region) and two MSAs. Its major cities are Amarillo and Lubbock.
- With nearly one million people (3 percent of the state's population) spread across more than 300,000 households, the High Plains has a relatively low population size.
- The High Plains is the second largest region in the state by area, which contributes to it being one of the least-dense regions in Texas.
- Households in the High Plains have a low median income. At $56,000, salaries are lower than Texas' $69,000 median annual income.
- About two-thirds of the High Plains population live in the suburbs surrounding Amarillo and Lubbock. Three percent live in urban areas, and the rest are in rural areas.



Location

Area Morphology

KEY INDICATORS[1]	TOTAL	RURAL	SUBURBAN	URBAN
Population (millions)	0.9	0.3	0.6	0.0
Households (millions)	0.3	0.1	0.2	0.0
Median household income[2] ($ thousands)	56	61	55	32

1. Assessed at census block group level: rural: < 600 people/sq. mi.; suburban: 600-7,500 people/sq. mi.; urban: >7,500 people/sq. mi.
2. Represents a population-weighted median income – aggregated from census block group level

Region 1 | High Plains

Broadband Demand Snapshot

The High Plains has one of the lowest concentrations of households and businesses in the state, with most located in suburban and rural areas.

- The High Plains is a low-density region by household and business, with density rates of eight households and 0.9 businesses per square mile, well below the 39 and 3.5 state density rates for households and businesses, respectively. Suburban areas in the High Plains are high-density relative to the rest of suburban areas in the state.
- The High Plains region has a low number of public service facilities. There are 160,000 students in the High Plains who attend almost 400 schools; 60 percent of these schools are in the suburbs. There are 46 healthcare institutions in the region, with more than 50 percent of them in rural areas. The top three regions in the state have between 70 and 200 facilities. Finally, there are slightly more than 300 public safety facilities in the High Plains, with more than 60 percent in rural areas. The top three regions in the state have more than 450.

Household Density

Business Density

Education & Healthcare Centers

Public Safety Facilities

KEY INDICATORS	TOTAL	RURAL	SUBURBAN	URBAN
Household Density (per sq. mi.)	8	3	877	3,660
Business Density (per sq. mi.)	1	0	88	147
# Education centers	392	167	223	2
# Healthcare centers	46	24	22	-
# Public safety facilities	308	186	122	-

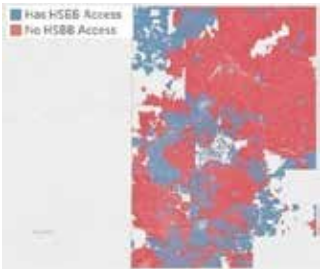
Region 1 | High Plains

Broadband Supply Snapshot

ISPs offer HSBB to a relatively low share of households; many schools and hospitals in rural areas remain unserved.

- The High Plains has a low HSBB coverage rate. Eighty-eight percent of High Plains households (290,000 households) are covered compared to 96 percent for the highest region in the state. That leaves approximately 40,000 unserved households in the region, most of them in suburban areas (26,000).
- The High Plains has the second highest rate of households served by fiber. ISPs offer FTTH to 59 percent of households (almost 200,000) compared to 46 percent for the rest of the state. This leaves around 140,000 households without FTTH.
- The High Plains includes a high number of HSBB providers. There are 24 distinct HSBB ISPs in the region. The lowest region has nine and the highest 31. Market penetration is similar for the top three providers, although only one of them provides fiber. Forty-one percent of households are served by only one ISP.
- Schools and hospitals in the High Plains are poorly covered. At 84 percent and 89 percent coverage, respectively, these are some of the lowest rates in the state. More than 60 schools and five hospitals remain unserved, with most of them concentrated in rural areas.

Availability of HSBB (households)



Availability of HSBB (businesses)

HSBB Offering by Tech

Number of HSBB Providers

PERCENT WITH ACCESS TO HSBB	TOTAL	RURAL	SUBURBAN	URBAN
Households	88%	67%	97%	100%
Education facilities	84%	70%	94%	100%
Healthcare facilities	89%	79%	100%	-

Region 1 | High Plains

Digital Divide Indicators

A relatively large share of the High Plains population is low-income, lacks internet devices and has not completed their high school education.

- The High Plains has a high share of low-income households. Forty-one percent of High Plains households (136,000) have annual income below $50,000 – this rate is equal to the median of most regions but above the state's rate of 35 percent.
- The High Plains has a high share of households lacking proper devices to connect to the internet. Ten percent of households (35,000) do not have any computing device to connect to the internet, and 30 percent of households (100,000) have no laptop or desktop computer to connect to the internet. This is in contrast with 9 percent and 25 percent, respectively, for the entire state.
- The High Plains has a low share of the population over the age of 65 but a high share of population without a high school diploma. Fourteen percent of residents (123,000) are over the age of 65 and 18 percent of residents (154,000) are without a high school diploma, compared to the state's 13 percent and 16 percent rates, respectively.
- Urban households in the High Plains are more likely to be younger, have lower educational attainment and have lower income. However, only three percent of the High Plains population lives in urban areas, which makes up fewer than 11,000 households.

Households w/ income <$50k

Households w/o computer

Population > 65y/o

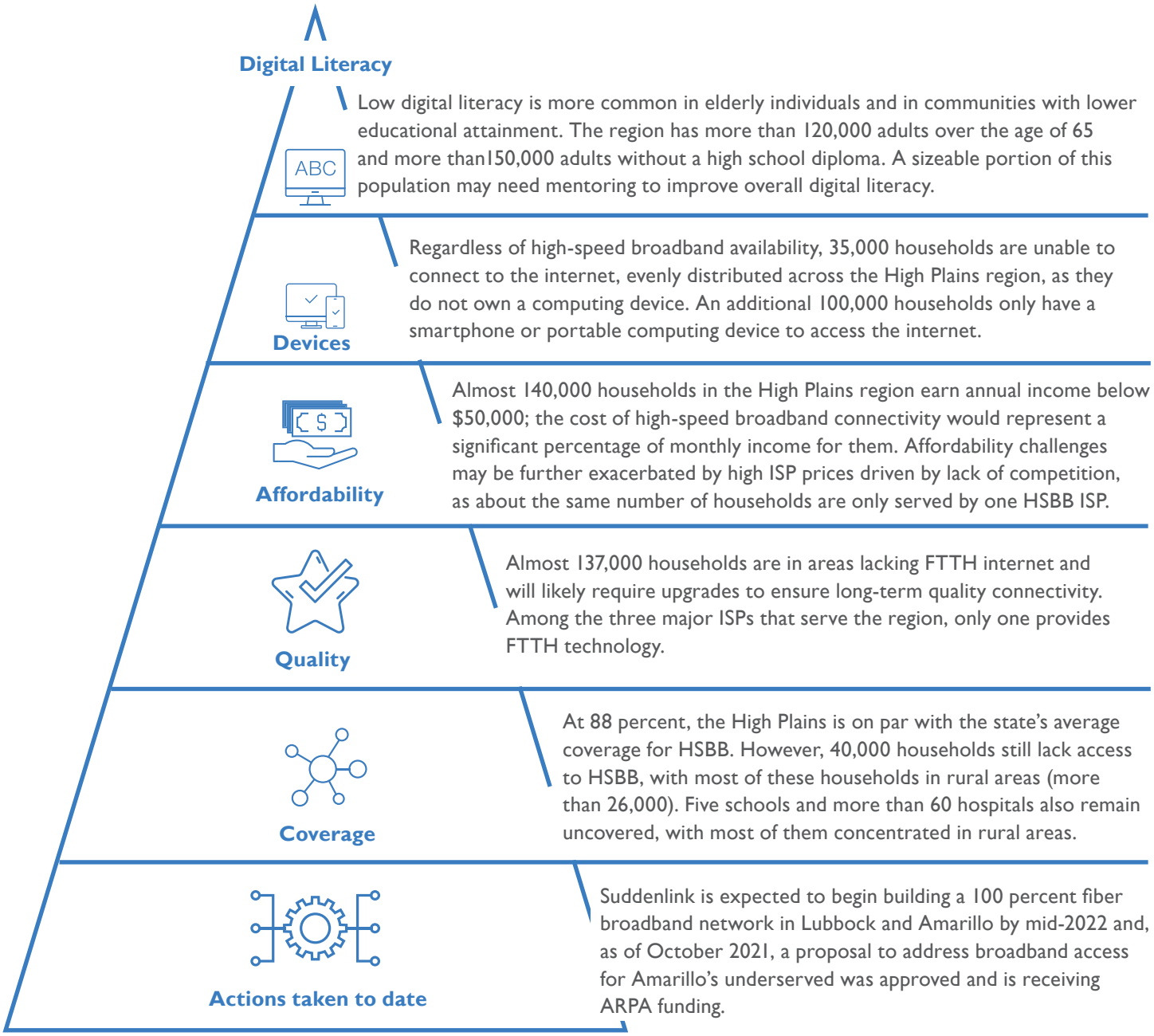
Population >25y/o w/o HS diploma

KEY INDICATORS	TOTAL	RURAL	SUBURBAN	URBAN
Households	334,000	106,000	217,000	11,000
Households w/ income <$50K	41%	37%	42%	54%
Households w/o any computing devices	10%	11%	10%	11%
Households w/o laptop/desktop	30%	30%	30%	32%
Population	873,000	285,000	560,000	28,000
Population 65 y/o or older	14%	18%	14%	7%
Population w/o a HS diploma (age 25+)	18%	15%	17%	19%

Region 1 | High Plains

Digital Divide Findings

The High Plains region is a low-density region with relatively high coverage rates for fiber. While digital divide challenges exist, they are not as significant as other regions.



High Plains Stakeholder Commentary

Stakeholders noted that regional demand outpaces supply in the High Plains; rural areas are left out.

- **Broadband demand** in the High Plains is growing – residents are now more aware than ever of the value of HSBB and want more or better access, to the point that they are exploring solutions on their own.

"From an economic development perspective there were opportunities – people want to relocate there but that ended when they realized they didn't have enough internet access."

- Nonprofit Leader

"Stakeholder requested a formal telecom map from a provider, they told him it'll take at least 60 days, he doesn't know what he'll even get at the end of that. Maps might say they have access when they don't – don't know if that's just a mistake or if they're inhibiting competition."

- Nonprofit Leader

"Worked with the city to hire a consultant even though money was tight, the consultant told them the broadband project was feasible but would be hard, helped them develop RFP, and gave them an idea of what to expect. Given the players in the area, management needs to understand nothing could come of this – the problem is getting people out to the Panhandle, Hill County scares people off."

- Nonprofit Leader

- **Broadband supply** in the High Plains is challenged by supply and demand imbalances, limited ISP options and lack of incentives for ISPs to expand.

"It's a chicken and egg problem for providers building that infrastructure in rural areas. If they build it, will people subscribe?"

- Educator

"We don't have a problem if there is only one provider in an area if their intention is good and they are willing to help those communities they serve. What's bad is when there's one ISP in town and they don't have good customer service and are not willing to upgrade tech. They have total control."

- Nonprofit Leader

"Funding in this area is mainly for build out, not maintenance and operations. It costs the same to put in the line, but profitability depends on number of customers served – rural can lay 20 miles and hit 5 households, urban can lay 20 miles and hit 5k households."

- Local ISP Representative

"Even when buildings were closed people were parking in library lots to access Wi-Fi. So much is online now – W2, taxes, benefits, applying for jobs, school, etc. Less in-person points of contact for those services than there used to be, but people need a way to access these services when the library isn't open. Device access is also important."

- Regional Foundation Representative

"Not just monthly costs are hard but also startup costs. There is a large refugee population (6 percent) that gets a monthly stipend for broadband but can't afford the $150 setup fee."

- Librarian

Region 2 | Northwest

Baseline Demographics

The Northwest is one of the largest regions by area but also one of the smallest by population size; its median income is below that of most regions.

- The Northwest region is in the north of Texas bordering the state of Oklahoma and the High Plains, Metroplex, Central and West regions. The Northwest has 30 counties and two MSAs, Abilene and Wichita Falls.
- With 550,000 people (2 percent of the Texas population) spread across more than 200,000 households, the Northwest is the least populated region in the state.
- The Northwest is also one of the largest regions in the state by area, which contributes to it being one of the least densely populated regions.
- At $52,000, Northwest residents have a relatively low median household income, in line with many other regions but below the state's median of $69,000.
- The Northwest's population is similarly split between rural and suburban areas (45 percent versus 55 percent).

Location

Area Morphology

KEY INDICATORS[1]	TOTAL	RURAL	SUBURBAN	URBAN
Population (millions)	0.6	0.2	0.3	0.0
Households (millions)	0.2	0.1	0.1	0.0
Median household income[2] ($ thousands)	52	56	49	41

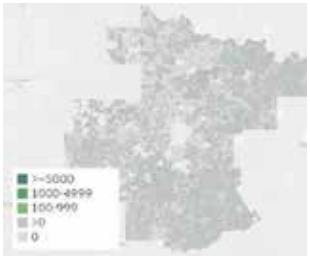
1. Assessed at census block group level: rural: < 600 people/sq. mi.; suburban: 600-7,500 people/sq. mi.; urban: >7,500 people/sq. mi.
2. Represents a population-weighted median income – aggregated from census block group level

Region 2 | Northwest

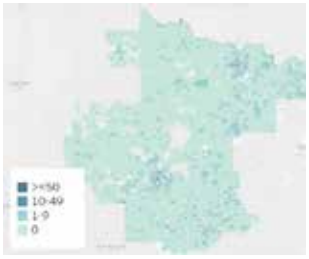
Broadband Demand Snapshot

The Northwest has the second lowest population density rate in Texas, with relatively few businesses and public service facilities.

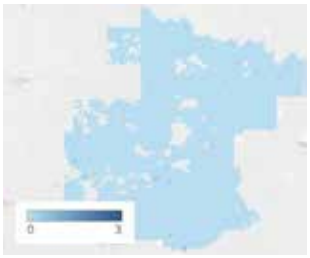
- The Northwest is one of the least densely populated regions by both household and business, with density rates of eight households and 0.8 businesses per square mile, well below the 39 and 3.5 state rates for households and businesses, respectively. Rural and suburban areas are particularly low density by household relative to the rest of the state, while the urban areas have a comparatively high density.
- The Northwest region has a low number of public service facilities. There are more than 250 schools serving around 90,000 students. Comparatively, half of the regions in the state have more than 400 schools. There are also 38 healthcare institutions in the Northwest region, but half of the regions have more than 45 hospitals. There are just under 270 public safety facilities in the region, but most regions have more than 300. Northwest schools and hospitals are somewhat evenly split between rural and suburban areas, but 70 percent of public safety facilities are in rural areas. There are no schools, hospitals or public safety facilities in urban areas.



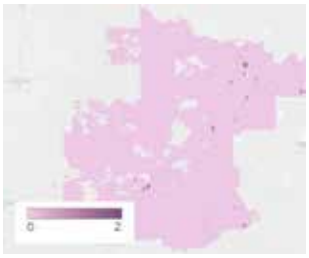
Household Density



Business Density



Education & Healthcare Centers



Public Safety Facilities

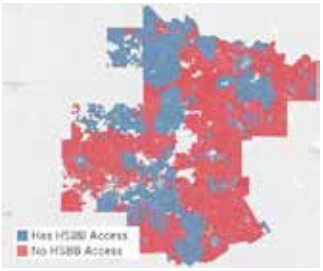
KEY INDICATORS	TOTAL	RURAL	SUBURBAN	URBAN
Household density (per sq. mi.)	8	4	681	5,175
Business density (per sq. mi.)	1	0	72	108
# Education centers	262	119	143	-
# Healthcare centers	38	19	19	-
# Public safety facilities	267	186	81	-

Region 2 | Northwest

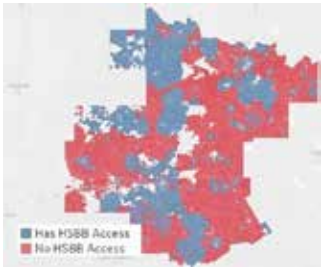
Broadband Supply Snapshot

A large share of Northwest households remains unserved, with rural households being impacted the most.

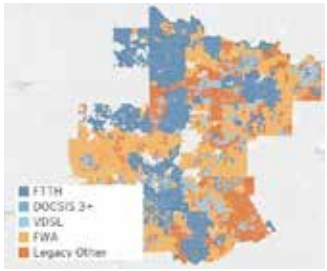
- The Northwest has a low HSBB coverage rate. Eighty-one percent of households in the Northwest (170,000) have access to HSBB, compared to the state average of 89 percent. Nearly all of the 40,000 unserved households are outside urban areas.
- The Northwest has a high rate of households served by FTTH. Forty-three percent of households in the region (over 90,000) are served by FTTH, while the average for the state is 46 percent.
- The Northwest has a high number of distinct HSBB providers, but a high share of households is only served by one ISP. There are 28 distinct HSBB ISPs in the region. Fifty-four percent of households are only served by one ISP.
- Coverage for education and healthcare facilities is low. At 82 percent and 84 percent coverage, respectively, 48 schools and six hospitals do not have coverage, with most of them concentrated in rural areas.



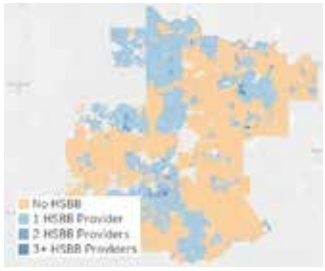
Availability of HSBB (households)



Availability of HSBB (businesses)



HSBB Offering by Tech



Number of HSBB Providers

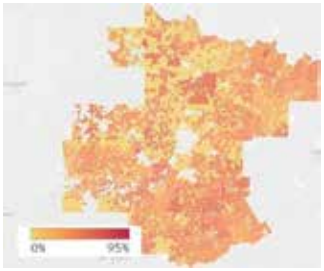
PERCENT WITH ACCESS TO HSBB	TOTAL	RURAL	SUBURBAN	URBAN
Households	81%	61%	98%	100%
Education facilities	82%	67%	94%	-
Healthcare facilities	84%	74%	95%	-

Region 2 | Northwest

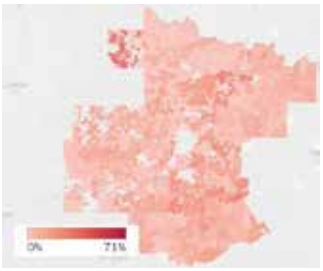
Digital Divide Indicators

A relatively high share of the Northwest population is low income, lacks internet devices and is over 65.

- The Northwest has a high share of low-income households. Forty-three percent of Northwest households (93,000) have annual income below $50,000 – this rate is similar to the median of most regions, but above the state's rate of 35 percent.
- The Northwest has a high share of households lacking proper devices to connect to the internet. Thirty-two percent of households (69,000) only connect via mobile devices, and 13 percent (29,000) do not have any computing device. This is in contrast with 25 percent and 9 percent, respectively, for the entire state.
- The Northwest has a low percentage of the population without a high school diploma but a high percentage of the population over 65. Fourteen percent of the Northwest population (almost 80,000) are people 25 and older who do not hold a high school diploma, while 18 percent (100,000) are over the age of 65, compared to the 16 percent and 13 percent state rates, respectively.
- Urban households in the Northwest are more likely to be younger but might also have lower income and lower educational attainment. However, only one percent of the Northwest population lives in urban areas, which makes up about 2,000 households.

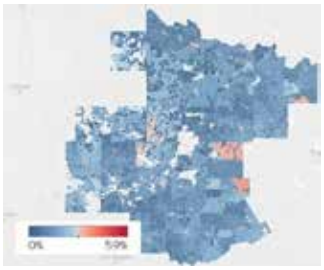


Households w/ income <$50k



Households w/o computing device

Population > 65y/o



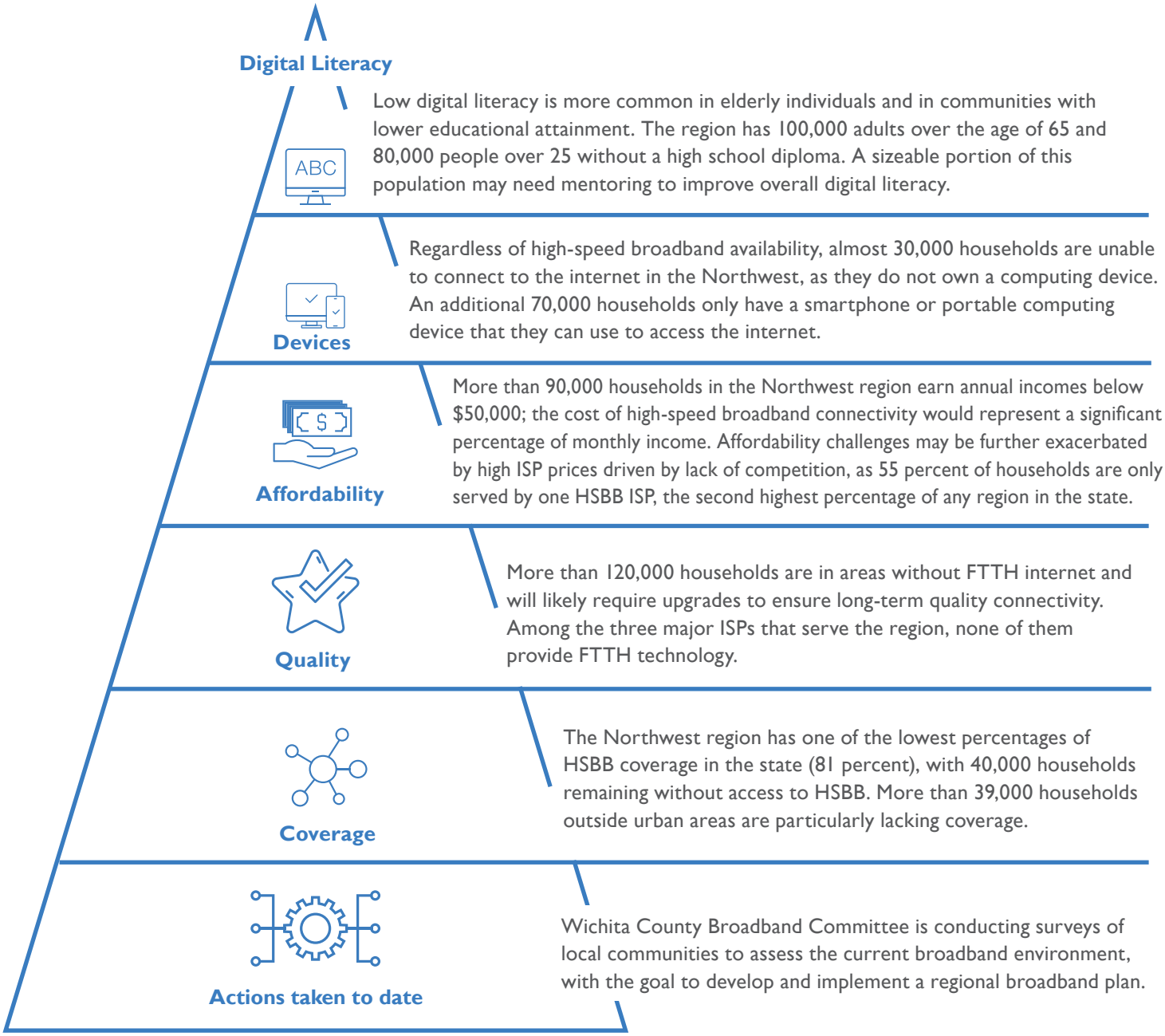
Population >25y/o w/o HS diploma

KEY INDICATORS	TOTAL	RURAL	SUBURBAN	URBAN
Households	215,000	97,000	116,000	2,000
Households w/ income < $50k	43%	41%	45%	53%
Households w/o any computing device	13%	14%	13%	6%
Households w/o laptop/desktop	32%	32%	33%	33%
Population	553,000	243,000	305,000	4,000
Population 65 y/o or older	18%	21%	15%	6%
Population w/o a HS diploma (age 25+)	14%	13%	16%	18%

Region 2 | Northwest

Digital Divide Findings

The Northwest region is a low-density region with a more rural and older population. While digital divide challenges exist, they are not as significant as other regions.



Northwest Stakeholder Commentary

Residents demand more permanent broadband solutions; providers report high delivery and maintenance costs. Despite access, affordability is still a digital divide challenge.

- **Broadband demand** for Northwest residents is critical for everyday life. While they appreciate temporary solutions to expand access, they seek permanent solutions.

"Despite an internet company setting up hotspots all over town, a lot of kids live so far out and don't have vehicles, or parents work late and weren't able to come to hotspot locations."

- Technology Director, Independent School District

"Internet connectivity is a basic requirement for health, safety, education, and information for daily life. It has become as basic a need as electricity, gas, and water for daily life."

- Chief Technology Officer

"There is a need to support the needs of communities to be able to produce communication of education, work, daily life."

- Director of Research and Special Projects

- **Broadband supply** in the Northwest has high delivery costs, and even if financing is secured, it requires a nuanced and ongoing cost analysis to ensure that service and quality remain competitive.

"There is never enough money to go around and get fiber everywhere. It is cheaper to build a house than it is to take fiber to a house that is 3 or 4 miles out."

- Director of Business Operations

"Cost of operations is not just equipment but also the technicians you have to pay, how far do you have to travel, and the type of connectivity (e.g., fiber, wireless, etc.) you're installing."

- Systems General Manager

"When it's working you have good access, and good up and down speeds. But when someone cuts it north of Midland, it affects the whole town."

- Stakeholder

- **Digital divide** challenges extend beyond access to broadband technology and require looking into aspects such as affordability of service and devices, as well as digital literacy training.

"Even if you get an affordable rate, can you afford a device? Can you afford the maintenance for that device?"

- Executive Director, Community Based Consortium

"What are we going to do about tech support? Some counties will need to buy it from stores such as Best Buy, while other counties will be able to provide it for themselves."

- Stakeholder

"Affordability for families is important. There are 65 percent who are economically disadvantaged. Some of them can't afford the $60 per month service fees."

- Director, Library Services

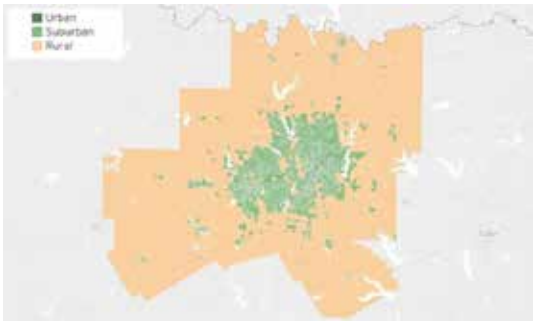
Region 3 | Metroplex

Baseline Demographics

The Metroplex is the most populous region in Texas and one of the wealthiest by median household income.

- The Metroplex region is in Northeast Texas, surrounding the Dallas-Fort Worth metro area; it includes 19 counties and two MSAs.
- With more than 8 million people (28 percent of the Texas population) spread across just under 3 million households, the Metroplex is the most populated region in the state.
- The Metroplex is also one of the smallest regions in the state by area, which in turn makes it the second most densely populated region in Texas.
- Metroplex residents have the second highest median household income in the state at $79,000, higher than the state's median of $69,000.
- About two-thirds of the Metroplex population live in the suburbs around Dallas and Fort Worth, with the remaining split similarly between rural and urban areas.

Location



Area Morphology

KEY INDICATORS[1]	TOTAL	RURAL	SUBURBAN	URBAN
Population (millions)	8.1	1.2	5.4	1.5
Households (millions)	2.9	0.4	1.9	0.5
Median household income[2] ($ thousands)	79	76	84	60

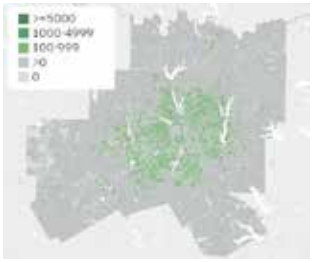
1. Assessed at census block group level: rural: < 600 people/sq. mi.; suburban: 600-7,500 people/sq. mi.; urban: >7,500 people/sq. mi.
2. Represents a population-weighted median income – aggregated from census block group level

Region 3 | Metroplex

Broadband Demand Snapshot

The Metroplex has one of the highest concentrations of households, businesses and public service facilities in the state.

- The Metroplex is the second densest region by household and business. At 191 households and 17 businesses per square mile, the Metroplex is considerably denser than the state, which sits at 39 households and 3.5 businesses per square mile. In density, the Metroplex is second to the Gulf Coast region, which is 10 percent smaller in area.
- The Metroplex is home to the largest network of public service facilities in the state. There are almost 2,250 schools serving 1.5 million students. This is more than three times as many as the state's average for all regions, at 700 schools. There are 187 healthcare institutions in the Metroplex, three times as many as the state's average. There are more than 900 public safety facilities in the Metroplex, almost three times as many as the state's average. About 66 percent of public safety facilities, 75 percent of schools and 90 percent of hospitals are in suburban areas.



Household Density

Business Density

Education & Healthcare Centers

Public Safety Facilities

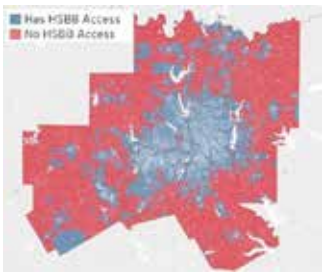
KEY INDICATORS	TOTAL	RURAL	SUBURBAN	URBAN
Household density (per sq. mi.)	191	32	927	3,810
Business density (per sq. mi.)	17	3	91	181
# Education centers	2,246	409	1,648	189
# Healthcare centers	187	19	163	5
# Public safety facilities	927	321	563	43

Region 3 | Metroplex

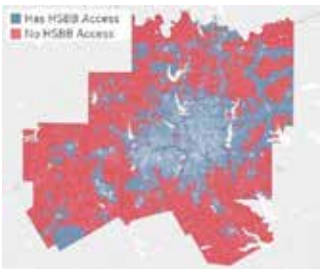
Broadband Supply Snapshot

ISPs cover a large portion of the Metroplex with HSBB, but given the Metroplex's large size, many gaps remain – especially in rural areas.

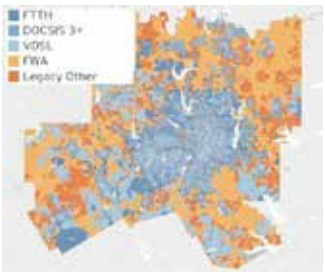
- The Metroplex has one of the highest HSBB coverage rates. Ninety-two percent of households have access to HSBB in the Metroplex, compared to the 89 percent state rate. However, given the large size of the Metroplex population, this still leaves 220,000 unserved households, most of which are in suburban areas (146,000). At 54 percent, coverage in rural areas is one of the lowest across the state.
- The Metroplex has one of the highest shares of households served by fiber. ISPs offer FTTH to 57 percent of households, compared to 46 percent for the rest of the state.
- The Metroplex has the highest number of distinct HSBB providers in the state, and a low rate of households served by only one ISP. There are 31 distinct HSBB ISPs in the region. Market penetration is much higher for the top providers than the rest. Thirty-six percent of households are only served by one ISP versus 43 percent for the entire state.
- Coverage for schools and hospitals in the Metroplex is also high. Ninety-four percent of schools have HSBB access; however, 140 schools remain unserved.



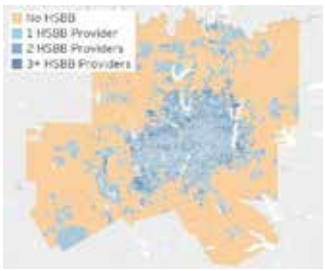
Availability of HSBB (households)



Availability of HSBB (businesses)



HSBB Offering by Tech



Number of HSBB Providers

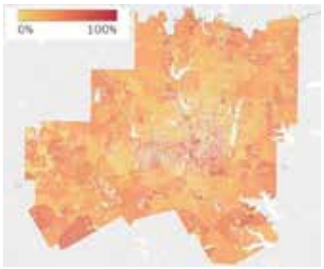
PERCENT WITH ACCESS TO HSBB	TOTAL	RURAL	SUBURBAN	URBAN
Households	92%	54%	99%	100%
Education facilities	94%	74%	98%	100%
Healthcare facilities	99%	95%	100%	100%

Region 3 | Metroplex

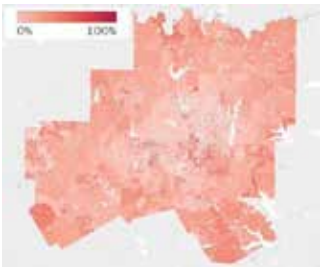
Digital Divide Indicators

The Metroplex has few low-income households, households without internet devices and population over 65 or without a high school diploma.

- The Metroplex has a low share of low-income households. Thirty-one percent of Metroplex households (900,000) have annual income below $50,000 – a few points below the 35 percent state rate.
- The Metroplex has a low share of households without internet devices. Seven percent of households (200,000) do not have any computing device, and 20 percent (600,000) have no laptop or desktop computer to connect to the internet, which is below the state average of 9 percent and 29 percent, respectively.
- The Metroplex has low shares of population over 65 or without a high school diploma. Twelve percent of residents (almost 1 million) are over the age of 65, and 14 percent of people 25 and older (close to 1.2 million) do not hold a high school diploma, relative to 13 percent and 16 percent, respectively, for the entire state.
- Urban households in the Metroplex are more likely to be younger, have lower educational attainment and have lower income. Eight percent of the urban population is over 65, 22 percent of urban adults do not hold a high school diploma and 41 percent of urban households make below $50,000.

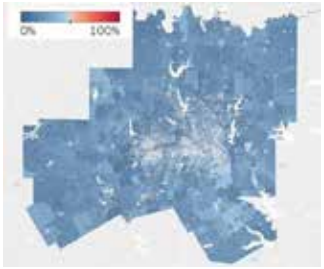


Households w/ income <$50k



Households w/o computing device

Population > 65y/o



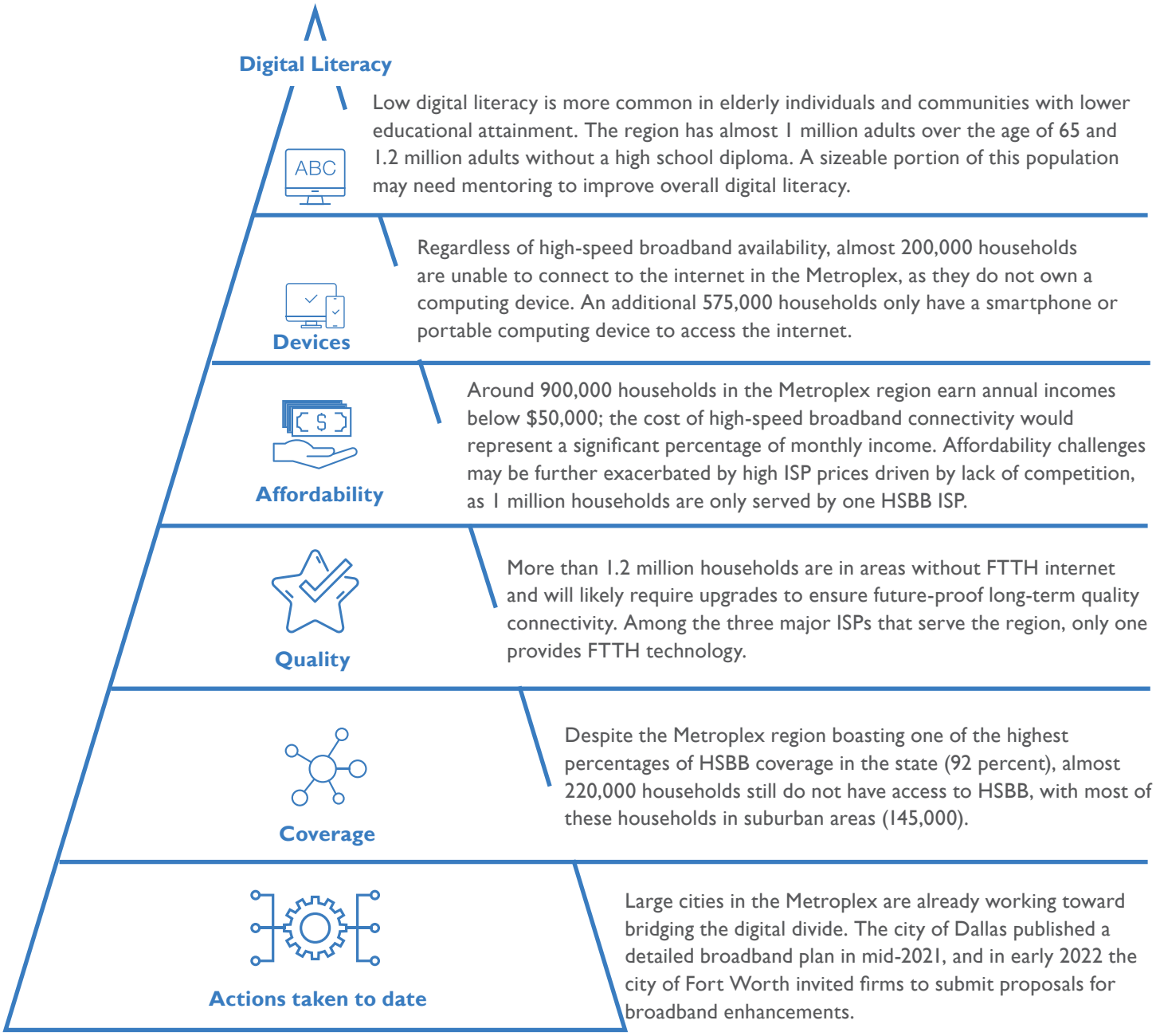
Population >25y/o w/o HS diploma

KEY INDICATORS	TOTAL	RURAL	SUBURBAN	URBAN
Households	2,868,000	409,000	1,909,000	550,000
Households w/ income < $50k	31%	30%	28%	41%
Households w/o any computing device	7%	8%	6%	8%
Households w/o laptop/desktop	20%	22%	18%	27%
Population	8,105,000	1,233,000	5,378,000	1,493,000
Population 65 y/o or older	12%	15%	12%	8%
Population w/o a HS diploma (age 25+)	14%	13%	13%	22%

Region 3 | Metroplex

Digital Divide Findings

The Metroplex performs well across all dimensions of the digital divide, but large numbers of households still face challenges across every dimension.



Metroplex Stakeholder Commentary

Metroplex residents emphasized the criticality of HSBB and the need to address network gaps, competition challenges, affordability and access to technology.

- **Broadband demand** sentiment in the Metroplex suggests users want HSBB to be considered a utility, a focus on long-term solutions and increased transparency and sharing of information.

"Connectivity should be a utility to households like electricity and this program will be more successful if the project is built as providing a statewide utility service that it has been doing for many years."

- Senior Technology Officer, Independent School District

"Ensure equitable distribution – make sure that people really get what they need, people don't want Band-Aid solutions to all this. Especially because these changes don't seem temporary – teachers and students need tech to access, even though pandemic is "over," people are still working from home."

- Stakeholder

"Local communities have had to make decisions about broadband investment without knowing broadband availability or provider access."

- Team member, Operation Connectivity

- **Broadband supply** challenges in the Metroplex revolve around network gaps, dated technology and limited competition.

"The last part of their territory will be line of sight fixed broadband, while the core is fiber. They want it all to be fiber, but maintenance challenges and cost will prohibit that for now."

- Chief Administrative Officer, Electric Cooperative

"Take a strong look at what minimum requirements must be for simultaneous connectivity – they gave out hot spots, but providers weren't ready for 20k new connections, so it still didn't work."

- Employee, Technology Consultancy

"Consumers feel like their hands are tied because they can only get one product (ISP)."

- Mayor

- **Digital divide** challenges include affordability and digital literacy, specifically as it pertains to privacy concerns.

"Need to make sure every single person is connected; we cannot overlook anyone or leave anyone out."

- Chief Administrative Officer, Electric Cooperative

"Responsibilities of privacy? Broadband requires interacting with a lot of personal information. Will there be requirements? Not yet, good questions. Right now, there's no requirements in this space."

- Stakeholder

"Digital discrimination – not talked about much, how do we have a complaint process for people, who is a protected class, what complaints will we see and how to respond."

- Chief of Staff

Region 4 | Upper East

Baseline Demographics

The Upper East region is small in area but medium in population size; it is mostly rural, and its median income is below the state's median.

- The Upper East region is in the northeastern part of Texas, bordering Oklahoma, Arkansas and Louisiana; it includes 23 counties and three MSAs. Its major cities are Tyler and Longview.
- With 1.2 million people (4 percent of Texas population) spread across over 400,000 households, the region has a medium-size population relative to other regions.
- Upper East residents have a low median household annual income at $52,000, below the state's median of $69,000 and the average of all regions at $61,000.
- Two-thirds of the population live in rural areas while the remaining one-third lives in the suburbs.

Location

Area Morphology

KEY INDICATORS[1]	TOTAL	RURAL	SUBURBAN	URBAN
Population (millions)	1.2	0.8	0.4	0.0
Households (millions)	0.4	0.3	0.1	0.0
Median household income[2] ($ thousand)	52	54	48	40

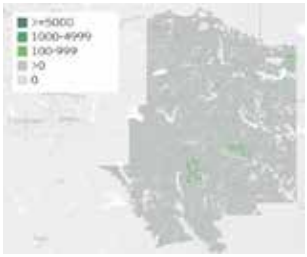
1. Assessed at census block group level: rural: < 600 people/sq. mi.; suburban: 600-7,500 people/sq. mi.; urban: >7,500 people/sq. mi.
2. Represents a population-weighted median income – aggregated from census block group level

Region 4 | Upper East

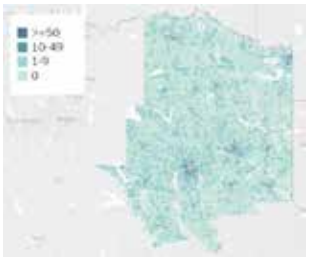
Broadband Demand Snapshot

The Upper East is a medium-density region by household and business; however, it has a relatively high number of public safety facilities, most of them in rural areas.

- The Upper East has density rates of 28 households and 2.5 businesses per square mile, below the 39 and 3.5 state rates for households and businesses, respectively. Suburban areas are particularly low-density relative to the rest of the state.
- The Upper East region has a low number of schools and hospitals but a high number of public safety facilities. The Upper East is home to 200,000 students attending fewer than 400 schools, 60 percent of them in rural areas. Comparatively, half of the regions in the state have more than 400 schools. There are also 39 healthcare institutions in the Upper East region, with 75 percent of these located in the suburbs. Lastly, there are more than 460 public safety facilities in the Upper East, the third highest number across the state despite the Upper East being a rather small region. Almost 80 percent of these facilities are in rural areas.



Household Density



Business Density

Education & Healthcare Centers

Public Safety Facilities

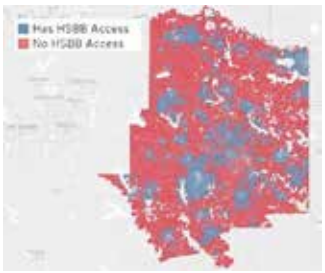
KEY INDICATORS	TOTAL	RURAL	SUBURBAN	URBAN
Household density (per sq. mi.)	28	19	540	4,146
Business density (per sq. mi.)	2.5	1	71	183
# Education centers	395	241	154	-
# Healthcare centers	39	10	29	-
# Public safety facilities	461	354	105	2

Region 4 | Upper East

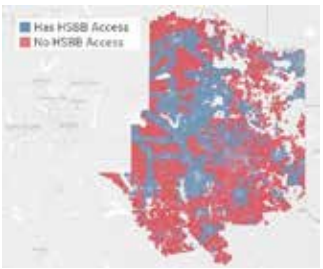
Broadband Supply Snapshot

ISPs offer HSBB and FTTH to the lowest share of households across the entire region, with a high share of schools also being unserved.

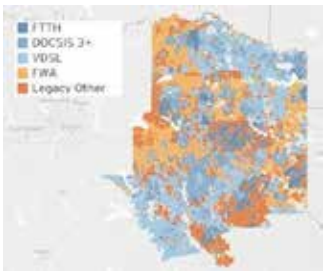
- The Upper East has the lowest HSBB coverage rate across all regions. Only 63 percent of households in the region have access to HSBB (270,000), compared to 89 percent for the entire state. This means that more than 160,000 households remain unserved. Large network gaps are found in both rural and urban areas.
- The Upper East has the lowest rate of households served by FTTH technology. Only 12 percent of households in the region (54,000) are served by FTTH technology, compared to 46 percent for the rest of the state.
- The Upper East region includes a high number of HSBB providers, but a high share of households only served by one ISP. There are 25 distinct HSBB ISPs in the region. Market penetration is similar for the top ISPs; however, only one of them offers FTTH. Fifty-four percent of households are only served by one ISP versus 43 percent for the entire state.
- Hospitals in the Upper East are well covered, but coverage for schools is low. Eighty-six percent of schools are served with HSBB, meaning 60 schools remain uncovered.



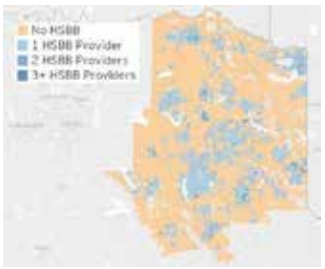
Availability of HSBB (households)



Availability of HSBB (businesses)



HSBB Offering by Tech



Number of HSBB Providers

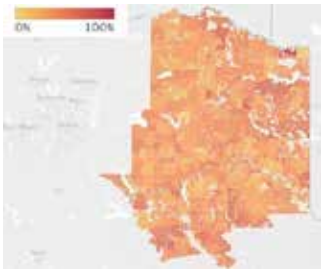
PERCENT WITH ACCESS TO HSBB	TOTAL	RURAL	SUBURBAN	URBAN
Households	63%	52%	83%	68%
Education facilities	86%	85%	88%	-
Healthcare facilities	95%	100%	93%	-

Region 4 | Upper East

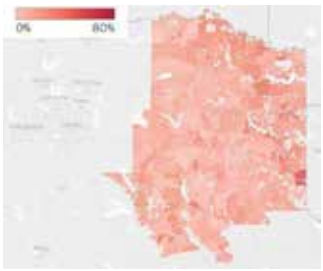
Digital Divide Indicators

The Upper East has the highest rate of population over 65, and high shares of low-income households or households without internet devices.

- The Upper East region has a high share of households with low income. Forty-two percent of Upper East households (180,000) have annual income below $50,000 – this rate is above the 35 percent state rate.
- The Upper East region has a high share of households lacking proper devices to connect to the internet. Thirty-five percent of households (154,000) have no computer to connect to the internet, and almost 14 percent (62,000) do not have any computing device. These rates are above the state rates at 25 percent and 9 percent, respectively.
- The Upper East region has the highest share of population over 65 at 18 percent of residents (213,000), compared to 13 percent for the entire state. Sixteen percent of residents (181,000) do not hold a high school diploma – this rate is in line with the state's rate.

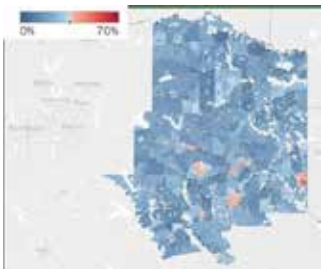


Households w/ income <$50k



Households w/o computing device

Population > 65y/o



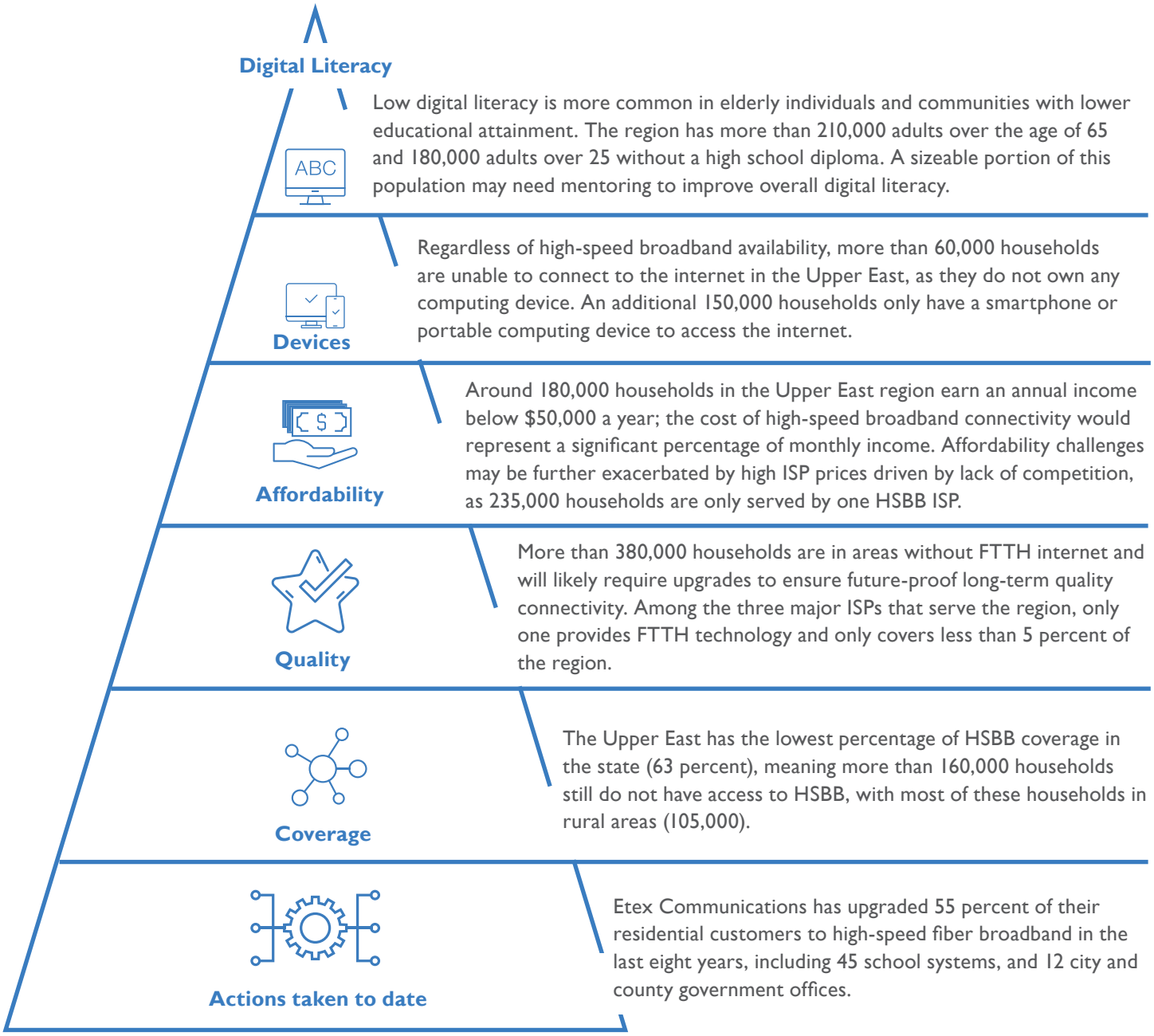
Population >25y/o w/o HS diploma

KEY INDICATORS	TOTAL	RURAL	SUBURBAN	URBAN
Households	436,000	284,000	149,000	2,000
Households w/ income < $50k	42%	41%	44%	47%
Households w/o any computing device	14%	15%	14%	9%
Households w/o laptop/desktop	35%	34%	37%	37%
Population	1,164,000	756,000	404,000	4,000
Population 65 y/o or older	18%	20%	16%	15%
Population w/o a HS diploma (age 25+)	16%	15%	17%	13%

Region 4 | Upper East

Digital Divide Findings

The Upper East performs poorly across most dimensions of the digital divide, making it a vulnerable region.



Upper East Stakeholder Commentary

Residents commented that the large ISPs are not addressing the needs of the Upper East residents, while digital divide challenges are stressing existing resources and impacting the education system.

- **Broadband demand** in the Upper East is strong, but large ISPs are failing to fulfill it, and local communities are opting for a more localized approach despite additional challenges.

"I have difficulty in finding that it would be a good investment to put scarce resources with a large company that has plenty of resources to deploy in the areas they haven't deployed in. Rural ISPs serving hard to reach areas seem like better candidates for that funding."

- ISP Representative

"Some communities are very rural so finding one broadband solution for their entire area has been hard. Satellite is harder because of the trees. They have problems with access, digital literacy, and low-income families that can't afford the monthly internet price."

- Librarian

"Hot spots don't reach some places for students in rural areas and don't meet the needs for the bandwidth that is required, or people had the devices available but, in the areas where they needed connectivity, there was none."

- Educator

- **Broadband supply** is not meeting demand due to lack of incentives for ISPs to expand; limited ISP options do not foster competition.

"I'd like to emphasize that it's just a different business plan to work in rural areas versus dense, urban areas. The same plan doesn't bring broadband to everyone."

- ISP Representative

"An example of 'The Donut' is, in Henderson, the cable company serves the middle of the donut and the tele coops serve rural areas around the donut, but the edges of the donut aren't covered or don't have opportunity for service because they're not in anyone's territory. That situation is common across the state."

- ISP Representative

"Some homes have decent download bandwidth but can't stream a Zoom because the upload speed is slow. Programs and apps available in 21st century require high-quality, high-speed internet."

- Nonprofit Representative

- **Digital divide** challenges of affordability, quality as well as digital literacy challenges stress existing resources and negatively impact the education system.

"For example: a mother was trying to save money for gas to go into town to go shopping. Someone trying to save money for a roundtrip to town is not going to afford a monthly service fee."

- Educator

"Higher education has seen a significant drop in enrollment. I felt that the lack of internet played a role in the drop. Schools lost a lot of teachers in the field, teachers were overwhelmed, stressed, and frustrated."

- Nonprofit Representative

"Lots of older patrons don't have digital literacy skills and they need a lot of help. They might not have someone available to help so they ask the library. Libraries have limited staff so it's more challenging."

- Librarian

Region 5 | Southeast

Baseline Demographics

The Southeast is one of the smallest regions in Texas, and the second most rural region; its median household income is below the state's median.

- Bordering Louisiana and the Gulf of Mexico, the Southeast region is the most eastern part of Texas; it includes 15 counties and one MSA. Beaumont is the major city in the region.
- With just under 800,000 people (3 percent of the Texas population) spread across 300,000 households, the region has a low population size relative to other regions.
- The Southeast is a small region by area, and its population density is above several other regions but still far behind the densest regions in the state.
- The Southeast region has the third lowest median household income in the state at $51,000, below the state's median of $69,000.
- Over half of the population of the Southeast lives in rural areas. The rest live mostly in the suburbs, and a small number of people (fewer than 100,000) live in urban areas.

Location

Area Morphology

KEY INDICATORS[1]	TOTAL	RURAL	SUBURBAN	URBAN
Population (millions)	0.8	0.4	0.3	0.0
Households (millions)	0.3	0.2	0.1	0.0
Median household income[2] ($ thousand)	51	51	50	4

1. Assessed at census block group level: rural: < 600 people/sq. mi.; suburban: 600-7,500 people/sq. mi.; urban: >7,500 people/sq. mi.
2. Represents a population-weighted median income – aggregated from census block group level

Region 5 | Southeast

Broadband Demand Snapshot

The Southeast is a medium-density region by household and business; it also has a low number of public safety facilities.

- The Southeast has density rates of 26 households and 2 businesses per square mile, below the 39 and 3.5 state rates, respectively. Suburban areas are particularly low-density relative to the rest of the state.
- The Southeast region has a low number of schools, hospitals and public safety facilities. The Southeast is home to just 130,000 students attending 255 schools, about 50 percent of them in rural areas. Comparatively, half of the regions in the state have more than 400 schools. There are 27 healthcare institutions in the region, with the bulk of them located in suburban areas. Half of the regions in the state have more than 40 hospitals. Lastly, there are more than 230 public safety facilities in the Southeast, a low number compared to almost 400 on average for the rest of the state. More than 60 percent of these facilities are in rural areas.

Household Density

Business Density

Education & Healthcare Centers

Public Safety Facilities

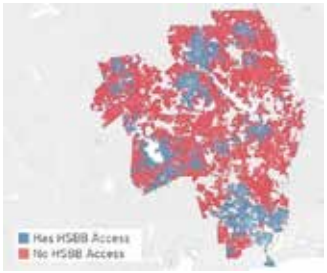
KEY INDICATORS	TOTAL	RURAL	SUBURBAN	URBAN
Household density (per sq. mi.)	26	15	657	1,203
Business density (per sq. mi.)	2	1	69	60
# Education centers	255	126	129	-
# Healthcare centers	27	5	22	-
# Public safety facilities	233	147	85	1

Region 5 | Southeast

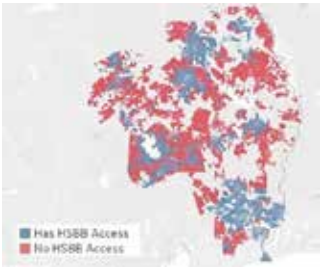
Broadband Supply Snapshot

ISPs offer HSBB and FTTH to a low share of households across the region, with a high share of schools unserved.

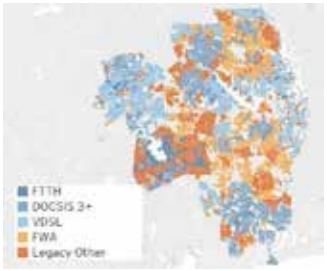
- The Southeast has a low HSBB coverage rate. Seventy-four percent of households in the region have access to HSBB (220,000), compared to 89 percent for the entire state. This means that more than 80,000 households remain unserved. The biggest network gaps can be found in rural areas.
- The Southeast has a low rate of households served by FTTH technology. Only 25 percent of households in the region (almost 80,000) are served by FTTH technology, compared to 46 percent for the rest of the state.
- The Southeast region includes a low number of HSBB providers, and a high share of households is only served by one ISP. There are 16 distinct HSBB ISPs in the region. Fifty percent of households are only served by one ISP versus 43 percent for the entire state.
- Hospitals in the Southeast are well covered, but coverage for schools is low. Eighty-seven percent of schools are served with HSBB, meaning 34 schools remain uncovered.



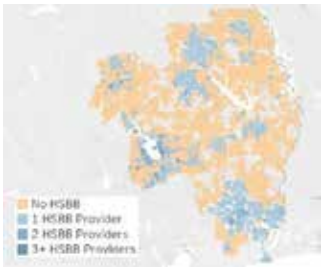
Availability of HSBB (households)



Availability of HSBB (businesses)



HSBB Offering by Tech



Number of HSBB Providers

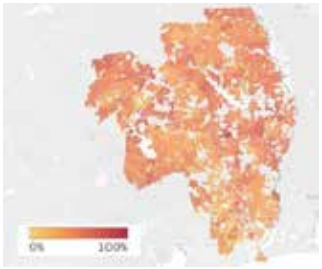
PERCENT WITH ACCESS TO HSBB	TOTAL	RURAL	SUBURBAN	URBAN
Households	74%	54%	99%	100%
Education facilities	87%	75%	98%	-
Healthcare facilities	96%	80%	100%	-

Region 5 | Southeast

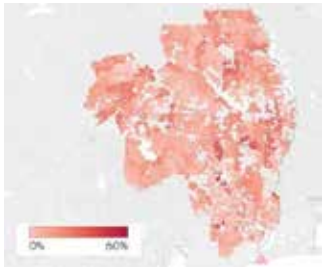
Digital Divide Indicators

The Southeast has a high rate of low-income households, households without internet devices and population over 65.

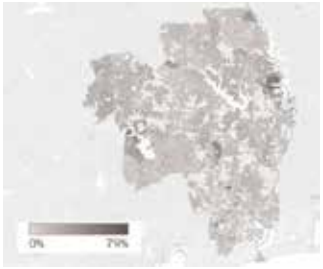
- Forty-two percent of Southeast households (130,000) have annual income below $50,000 – this rate is above the 35 percent state rate.
- The Southeast region has a high share of households lacking devices to connect to the internet. Thirty-five percent of households (106,000) have no laptop or desktop computer to connect to the internet, and 14 percent (43,000) do not have any computing device. These rates are above the state rates of 25 percent and 9 percent, respectively.
- The Southeast region has the second highest share of population over 65. Eighteen percent of residents (136,000) are over the age of 65, and 16 percent of residents (125,000) do not hold a high school diploma – compared to 13 percent and 16 percent, respectively, for the entire state.
- Differences between urban/suburban and rural households in the Southeast are much more pronounced than in other regions. However, the Southeast is also one of the least urban regions in the state, with fewer than 1,000 households qualifying as urban.



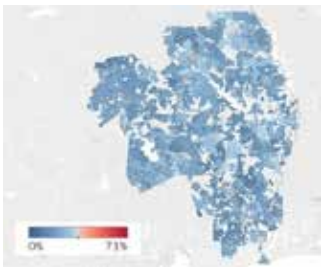
Households w/ income <$50k



Households w/o computing device



Population > 65y/o



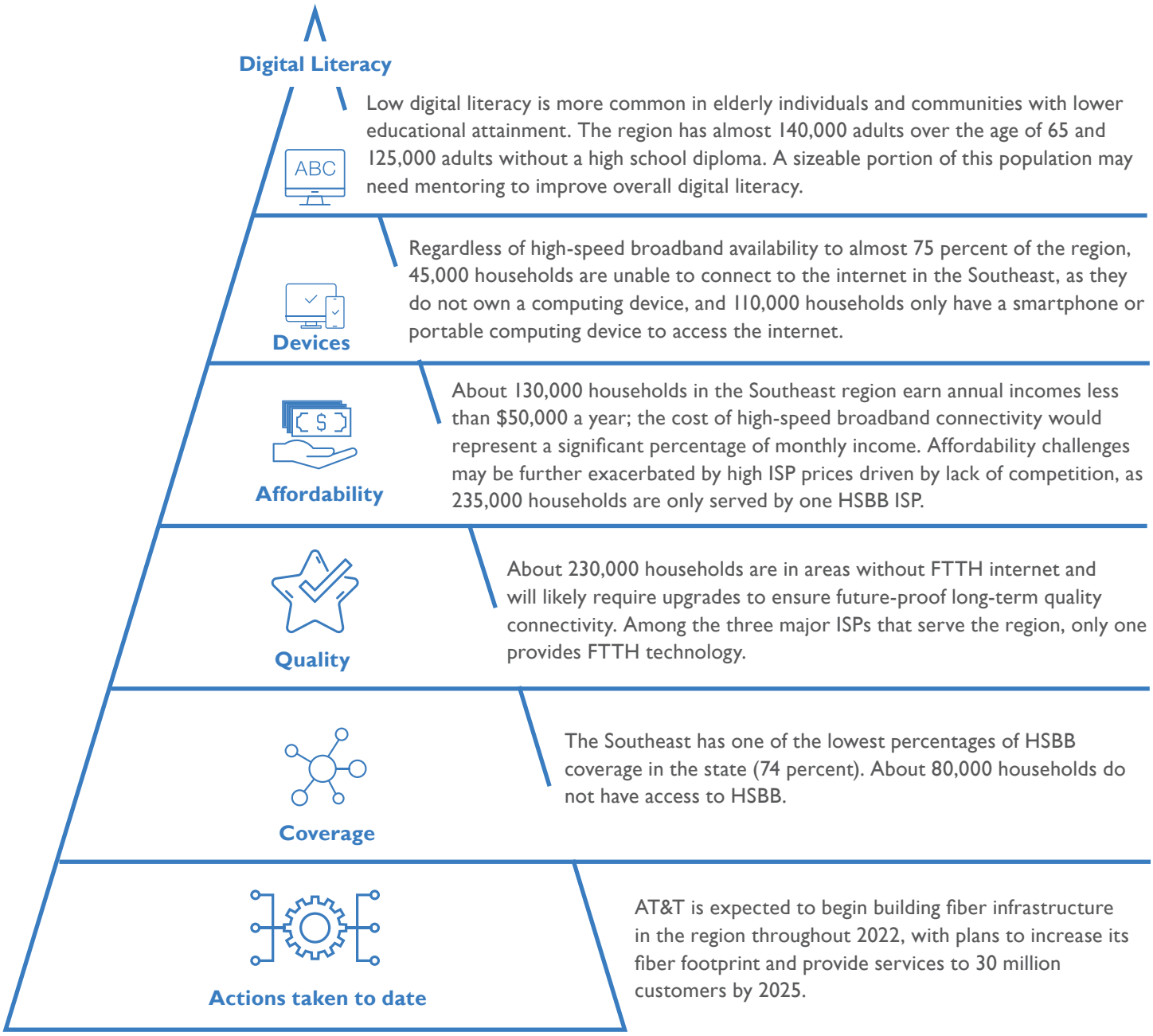
Population >25y/o w/o HS diploma

KEY INDICATORS	TOTAL	RURAL	SUBURBAN	URBAN
Households	307,000	173,000	133,000	1,000
Households w/ income < $50k	42%	42%	42%	23%
Households w/o any computing device	14%	14%	14%	43%
Households w/o laptop/desktop	35%	34%	35%	78%
Population	777,000	431,000	340,000	5,000
Population 65 y/o or older	18%	19%	15%	1%
Population w/o a HS diploma (age 25+)	16%	15%	17%	27%

Region 5 | Southeast

Digital Divide Findings

The Southeast performs poorly across several dimensions of the digital divide, making it a vulnerable region.



Southeast Stakeholder Commentary

Stakeholders now understand the value of HSBB, however, limited ISP options remain a challenge, and rural residents feel left out.

- **Broadband demand** needs to be sustainable and long term to ensure economic development in the region. There are concerns about the grant process for expansion being highly competitive.

"The lack of broadband closes off opportunities and affects telehealth, learning, higher education, and remote work."

- Nonprofit Representative

"The library added hotspots that we first paid for with a grant from Texas State Library Association. These have been hugely popular, but we only have 10 to loan. It doesn't solve the lack of connectivity. Additional hotspots would benefit families the most."

- Librarian

"It's counterproductive to offer grants that require a match amount that the school can't afford. Then, once the information goes public, people look at the school and wonder why they aren't taking advantage of the grant, but people don't understand the maintenance piece once the grant is over."

- Technical Director, Independent School District

- **Broadband supply** levels and quality of coverage are not always accurate and often exclude households outside city limits. The region's geography makes expanding infrastructure challenging due to tree cover making construction difficult and blocking site lines for wireless service.

"You have broadband within the city limits of Jasper, but when you get outside city limits, you start to see huge deficiencies."

- Economic Developer

"Sent out hotspots, received 75 percent of them back because students could not access service. This is what pine trees do to service."

-Educator

"The State should hold ISPs accountable for the coverage they are claiming to be providing to the area."

- Technology Director, Independent School District

- **Digital divide** challenges make many residents of the Southeast region feel they are given less attention and resources from statewide organizations and ISPs due to their lack of population density.

"We don't deserve to be discriminated against because of where we live. Kids shouldn't be discriminated against because of where their parents choose to live."

- Economic Developer

"Those that have resources can work on connectivity issues; those that don't suffer the most."

- Educator

"For us its more of a crisis area with the customers that we help, because their needs is about how to get on the computer, how to use the internet."

- Librarian

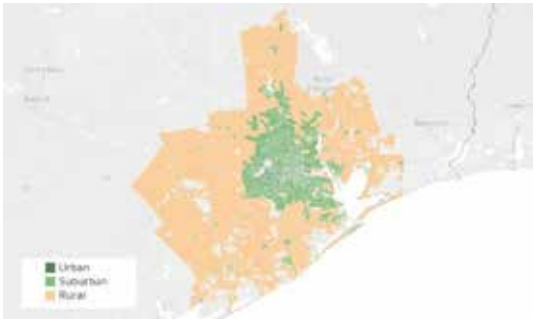
Region 6 | Gulf Coast

Baseline Demographics

The Gulf Coast is the second most populous region in the state, as well as one of the wealthiest by median income.

- The Gulf Coast region is in East Texas, surrounding the Houston metro area and bordering the Gulf of Mexico; it includes 13 counties and one MSA. Its major cities are Houston and Galveston.
- With more than 7 million people (25 percent of the Texas population) distributed across 2.5 million households, the Gulf Coast is the second most populated region in the state.
- The Gulf Coast is also one of the smallest regions in the state by area, helping make it the most densely populated region in Texas.
- Gulf Coast residents have one of the highest median annual household incomes in the state at $76,000, above the state's median of $69,000.
- Almost 70 percent of the Gulf Coast population lives in the suburbs around Houston, The Woodlands and Sugar Land, with the remaining split between urban (21 percent) and rural areas (12 percent).

Location



Area Morphology

KEY INDICATORS[1]	TOTAL	RURAL	SUBURBAN	URBAN
Population (millions)	7.3	0.9	4.9	1.5
Households (millions)	2.5	0.3	1.7	0.5
Median household income[2] ($ thousand)	76	74	83	57

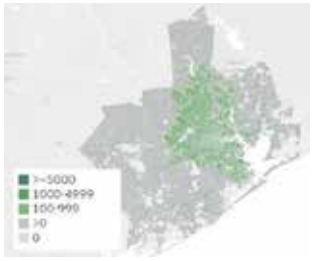
1. Assessed at census block group level: rural: < 600 people/sq. mi.; suburban: 600-7,500 people/sq. mi.; urban: >7,500 people/sq. mi.
2. Represents a population-weighted median income – aggregated from census block group level

Region 6 | Gulf Coast

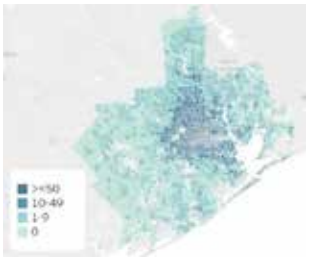
Broadband Demand Snapshot

The Gulf Coast has the highest household density in the state; similar trends apply for businesses and public service facilities.

- The Gulf Coast is the densest region by household and business. At 208 households and 19 businesses per square mile, the Gulf Coast is more than five times denser than the state, which sits at 39 households and 3.5 businesses per square mile. Rural areas of the Gulf Coast region are particularly dense relative to the rest of the state; business density is particularly high in both urban and rural areas.
- The Gulf Coast is home to the second largest network of public service facilities in Texas. There are more than 1,600 schools serving 1.4 million students. This is more than twice as many as the state's average for all regions at 700. There are 146 healthcare institutions in the Gulf Coast, more than twice as many as the state's average for all regions at just over 63. There are almost 670 public safety facilities in the region, almost twice as many as the state average for all regions at more than 370. About 75 percent of schools, 90 percent of hospitals and 65 percent of public safety facilities are in suburban areas.



Household Density



Business Density

Education & Healthcare Centers

Public Safety Facilities

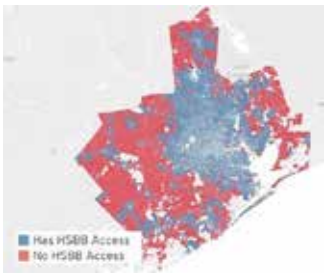
KEY INDICATORS	TOTAL	RURAL	SUBURBAN	URBAN
Household density (per sq. mi.)	208	30	865	3,683
Business density (per sq. mi.)	19	2	88	249
# Education centers	1,611	225	1,195	191
# Healthcare centers	146	8	126	12
# Public safety facilities	668	668	433	49

Region 6 | Gulf Coast

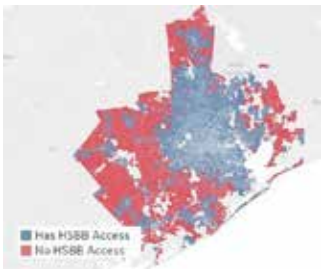
Broadband Supply Snapshot

HSBB providers in the Gulf Coast cover a large portion of the region but many gaps remain, especially for rural areas.

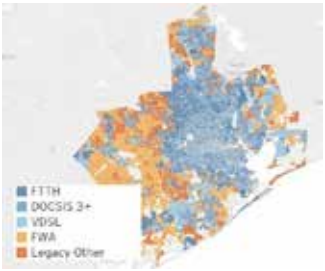
- The Gulf Coast has a high HSBB coverage rate. Ninety-two percent of households have access to HSBB in the Gulf Coast, compared to a state rate of 89 percent. However, given the large size of the region's population, this still leaves 212,000 unserved households, most of which (141,000) are in suburban areas. At 66 percent, coverage in rural areas is also low.
- The Gulf Coast has a high share of households served by fiber. ISPs offer FTTH to 48 percent of households, representing a higher share of households served than seven other regions.
- The Gulf Coast has the third highest number of distinct HSBB providers in the state and 42 percent of households served by only one ISP. There are 28 distinct HSBB ISPs in the region. Market penetration is much higher for the top providers than the rest.
- Coverage for schools and hospitals in the Gulf Coast is also high. Ninety-six percent of schools have HSBB access; however, 69 schools outside urban areas remain unserved.



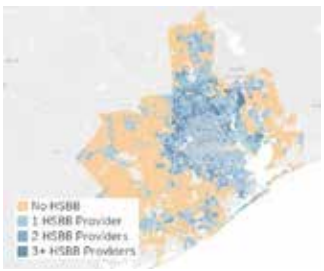
Availability of HSBB (households)



Availability of HSBB (businesses)



HSBB Offering by Tech



Number of HSBB Providers

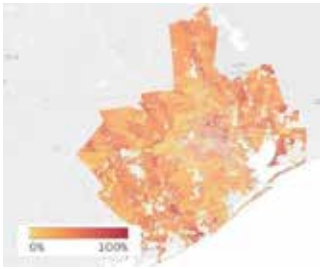
PERCENT WITH ACCESS TO HSBB	TOTAL	RURAL	SUBURBAN	URBAN
Households	92%	66%	96%	92%
Education facilities	96%	81%	98%	99%
Healthcare facilities	99%	88%	100%	92%

Region 6 | Gulf Coast

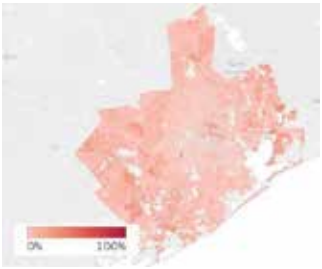
Digital Divide Indicators

The Gulf Coast has low shares of low-income households, households without internet devices and population over 65.

- Thirty-two percent of Gulf Coast households (820,000) have an annual income below $50,000.
- The Gulf Coast has a higher than average share of households with internet devices. Eight percent of households (202,000) do not have any computing device, and 22 percent (565,000) have no laptop or desktop computer to connect to the internet, which is below the average for the state at 9 percent and 25 percent, respectively.
- The Gulf Coast has the lowest share of population over 65, but a high share of population over 25 without a high school diploma. Twelve percent of residents (848,000) are over the age of 65 and 17 percent of people 25 and older (1.2 million) do not hold a high school diploma, relative to 13 percent and 16 percent, respectively, for the state.
- The Gulf Coast's households in urban areas are more likely to have lower income and less likely to own devices to connect to the internet. More than 40 percent of urban households show annual income below $50,000 (versus 30 percent for other areas). Similarly, close to 30 percent of urban households do not have a computer (versus 22 percent for the other areas).

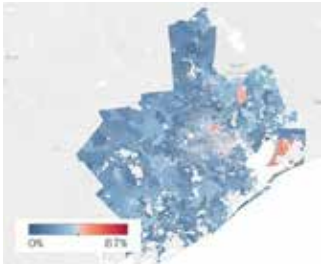


Households w/ income <$50k



Households w/o computing device

Population > 65y/o



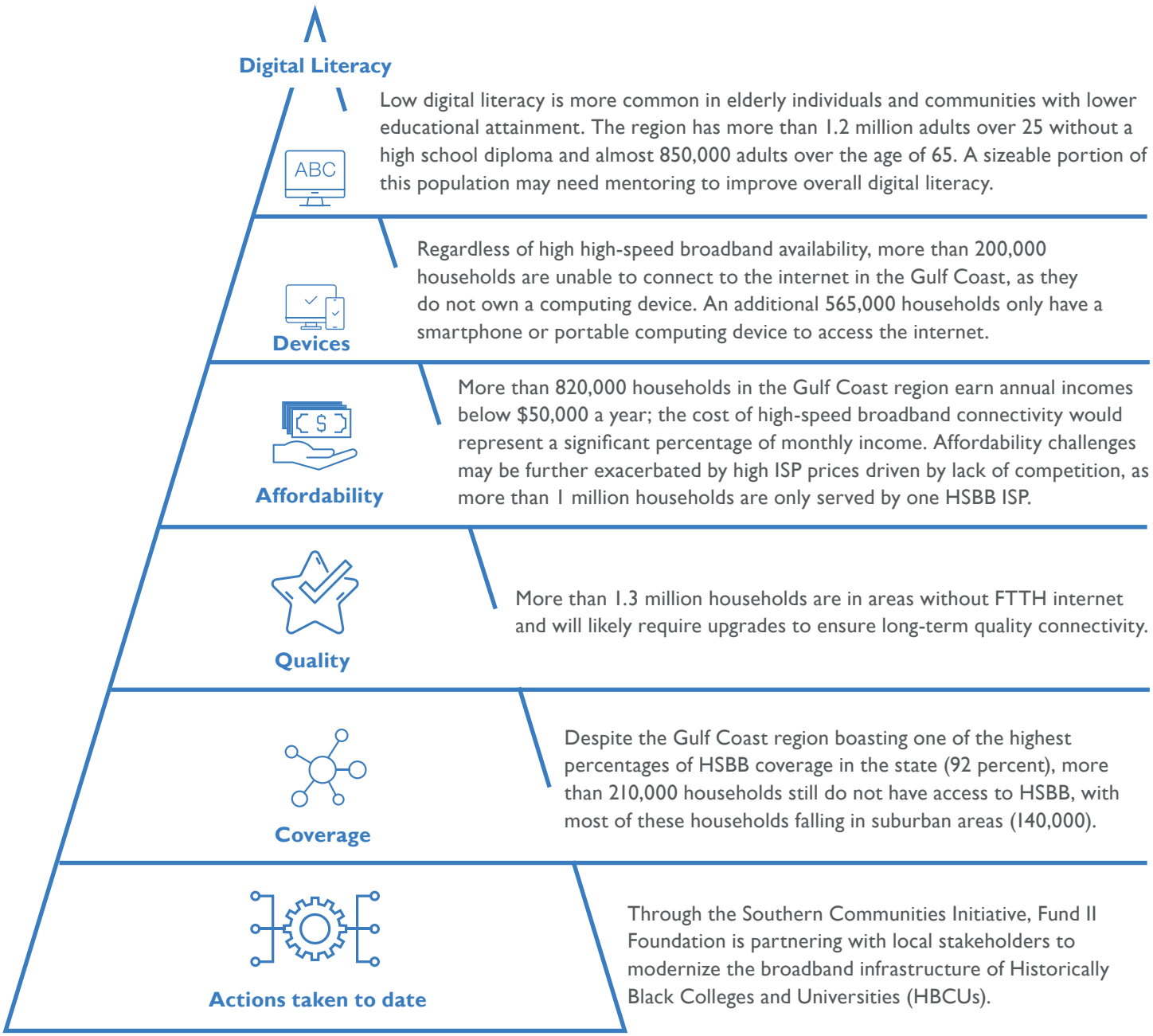
Population >25y/o w/o HS diploma

KEY INDICATORS	TOTAL	RURAL	SUBURBAN	URBAN
Households	2,532,000	299,000	1,687,000	547,000
Households w/ income < $50k	32%	31%	30%	42%
Households w/o any computing device	8%	9%	7%	10%
Households w/o laptop/desktop	22%	25%	20%	29%
Population	7,326,000	879,000	4,906,000	1,541,000
Population 65 y/o or older	12%	14%	12%	9%
Population w/o a HS diploma (age 25+)	17%	15%	15%	23%

Region 6 | Gulf Coast

Digital Divide Findings

While the Gulf Coast performs well across all dimensions of the digital divide, large numbers of households face challenges across every dimension.



Gulf Coast Stakeholder Commentary

Customer adoption and knowledge of funding options affect supply. The digital divide is driven by digital literacy and affordability.

- **Broadband demand** in the region faces equity challenges. Residents acknowledge the benefits of broadband access but notice how current status affects economic development.

"Fast and secure internet is no longer a luxury, it's a necessity – especially for communities of color."

- Nonprofit Director

"Local workforce boards have apprenticeship programs in cybersecurity, digital organic gardening, and drone technology; however, these programs aren't serving rural residents due to lack of access."

- Workforce Program Development Specialist, Southeast

"Challenge is not just are kids ready for postsecondary or workforce but thinking about how lack of access and challenges engaging with online learning means we lost a lot of students from K-12. This challenge has impacted students now, not just when they're ready for college or jobs."

- Administrator, Higher Education Facility

- **Broadband supply** challenges experienced by ISPs include limited awareness of available funding options and how to utilize them, lack of customer adoption, regulatory hurdles and profitability metrics.

"We need the BDO to bring in experts who are willing to help figure out challenges in certain areas and create plans that work for them. Local government leaders are usually not broadband experts."

- Elected Official

"Motorola is the tech provider working in Harris County to construct infrastructure to get broadband at home and the county worked with ISDs. The challenge for the provider is adoption: how do you make sure if you put solutions out there that it'll actually be used."

- Stakeholder

- **Digital divide** challenges involving affordability are especially prevalent for the area. Digital literacy is also a factor impacting economically disadvantaged communities.

"The college put Wi-Fi in all parking garages but students still need a device. Affordability is the biggest challenge for them. Also, having broadband at home is a whole other story."

- Administrator, Higher Education Facility

"If you don't have access, affordability and digital literacy don't matter, and for many families even a small fee for broadband can be a big deal."

- Administrator, Independent School District

"Lots of stuff on the internet is supposed to be addressing the needs of the socially vulnerable, but many don't have the access, devices, or knowledge to even know these efforts are a thing. How do we ensure everyone has a base level of access? It's a vicious cycle."

- Employee, County Emergency Management Operations

Region 7 | Central

Baseline Demographics

The Central region covers a small area and has a medium-size population; its median household income is relatively low.

- The Central region is centrally located and bordered by seven of the state's other economic regions. It includes 20 counties and three MSAs. Its major cities are Waco and College Station.
- With 1.3 million people (4 percent of the Texas population) distributed across 460,000 households, the Central region is midsize by population, in line with the state median.
- At $55,000, Central region residents have a median household income that is lower than the state's median of $69,000. Rural residents have a higher median income, at $64,000.
- More than half of the Central region's population lives in the suburbs around Waco and College Station, with the remaining split between rural (40 percent) and urban areas (<10 percent).

Location

Area Morphology

KEY INDICATORS[1]	TOTAL	RURAL	SUBURBAN	URBAN
Population (millions)	1.3	0.5	0.7	0.1
Households (millions)	0.5	0.2	0.2	0.0
Median household income[2] ($ thousand)	55	64	51	29

1. Assessed at census block group level: rural: < 600 people/sq. mi.; suburban: 600-7,500 people/sq. mi.; urban: >7,500 people/sq. mi.
2. Represents a population-weighted median income – aggregated from census block group level

Region 7 | Central

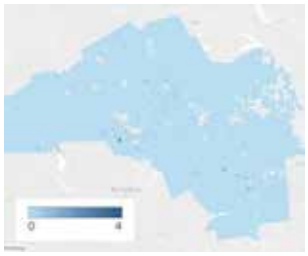
Broadband Demand Snapshot

The Central region is a medium-density region, with households and public service facilities heavily concentrated in suburban and rural areas.

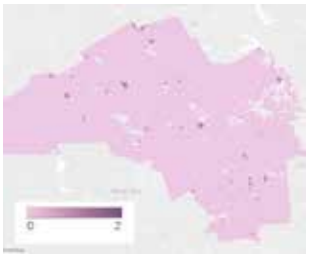
- The Central region is a medium-density region by household and low-density region by business, with density rates of 27 households and 2.1 businesses per square mile, below the 39 and 3.5 state rates for households and businesses, respectively. Suburban areas in the Central region are low density, especially in business, relative to the rest of the state.
- The Central region has a high number of schools but a low number of hospitals and public service facilities. There are 220,000 students in the region who attend more than 400 schools, which are evenly divided between the suburbs and rural areas. There are also 34 healthcare institutions in the region, with more than two-thirds of them in suburban areas and the rest in rural areas. The top three regions in the state have between 70 and approximately 200 facilities. Finally, there are slightly more than 300 public safety facilities in the Central region, with more than 60 percent in rural areas and the rest in suburban areas. The top three regions in the state have more than 450 such facilities.

Household Density

Business Density



Education & Healthcare Centers



Public Safety Facilities

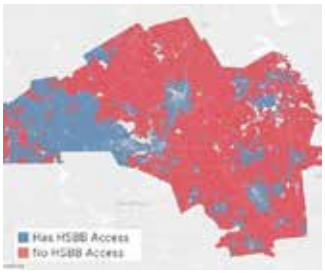
KEY INDICATORS	TOTAL	RURAL	SUBURBAN	URBAN
Household density (per sq. mi.)	27	11	779	3,530
Business density (per sq. mi.)	2	1	67	130
# Education centers	431	211	218	2
# Healthcare centers	34	11	23	-
# Public safety facilities	329	215	111	3

Region 7 | Central

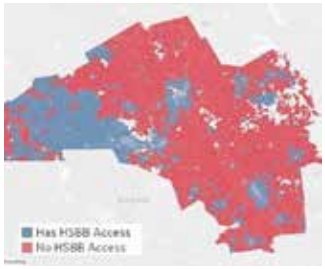
Broadband Supply Snapshot

The Central region has low HSBB and FTTH coverage rates for households, with schools following the same trend.

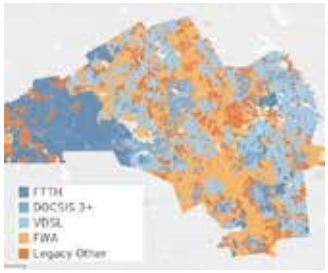
- The Central region has a low HSBB coverage rate. Only 78 percent of the region's households (360,000) are covered, compared to the state average of 89 percent and 96 percent for the region with the highest coverage rate. That leaves more than 100,000 unserved households in the region, most of them in rural (42,000) and suburban (53,000) areas.
- The Central region also has a low rate of households served by fiber. ISPs offer FTTH to 25 percent of households (116,000), compared to 46 percent for the rest of the state. This leaves around 345,000 households without FTTH.
- The Central region includes a high number of HSBB providers. There are 26 distinct HSBB ISPs in the region. Forty-four percent of households are served by only one ISP.
- The Central region has the lowest coverage for schools in the state. At 75 percent coverage, there are 109 schools unserved in the region, the majority in rural areas (88).



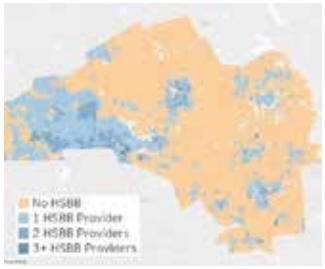
Availability of HSBB (households)



Availability of HSBB (businesses)



HSBB Offering by Tech



Number of HSBB Providers

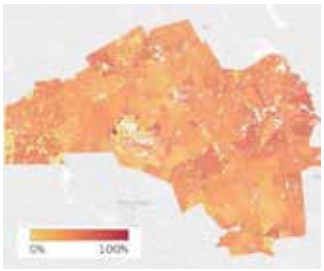
PERCENT WITH ACCESS TO HSBB	TOTAL	RURAL	SUBURBAN	URBAN
Households	78%	51%	96%	100%
Education facilities	75%	58%	90%	100%
Healthcare facilities	97%	100%	96%	-

Region 7 | Central

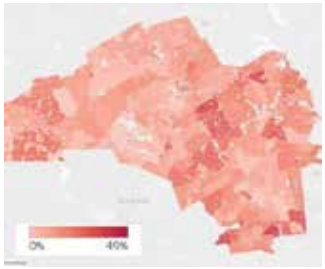
Digital Divide Indicators

The Central region has a high share of low-income households or households lacking devices, but a low rate of older adults or adults without a high school diploma.

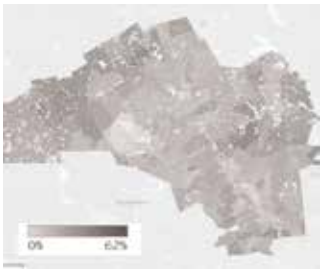
- The Central region has a high share of low-income households. Forty percent of Central households (186,000) have an annual income below $50,000 – this rate is above the state's rate of 35 percent.
- The Central region is comparable to the state average for households lacking proper devices to connect to the internet. Eleven percent of households (49,000) do not have any computing device to connect to the internet, and 26 percent of households (118,000) have no laptop or desktop computer to connect to the internet. The state average is 9 percent and 25 percent, respectively. This is in contrast with other regions where these marks are as high as 17 percent and 42 percent, respectively.
- The Central region has a low percentage of the population older than 65 years old or over 25 and without a high school diploma. Fourteen percent of residents (170,000) do not hold a high school diploma, and 14 percent of residents (174,000) are over the age of 65, compared to 16 percent and 13 percent for the state, respectively.
- Households in rural and suburban areas are more likely to make more than $50,000 in annual income but tend to lack internet devices. Over half of urban households show annual income below $50,000, and 18 percent of households only have a mobile device to access HSBB.



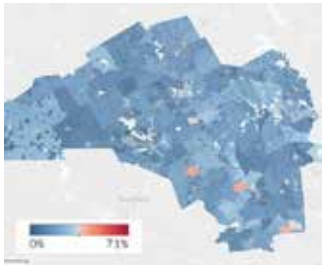
Households w/ income <$50k



Households w/o computing device



Population > 65y/o



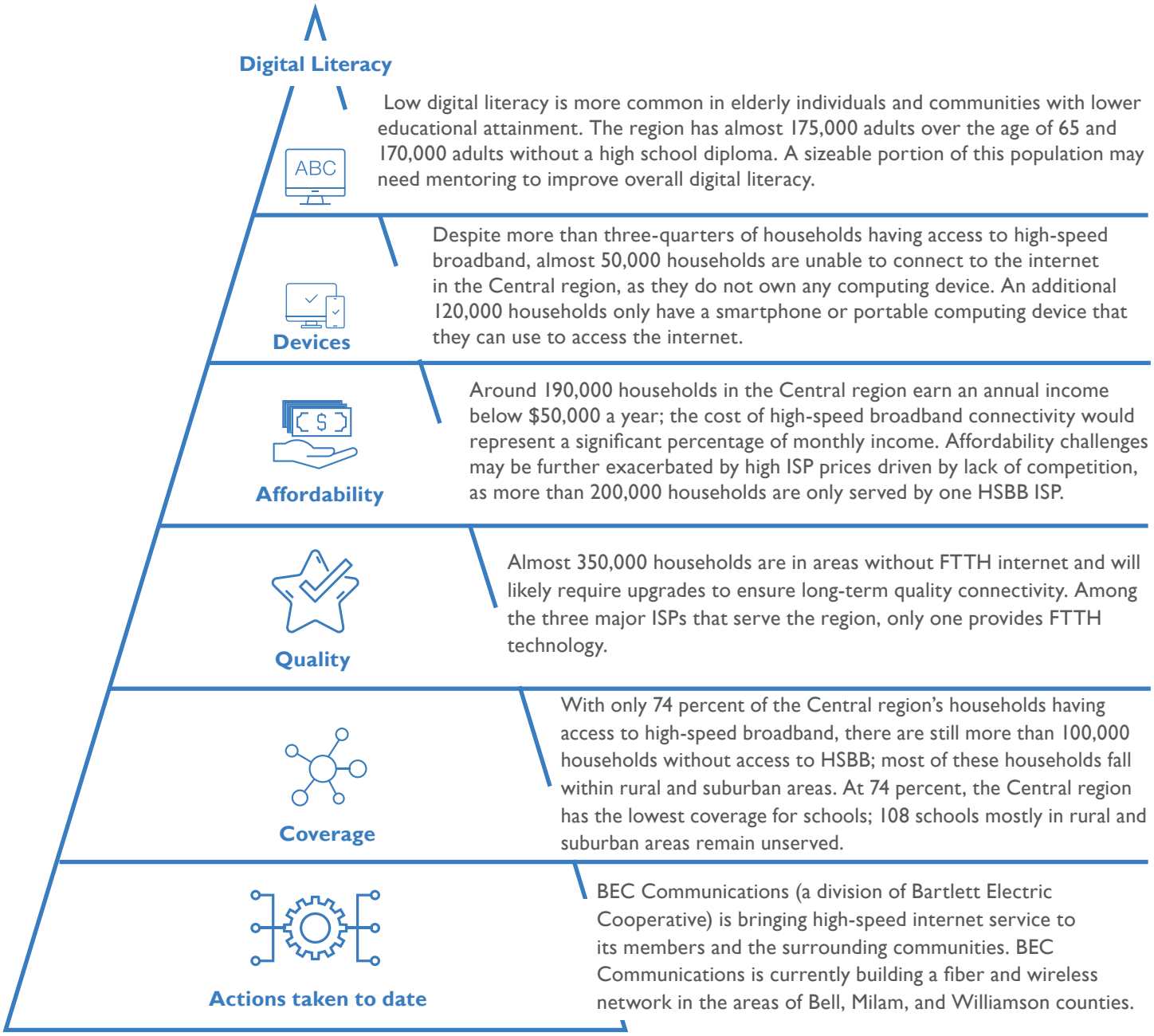
Population >25y/o w/o HS diploma

KEY INDICATORS	TOTAL	RURAL	SUBURBAN	URBAN
Households	461,000	189,000	247,000	25,000
Households w/ income < $50k	40%	36%	43%	51%
Households w/o any computing device	11%	12%	10%	6%
Households w/o laptop/desktop	26%	28%	25%	18%
Population	1,254,000	514,000	673,000	67,000
Population 65 y/o or older	14%	18%	12%	3%
Population w/o a HS diploma (age 25+)	14%	13%	14%	12%

Region 7 | Central

Digital Divide Findings

Network access is the key driver of the divide for the Central region, closely followed by broadband quality and income-related issues such as affordability.



Central Stakeholder Commentary

While demand is being met in Waco, many rural areas remain unserved. Supply is especially expensive in rural areas, and residents experience inequity between rural and urban areas.

- **Broadband demand** is being met in places like Waco, however, affordability remains a challenge. Outside cities, agricultural and energy businesses also rely heavily on broadband for economic development.

"Almost exclusively all residents in Waco have access. But there is a big chasm of affordability. The minute we start giving out subsidies, that's the minute it becomes permanent."

- Public Servant

"The city of Waco could spend all their money on broadband and education, but that doesn't matter if people don't have access or can't afford."

- Public Servant

"Dairies might have a fixed wireless connection but lots of data – each cow has RFID and that's a lot of data to transmit. Same with wind farm – lots of remote monitoring that depends on broadband access."

- Rural ISP Representative

- **Broadband supply** is expensive in rural areas, and there are no clear plans or funds available for maintenance after a network is established.

"Not many counties want to be in the broadband business offering tech support, payments, etc. It's a lot for a county and not in their wheelhouse. Why ask them to expand skills to do something that ISPs are already great at."

- Public Servant

"Location matters, there can be bad connection in an area. Wind is a big problem. I had some internet service available before, and it was supposed to be really fast, but it was really slow. Not dial up for sure. I was paying almost $400 a month for bad internet."

- Small Business Owner

"When looking at Wi-Fi repeaters, network stuff, etc. It's supposed to be replaced every five years but in reality, it's like a two-year service life. How to keep up on a city-wide scale? Largest cost in this expansion is going to be talent who will maintain service. Need to budget a full replacement every two years."

- Public Servant

- **Digital divide** challenges are experienced differently between rural and urban Texans. Residents reported feeling left out and are increasingly concerned about cybersecurity.

"Keep in mind there are multiple solutions to multiple problems, we need to be open to various solutions. Especially different options for rural communities, they're really getting left behind. People in rural areas are just as entitled to have the resources and live wherever they want."

- Public Servant

"There needs to be real evaluation of where the need is. When you do things in metroplexes you leave out 90 percent of the state. I would like to know what other areas are finding and share best practices among communities."

- Public Servant

"If it's possible to filter the internet for families, find a cost-effective option for parents so that while someone is providing internet, there's something so parents can manage what their kids access. Parents might not know how to put restrictions in place or not afford software."

- Technical Director, Independent School District

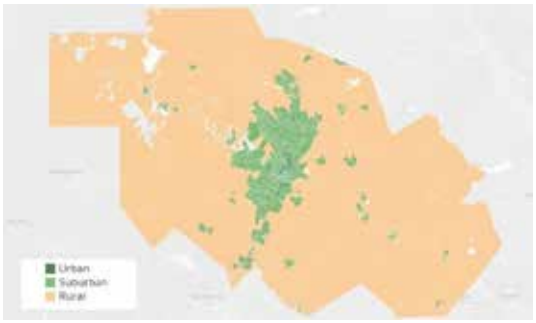
Region 8 | Capital

Baseline Demographics

Home to the state's capital, the Capital region is the smallest region by area but the wealthiest by median income.

- The Capital region surrounds Austin, the state capital. It includes 10 counties and one MSA.
- With 2.4 million people (8 percent of the Texas population) spread across over 900,000 households, the region has a large-size population, above many other regions in the state.
- The Capital is the smallest region in Texas by area, which in turn makes it one of the densest regions in the state, only after the Metroplex and the Gulf Coast.
- Capital residents have the highest median household income at $84,000, considerably more than the states median of $69,000.
- Almost two-thirds of the Capital population (63 percent) lives in the suburbs around Austin, with a quarter living in rural areas and the remaining in Austin.

Location



Area Morphology

KEY INDICATORS[1]	TOTAL	RURAL	SUBURBAN	URBAN
Population (millions)	2.4	0.6	1.5	0.3
Households (millions)	0.9	0.2	0.6	0.1
Median household income[2] ($ thousand)	84	80	91	57

1. Assessed at census block group level: rural: < 600 people/sq. mi.; suburban: 600-7,500 people/sq. mi.; urban: >7,500 people/sq. mi.
2. Represents a population-weighted median income – aggregated from census block group level

Region 8 | Capital

Broadband Demand Snapshot

The Capital is a high-density region by household and business, with most of its public service facilities concentrated in suburban areas.

- The Capital is a high-density region by household and business. At 105 households and nine businesses per square mile, the Capital has density rates significantly greater than the statewide rate, which sits at 39 households and 3.5 businesses per square mile. Rural and urban areas in the Capital are particularly high density relative to the rest of Texas.
- The Capital has a large number of schools and hospitals but a low number of public service facilities; however, these numbers are below the state's average. There are more than 366,000 students attending more than 580 different schools. This is just under the state's average for all regions of 700. There are 57 healthcare institutions in the Capital region, under the state's average for all regions, at more than 60. There are more than 300 public safety facilities in the Capital, under the state's average for all regions, at more than 370. Over half of public safety facilities and schools, and almost all hospitals, are in suburban areas.

Household Density

Business Density

Education & Healthcare Centers

Public Safety Facilities

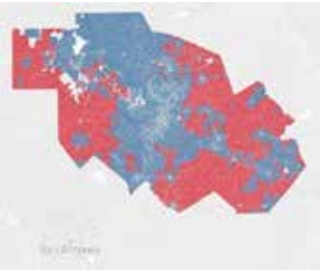
KEY INDICATORS	TOTAL	RURAL	SUBURBAN	URBAN
Household density (per sq. mi.)	105	26	837	3,805
Business density (per sq. mi.)	9	2	77	235
# Education centers	581	168	376	37
# Healthcare centers	57	7	50	-
# Public safety facilities	302	129	158	15

Region 8 | Capital

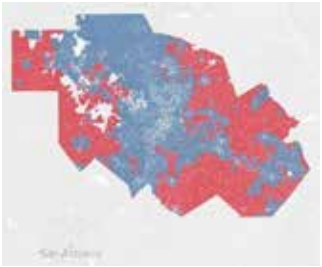
Broadband Supply Snapshot

ISPs offer HSBB to a high share of the population, although many households have poor coverage in the suburbs and rural areas.

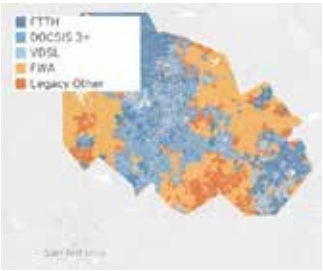
- The Capital has the second highest HSBB coverage rate in the state. Ninety-four percent of households have access to HSBB in the Capital region, compared to the 89 percent state rate. However, given the large size of the Capital population, this still leaves 50,000 unserved households, most of which are in suburban areas (32,000).
- The Capital has a high share of households served by fiber. ISPs offer FTTH to 49 percent of households, representing a higher share of households served than eight other regions.
- The Capital has a high number of distinct HSBB providers and 42 percent of households served by only one ISP. There are 25 distinct HSBB ISPs in the region.
- Coverage for schools and hospitals in the Capital is high. Ninety-eight percent of schools are served by HSBB; however, 13 rural schools remain uncovered.



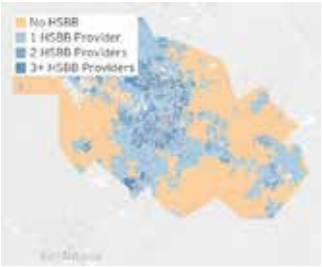
Availability of HSBB (households)



Availability of HSBB (businesses)



HSBB Offering by Tech



Number of HSBB Providers

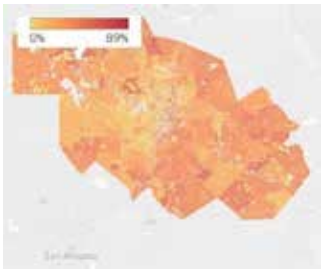
PERCENT WITH ACCESS TO HSBB	TOTAL	RURAL	SUBURBAN	URBAN
Households	94%	76%	100%	100%
Education facilities	98%	92%	100%	100%
Healthcare facilities	100%	100%	100%	-

Region 8 | Capital

Digital Divide Indicators

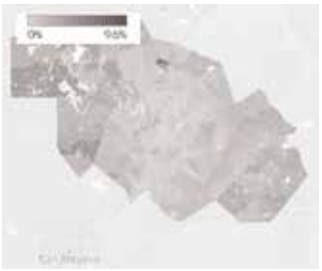
The Capital region has the lowest share of low-income households, households without internet devices and people over 25 without a high school diploma.

- The Capital has the lowest share of low-income households. Twenty-seven percent of Capital households (242,000) have an annual income below $50,000 – below the 35 percent state rate.
- The Capital has the lowest share of households without internet devices. Only 5 percent of households (50,000) do not have a computing device, and 15 percent (130,000) have no laptop or desktop computer to connect to the internet, which is below the state average of 9 percent and 25 percent, respectively.
- The Capital has the lowest share of population over 25 without a high school diploma, and one of the lowest shares of population over 65. Ten percent of people 25 and older (245,000) do not hold a high school diploma, and 12 percent of residents (295,000) are over the age of 65, relative to 16 percent and 13 percent, respectively, for the entire state.
- Urban areas are also more likely to have younger people and more low-income households than the rest of the region. At 6 percent, the percentage of population under 65 is about 10 percent lower in urban areas than the rest of the region.

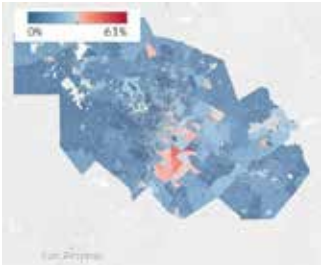


Households w/ income <$50k

Households w/o computing device



Population > 65y/o



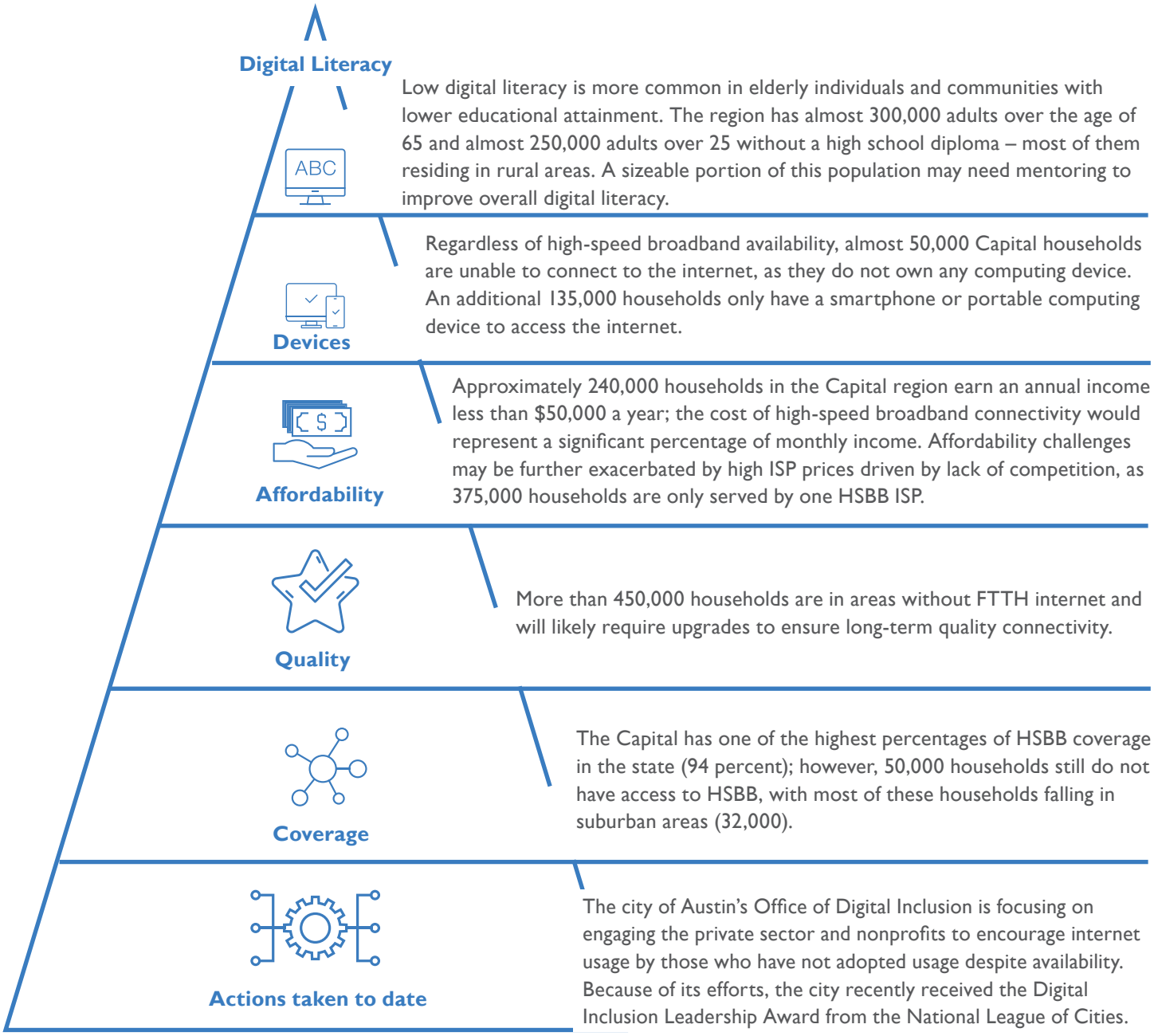
Population >25y/o w/o HS diploma

KEY INDICATORS	TOTAL	RURAL	SUBURBAN	URBAN
Households	890,000	200,000	578,000	111,000
Households w/ income < $50k	27%	29%	25%	38%
Households w/o any computing device	5%	8%	4%	7%
Households w/o laptop/desktop	15%	20%	12%	21%
Population	2,422,000	595,000	1,527,000	299,000
Population 65 y/o or older	12%	16%	12%	6%
Population w/o a HS diploma (age 25+)	10%	12%	8%	17%

Region 8 | Capital

Digital Divide Findings

The Capital performs well across most digital divide indicators, but because of its size, a high number of residents face challenges that still need to be addressed.



Capital Stakeholder Commentary

Residents in urban areas feel left behind. For suppliers, permitting barriers could help with costs to provide service. Solutions for the digital divide require a holistic approach.

- **Broadband demand** is especially needed for student success, public health and safety services. Residents in the region report urban communities are being left behind.

"Many people rely on one wireless service device for education, telehealth, everything. Service is not always reliable."

- CEO, Broadband Infrastructure Consultant

"During COVID, the Bastrop Fires, and the Winter Storm emergency staff were disconnected and couldn't respond to calls. They didn't know where the tragedies were. Even during Boil Water Notices-residents without connection weren't aware till hours later."

- Emergency Services Coordinator

"Don't forget about urban areas – people assume urban areas are better connected but that's not always true."

- ISP Associate

- **Broadband supply** is highly dependent on maintenance and operating costs. Addressing permitting challenges might help with costs.

"Now that we've spent billions to create these networks, what's being done to maintain this access in the future? How do we make sure there are funds available to maintain the networks that are being deployed?"

- ISP CEO

"Permitting – making sure that's not a cumbersome process. It goes from local to statewide. Lots of small differences in how people implement this infrastructure, like shallow trenching can be faster but fiber is shallower and could be cut – we need to figure out all these eventualities and be innovative. Texas is hotter so what works in other states won't work here."

- Public Official

"If state dollars were spent on a community backbone that I could lease from the state for that middle mile transport, that enables us to build and do what we're good at - building out to the homes, schools, communities, etc."

- ISP Owner

- **Digital divide** challenges involving adoption can be addressed by increasing familiarity, trust and device accessibility, showing that barriers are often multifaceted and require more approaches to increase adoption than simply connecting a home to a network.

"Moving beyond access, connect people to the idea to take advantage of technology. They can create something that means something to them. Encourage them to be creators and not just users of the internet – has to do with general knowledge but also workforce development."

- Nonprofit Program Manager

"Affordability? We can fix this through programs, but did we ask about that device? Did we ask about skills? We have to think holistically. There are often more than one barrier."

- Librarian

"With respect to telehealth, the quality of broadband is important, but so is a VPN to make sure it's a secure connection – VPNs can keep the connection safe but that's a whole other thing to teach people, what a VPN is, how to connect, etc."

- CEO, Broadband Infrastructure Consultant

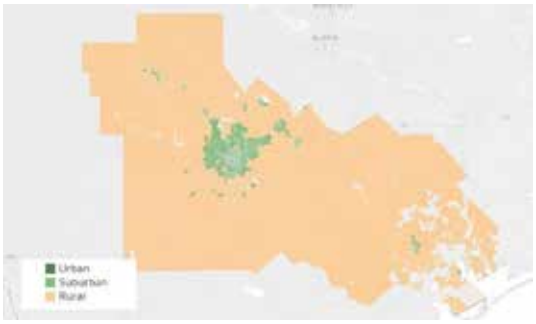
Region 9 | Alamo

Baseline Demographics

Home to San Antonio, the Alamo region is a small region with a large population size that earns a relatively high household income.

- The Alamo region encompasses the east coast of Texas bordering the Gulf of Mexico and the Gulf Coast, Capital, West and South regions; it includes 19 counties and two MSAs. Its major city is San Antonio.
- With 2.9 million people (10 percent of the Texas population) spread across more than 960,000 households, it is the third most populated region in the state.
- Because of its limited area, it is a relatively dense region, preceded in rank only by the Gulf Coast, Metroplex and Capital regions.
- Households in the Alamo region have a median annual income of $65,000, which is just below the state's median of $69,000 but still among the highest relative to most regions.
- Almost 60 percent of the Alamo's population lives in the suburbs around San Antonio, with the remaining split between rural (24 percent) and urban (17 percent) areas.

Location



Area Morphology

KEY INDICATORS[1]	TOTAL	RURAL	SUBURBAN	URBAN
Population (millions)	2.9	0.7	1.7	0.5
Households (millions)	1.0	0.2	0.6	0.2
Median household income[2] ($ thousand)	65	71	67	45

1. Assessed at census block group level: rural: < 600 people/sq. mi.; suburban: 600-7,500 people/sq. mi.; urban: >7,500 people/sq. mi.
2. Represents a population-weighted median income – aggregated from census block group level

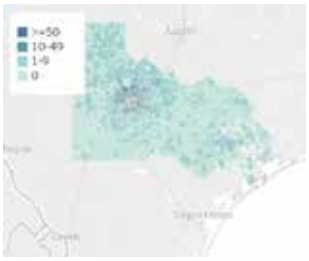
Region 9 | Alamo

Broadband Demand Snapshot

The Alamo is a high-density region by household and business; public service facilities follow similar distribution trends in the area.

- The Alamo is a high-density region by household and business. At 56 households and five businesses per square mile, the Alamo is about 40 percent denser than the state, which sits at 39 households and 3.5 businesses per square mile.
- The Alamo has a high number of schools, hospitals and public safety facilities, in line with its household density. There are 822 schools serving almost 500,000 students. More than half of these are in suburban areas, while about 30 percent are in rural areas and the rest in urban areas. This is higher than the state's average for all regions, at 700. There are 73 healthcare institutions in the region, just above the state's average of 63, with more than 80 percent in suburbs. There are almost 380 public safety facilities in the Alamo, about the same as the state's average, at more than 370. Around 66 percent of public safety facilities, 75 percent of schools and 90 percent of hospitals are in the suburbs.

Household Density



Business Density

Education & Healthcare Centers

Public Safety Facilities

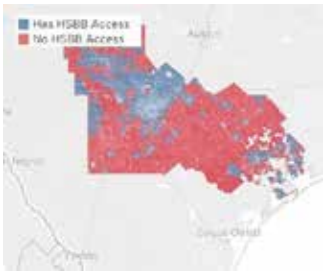
KEY INDICATORS	TOTAL	RURAL	SUBURBAN	URBAN
Household density (per sq. mi.)	56	14	886	3,110
Business density (per sq. mi.)	5	1	89	127
# Education centers	822	235	514	73
# Healthcare centers	73	13	59	1
# Public safety facilities	379	183	187	9

Region 9 | Alamo

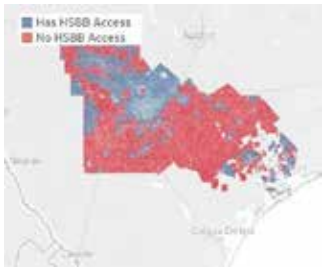
Broadband Supply Snapshot

ISPs offer HSBB and FTTH to a high share of the Alamo population, but many gaps remain.

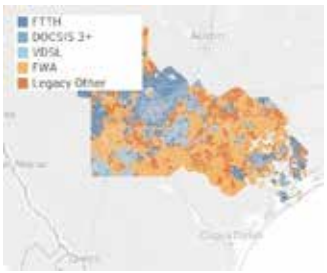
- The Alamo region has a high HSBB coverage rate. Ninety-one percent of households have access to HSBB in the region, compared to the 89 percent statewide rate. However, given the large size of the Alamo population, this still leaves nearly 90,000 households unserved, most of which are in suburban areas (53,000).
- The Alamo has the highest share of households served by fiber. ISPs offer FTTH to 60 percent of households, compared to 46 percent for the rest of the state.
- The Alamo has a high number of distinct HSBB providers, and the lowest rate of households served by only one ISP. There are 26 distinct HSBB ISPs in the region. Market penetration is much higher for the top providers than the rest, and of these top providers, only one offers fiber. Thirty-four percent of households are only served by one ISP versus 43 percent for the entire state.
- Despite a high overall coverage for schools, coverage is still low in rural areas, with 55 schools still lacking access to HSBB.



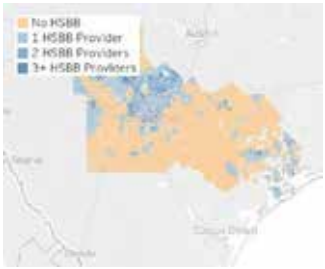
Availability of HSBB (households)



Availability of HSBB (businesses)



HSBB Offering by Tech



Number of HSBB Providers

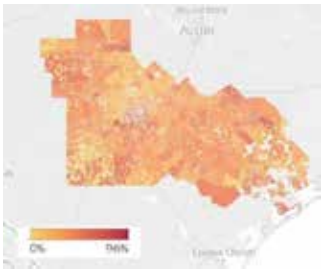
PERCENT WITH ACCESS TO HSBB	TOTAL	RURAL	SUBURBAN	URBAN
Households	91%	64%	99%	100%
Education facilities	92%	77%	99%	100%
Healthcare facilities	99%	92%	100%	100%

Region 9 | Alamo

Digital Divide Indicators

The Alamo has a low share of low-income population and population without internet devices.

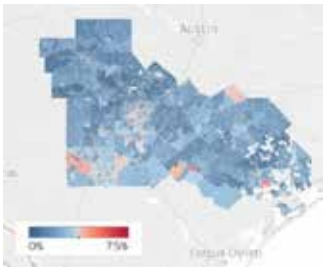
- The Alamo has a low share of low-income households. Thirty-six percent of Alamo households (346,000) have an annual income less than $50,000 – just above the 35 percent state rate.
- The Alamo has a low share of households without internet devices. Ten percent of households (94,000) do not have any computing device, and 26 percent (254,000) have no laptop or desktop computer to connect to the internet, which is below the average for all the state at 9 percent and 25 percent, respectively.
- The Alamo has a low share of the population over 65, but a high share of adults over 25 without a high school diploma. Fourteen percent of residents (413,000) are over the age of 65, relative to 13 percent for the entire state. Sixteen percent of people 25 and older (452,000) do not hold a high school diploma, which mirrors the state average of 16 percent and is higher than the region with the lowest mark.
- Urban areas are more likely to see lower income and have more limited access to devices. Forty-six percent of urban households show annual income below $50,000. Similarly, 36 percent of households in urban areas only have a mobile device to connect to the internet.



Households w/ income <$50k

Households w/o computing device

Population > 65y/o



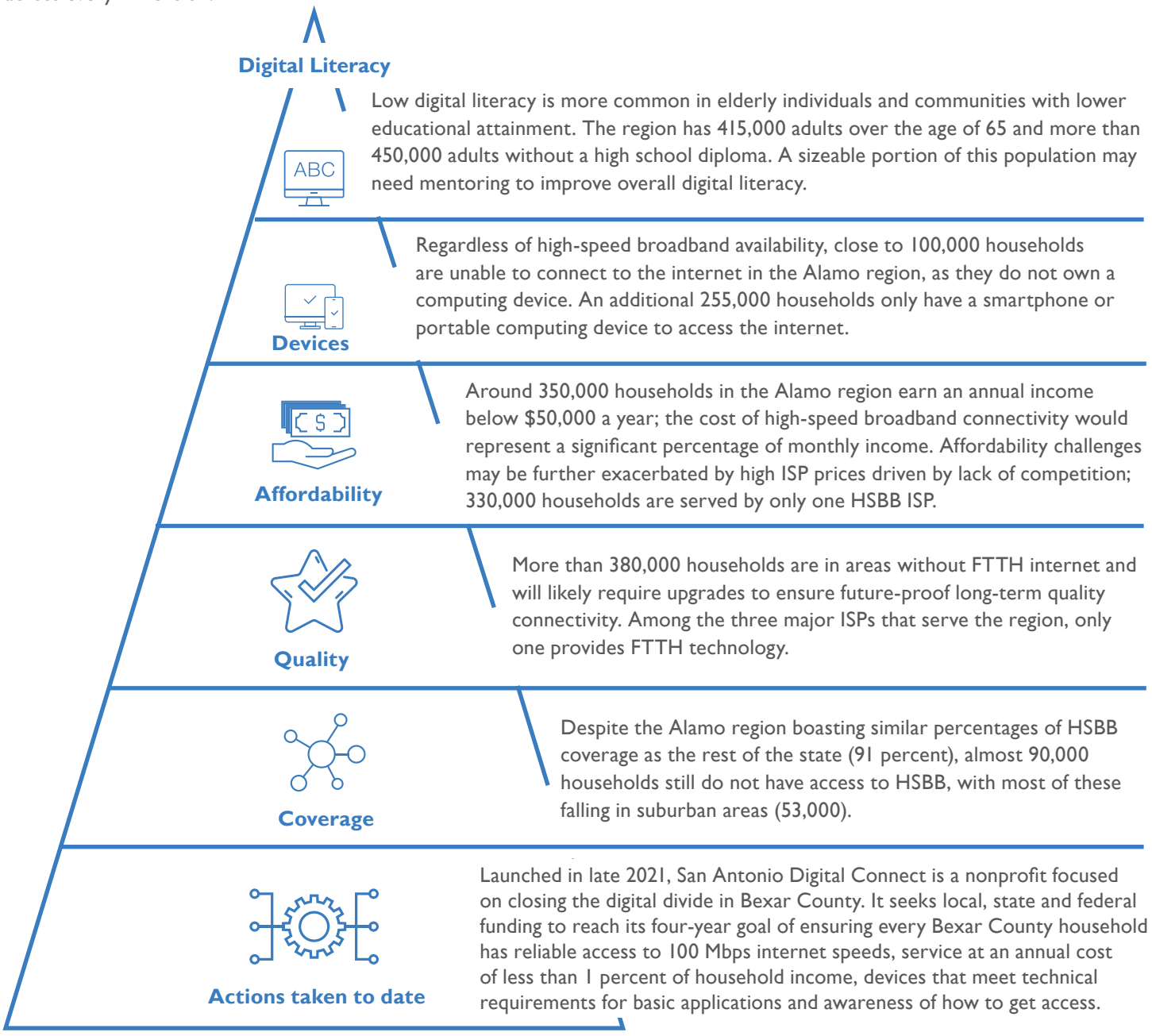
Population >25y/o w/o HS diploma

KEY INDICATORS	TOTAL	RURAL	SUBURBAN	URBAN
Households	964,000	233,000	575,000	156,000
Households w/ income < $50k	36%	32%	35%	46%
Households w/o any computing device	10%	11%	9%	13%
Households w/o laptop/desktop	26%	26%	24%	36%
Population	2,903,000	714,000	1,725,000	465,000
Population 65 y/o or older	14%	18%	14%	11%
Population w/o a HS diploma (age 25+)	16%	14%	14%	24%

Region 9 | Alamo

Digital Divide Findings

The Alamo region performs well across most dimensions of the digital divide, but large numbers of households still face challenges across every dimension.



Alamo Stakeholder Commentary

Demand is tightly linked to public services efficiency and economic competitiveness, supply is impaired by high costs, and digital divide solutions will need multiple iterations.

- **Broadband demand** for the Alamo exceeds available bandwidth and number of providers.

"Lack of diversity in providers is a challenge – Victoria has one provider and others can't compete because the one ISP owns the lines. Competition would be beneficial; help keep prices low."

- Nonprofit Executive Director

"We need an ability to link all first responders. They all have different communication links. As we move toward broadband, let's ensure everyone is all connected. Sometimes ambulances cannot talk to the ER because they're on different systems."

- County Emergency Management Operations

"From the economic development side, people are looking at connectivity as a business perk. Businesses want to locate in cities with good internet access for themselves and employees. This applies to the whole state. We're already a competitive state for business, being a connected state would take it to the next level."

- Legislative Manager

- **Broadband supply** is hindered by the high cost of expanding and maintaining infrastructure in rural communities. ISPs are seeking centralized data to make better-informed expansion decisions.

"We serve a bunch of counties, but it doesn't make economic sense to build multiple miles of fiber for one home. Those folks still need access however, funding is one of our biggest needs."

- Manager, ISP

"Regulated telecom firms know that there is high-cost support for rural networks, and they depend on that to continue maintaining those networks. These grants are great for building, but not maintaining. We want these to be long lasting, generational networks."

- VP of Business Development, ISP

"There is a disconnect in data – no congruency across data means that providers and others are working off of different information. Texas can do it! Other states are doing it better."

- CEO, Broadband Consultancy

- **Digital divide** challenges may require multiple iterations to address all needs. Equity and systematic barriers need to be considered when developing a broadband plan.

"This involves full spectrum of generations – students who did remote learning and had technical challenges couldn't always rely on their parents to fix the challenge since parents didn't know how to use the device."

- Administrator, Independent School District

"As we gain ground on all of these structural/policy challenges, we need to build a more robust safety net through community access to broadband, devices and digital literacy. This is critical for vulnerable communities experiencing homelessness, economic hardship, weather and emergency events in their lives."

- Director, Public Library System

"Broadband could be almost free, and it would still be unaffordable for some – extremely impoverished areas need support too."

- Nonprofit Executive Director

Region 10 | South

Baseline Demographics

The South region is one of the largest regions in Texas by population and area; it also has the lowest median household income across the entire state.

- The South region is in the most southern part of Texas, bordering Mexico and the Gulf of Mexico; it includes 28 counties and four MSAs. Its major cities are Laredo, McAllen and Corpus Christi.
- With 2.4 million people (8 percent of the Texas population) spread across 800,000 households, the region has a large population size relative to other regions in the state.
- However, because the South region is one of the largest in the state by area, its population density is below most regions.
- At $45,000, South residents have the lowest median household income in the state, considerably below the state median of $69,000 and the average of all regions at $61,000.
- Almost 70 percent of South Texas' residents live in the suburbs around Laredo, McAllen and Corpus Christi, with the remaining split between rural (22 percent) and urban areas (11 percent).

Location

Area Morphology

KEY INDICATORS[1]	TOTAL	RURAL	SUBURBAN	URBAN
Population (millions)	2.4	0.5	1.7	0.3
Households (millions)	0.8	0.2	0.5	0.1
Median household income[2] ($ thousand)	45	45	47	36

1. Assessed at census block group level: rural: < 600 people/sq. mi.; suburban: 600-7,500 people/sq. mi.; urban: >7,500 people/sq. mi.
2. Represents a population-weighted median income – aggregated from census block group level

Region 10 | South

Broadband Demand Snapshot

The South region has a medium density of households and businesses but a comparatively high number of schools and students.

- The South region is a medium-density region by household and business, with density rates of 22 households and two businesses per square mile. However, because of its size, it has some of the lowest density rates in the state in both households and businesses in suburban areas.
- The South region has a high number of schools, hospitals and public safety facilities. The South is home to 600,000 students attending close to 900 schools, ranking it third highest in the state. About 70 percent of schools are in suburban areas. Comparatively, half of the regions in the state have more than 400 schools. There are also 57 healthcare institutions in the South region, with 90 percent of these located in the suburbs. Half of the regions in the state have more than 40 hospitals. Lastly, there are more than 360 public safety facilities in the South which is near the state average of 370. More than 60 percent of these facilities are in suburban areas.

Household Density

Business Density

Education & Healthcare Centers

Public Safety Facilities

KEY INDICATORS	TOTAL	RURAL	SUBURBAN	URBAN
Household density (per sq. mi.)	22	5	636	2,916
Business density (per sq. mi.)	2	0	59	146
# Education centers	896	212	632	52
# Healthcare centers	57	4	53	-
# Public safety facilities	363	128	223	12

Region 10 | South

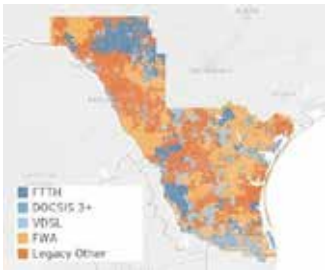
Broadband Supply Snapshot

ISPs offer HSBB to most households and public service centers in the region, but future-proof technology is only available to a small percentage of communities.

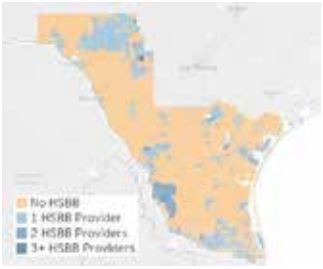
- The South has a high HSBB coverage rate. Ninety-two percent of households in the South region have access to HSBB (710,000), compared to 89 percent for the state. However, 60,000 households remain unserved; most of these are in suburban areas across the region.
- The South has the second-lowest rate of households served by FTTH technology. Only 19 percent of households in the region (150,000) are served by FTTH technology, compared to 46 percent for the rest of the state. This leaves more than 600,000 households lacking FTTH coverage.
- The South region has a high number of distinct HSBB providers and the highest rate of households served by only one ISP. There are 23 distinct HSBB ISPs in the region. The lowest region has nine and the highest 31. Market penetration is similar across the top three. However, only two out of three offer FTTH technology. Sixty-six percent of households are served by only one ISP versus 43 percent for the state.
- Coverage rates for education and healthcare facilities are some of the highest. At 96 percent coverage, about 38 schools are not covered, mostly in rural areas. All hospitals have access to high-speed broadband.

Availability of HSBB (households)

Availability of HSBB (businesses)



HSBB Offering by Tech



Number of HSBB Providers

PERCENT WITH ACCESS TO HSBB	TOTAL	RURAL	SUBURBAN	URBAN
Households	92%	67%	99%	100%
Education facilities	96%	85%	99%	100%
Healthcare facilities	100%	100%	100%	-

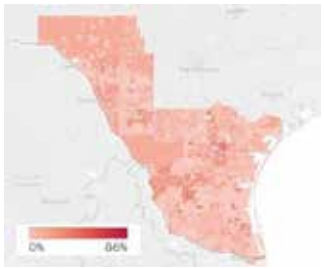
Region 10 | South

Digital Divide Indicators

The South region has the highest rate of low-income households, households with no internet devices and residents over 25 without a high school diploma.

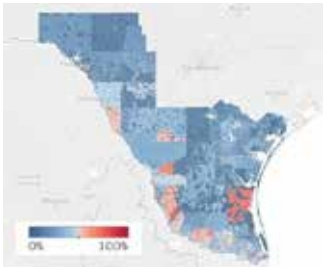
- The South region has the highest share of low-income households. At almost 46 percent, more than 350,000 households have an annual income below $50,000. This is the highest rate in the state, above the state's 35 percent rate.
- The South region also has the highest share of households with limited device availability to connect to the internet. Forty-three percent (323,000) have no laptop or desktop computer to connect to the internet, and almost 17 percent (129,000) do not have any computing device whatsoever. These are the highest rates in the state, above the state rates of 25 percent and 9 percent, respectively.
- The South region has the highest share of population over 25 without a high school diploma, but an average rate of population over 65. Thirty percent (741,000) of residents are people 25 and older who do not hold a high school diploma, and 13 percent (323,000) of residents are over the age of 65 – compared to 16 percent and 13 percent, respectively, in the state.
- Households outside urban areas are less likely to have easy access to devices. Fifty-two percent of urban households have income below $50,000 and do not have computers.

Households w/ income <$50k



Households w/o computing device

Population > 65y/o



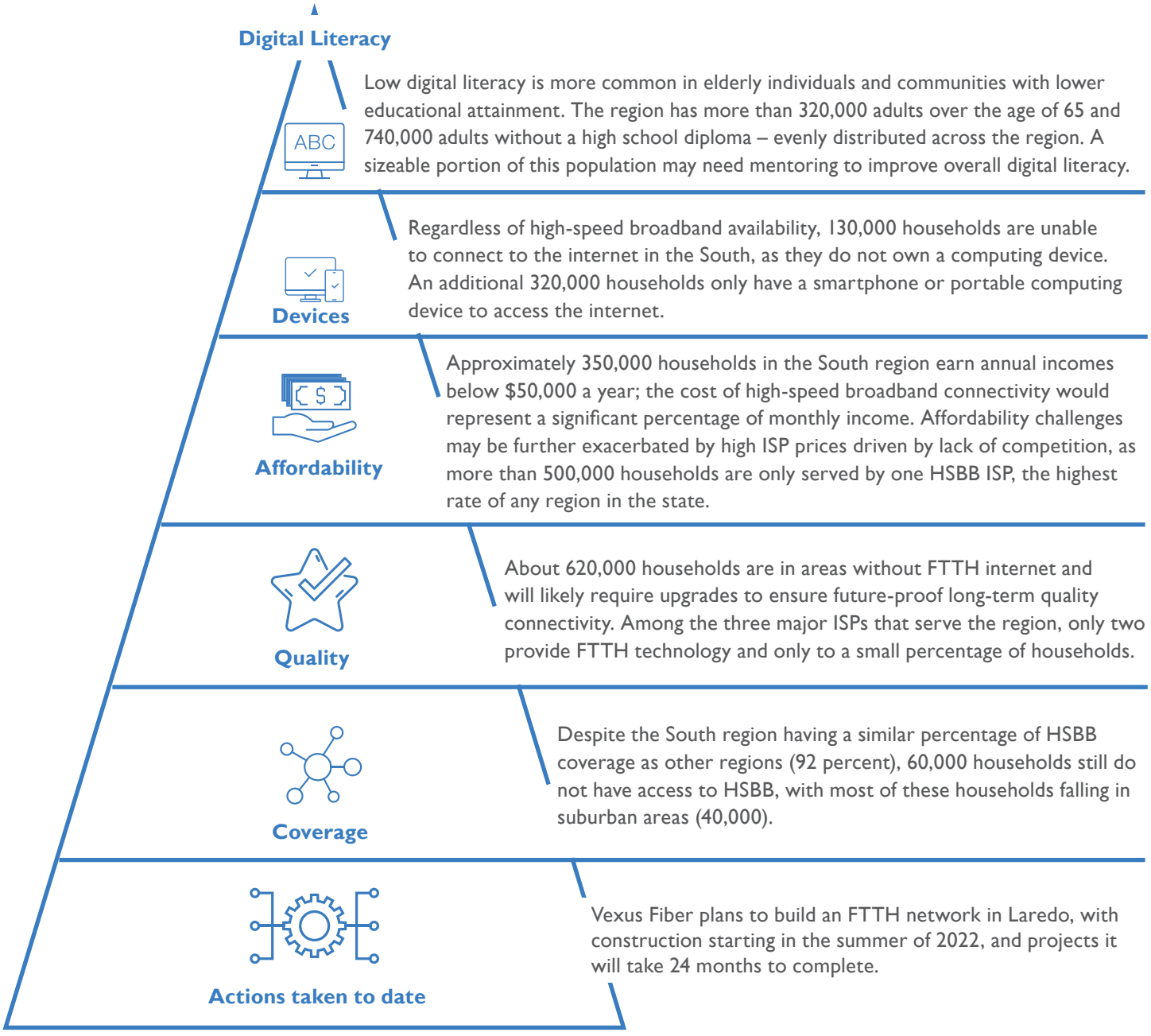
Population >25y/o w/o HS diploma

KEY INDICATORS	TOTAL	RURAL	SUBURBAN	URBAN
Households	770,000	167,000	524,000	79,000
Households w/ income < $50k	46%	46%	44%	52%
Households w/o any computing device	17%	18%	16%	23%
Households w/o laptop/desktop	42%	44%	40%	52%
Population	2,450,000	531,000	1,658,000	261,000
Population 65 y/o or older	13%	14%	13%	13%
Population w/o a HS diploma (age 25+)	30%	32%	29%	38%

Region 10 | South

Digital Divide Findings

The South has challenges across almost all dimensions of the digital divide, making it a vulnerable region.



South Stakeholder Commentary

Demand during the COVID-19 pandemic exceeded capacity. Supply should address build-out and maintenance expenses. The digital divide is tied to economic disadvantage.

- **Broadband demand** especially during the pandemic, exceeded short-term solutions such as "hot spots." Students were particularly affected.

"We purchased hotspots that we'd mount on vehicles and drive out to locations/parking lots that didn't have connectivity. We had issues with weak signals. Some parents didn't let their children gather around to share signal with other students/families."

- Coordinator for Network and Cybersecurity, Independent School District

"Students not being able to access classes from home, would go to Starbucks, McDonalds, school parking lots in order to do their remote learning."

- Director of Entrepreneurship, Higher Education

"We experienced loss of student population because parents decided to keep their students on remote learning versus send them to campus."

- Coordinator for Network and Cybersecurity, Independent School District

- **Broadband supply** in the South region faces challenges due to estimated high financial costs of network build-out and maintenance by ISPs. Many local governments noted that they also faced challenges due to limited technical expertise for broadband planning and operations.

"People want fiber to the home, but it wouldn't be financially possible. People want the Cadillac out there but really the Civic will do."

- Director, Economic Development Consortium

"Broadband is a broad topic. There needs to be strong governmental overlay of expertise."

- Associate Vice President, Higher Education

"Plan to build a city-owned fiber network but concerned for funding as to how we are going to support this project once the funding runs out."

- Information Technology Professional

- **Digital divide** challenges adversely affect those who are economically disadvantaged, and there's a need for equity, affordability and digital literacy as part of solutions to address access.

"The state of connectivity in the region is in need for the equity piece."

- Coordinator for Network and Cybersecurity, Independent School District

"People have to ask themselves the question: Do I prioritize a bag of groceries or the internet?"

- Director, Economic Development Consortium

"I see digital literacy as a core topic, like with school districts at a more robust level. You can learn from family and friends but if you want more of an enhancement you go to a resource. Accessibility to a resource is better."

- Associate Vice President, Higher Education

Region 11 | West

Baseline Demographics

The West is the largest region by area but one of the smallest by population size; its median household income, however, is relatively high.

- The West region borders Mexico and New Mexico. It includes 30 counties and three MSAs. Its major cities are Odessa and Big Spring.
- With just under 700,000 people (2 percent of the Texas population) spread across 230,000 households, it is the second least-populated region in the state.
- The West region is the largest region by area in the state, helping to make it the least dense region.
- At $66,000, West region residents have a median household income slightly below the state's median, but still above most regions.
- Two-thirds of the West region's population live in suburbs around large cities, with the remaining mostly in rural areas.

Location

Area Morphology

KEY INDICATORS[1]	TOTAL	RURAL	SUBURBAN	URBAN
Population (millions)	0.7	0.2	0.4	0.0
Households (millions)	0.2	0.1	0.2	0.0
Median household income[2] ($ thousand)	66	72	64	58

1. Assessed at census block group level: rural: < 600 people/sq. mi.; suburban: 600-7,500 people/sq. mi.; urban: >7,500 people/sq. mi.
2. Represents a population-weighted median income – aggregated from census block group level

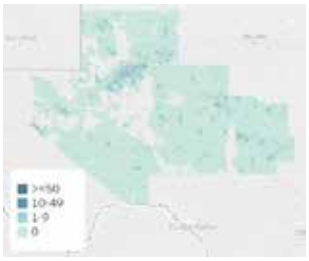
Region 11 | West

Broadband Demand Snapshot

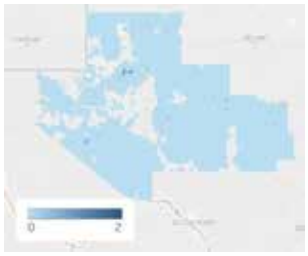
The West region has the lowest household and business density in the state. It also has a low number of public service facilities.

- The West region is the lowest-density region by household and business, with density rates of six households and one business per square mile, well below the 39 and 3.5 state rates for households and businesses, respectively. It has the second-lowest density in the state in both metrics in rural areas; however, it has the highest business density in the state in suburban areas.
- The West region has a low number of schools, hospitals and public safety facilities. There are 230 schools serving 120,000 students. Comparatively, half of the regions have more than 400 schools. There are 32 healthcare institutions in the West region, making it one of the regions with the least number of hospitals. The top three regions in the state have anywhere from 70 to 200 healthcare institutions. Finally, there are 178 public safety facilities. The top three regions have more than 450. All schools, hospitals and public safety institutions are evenly divided between rural and suburban areas.

Household Density



Business Density



Education & Healthcare Centers

Public Safety Facilities

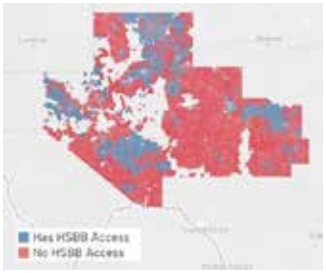
KEY INDICATORS	TOTAL	RURAL	SUBURBAN	URBAN
Household density (per sq. mi.)	6	2	815	3,641
Business density (per sq. mi.)	1	0	93	87
# Education centers	230	74	155	1
# Healthcare centers	32	12	20	-
# Public safety facilities	178	87	91	-

Region 11 | West

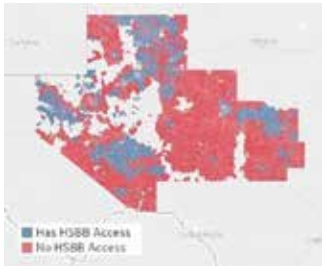
Broadband Supply Snapshot

ISPs offer HSBB and FTTH to a low share of households, and coverage for schools is particularly low.

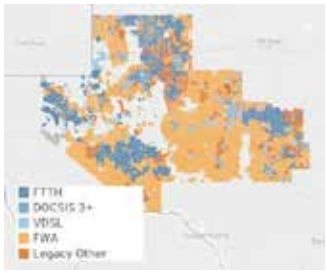
- The West has a low HSBB coverage rate. Eighty-seven percent (196,000) of households in the West region have access to HSBB, compared to the state average of 89 percent and 96 percent for the highest region. That leaves almost 30,000 households unserved, most of which are in suburban areas across the region (20,000).
- The West has a low FTTH coverage rate. Only 27 percent (60,000) of households in the region are served by FTTH technology, compared to 46 percent for the rest of the state. There are still more than 160,000 households lacking FTTH coverage.
- A low share of West households is served by only one ISP, despite a low number of HSBB providers in the region. There are 21 distinct HSBB ISPs in the region. Market penetration is similar for the top three, and only two of the top three ISPs offer some FTTH. Forty-four percent (100,000) of households are only served by one ISP which is close to the state average of 43 percent.
- Coverage for education and healthcare facilities is relatively low. At 83 percent and 91 percent, respectively, 40 schools and a handful of hospitals remain unserved, mostly in rural and suburban areas.



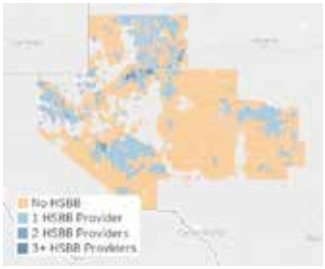
Availability of HSBB (households)



Availability of HSBB (businesses)



HSBB Offering by Tech



Number of HSBB Providers

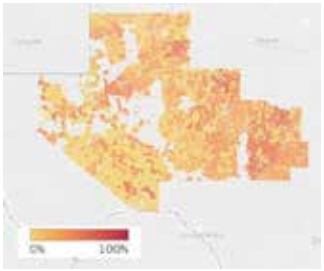
PERCENT WITH ACCESS TO HSBB	TOTAL	RURAL	SUBURBAN	URBAN
Households	87%	59%	99%	100%
Education facilities	83%	55%	95%	100%
Healthcare facilities	91%	75%	100%	-

Region 11 | West

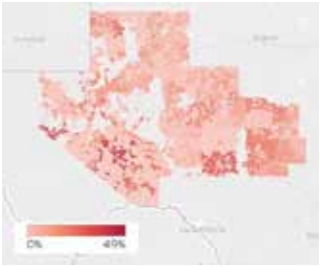
Digital Divide Indicators

The West region has a low rate of low-income households, but high rates of households without internet devices and adults over 25 without a high school diploma.

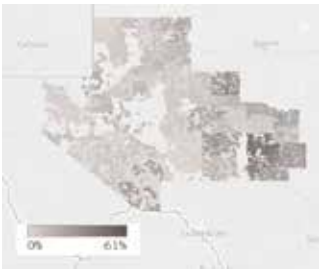
- The West region has a low share of low-income households. Only 35 percent of West households (79,000) have annual incomes below $50,000 – this rate is below the median of most regions (41 percent) but equal to the state's rate of 35 percent. In absolute numbers, it is the region with the least number of low-income households in the state.
- The West has a high share of households lacking proper devices to connect to the internet. Thirty-one percent of households (71,000) only have a mobile device to connect to the internet, while 12 percent (26,000) have no device at all. This is in contrast with 25 percent and 9 percent, respectively, for the entire state.
- The West region has one of the highest rates of population over 25 without a high school diploma, but an average rate of population over 65. Twenty-one percent (138,000) of residents in the West region are people 25 and older who do not hold a high school diploma, and 13 percent (85,000) of West residents are over the age of 65, compared to 16 percent and 13 percent, respectively, for the state.
- Rural and suburban areas are more likely than urban areas to see limited device availability and digital divide indicators. However, low-income levels are lower in urban areas.



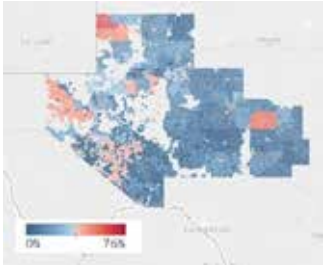
Households w/ income <$50k



Households w/o computing device



Population > 65y/o



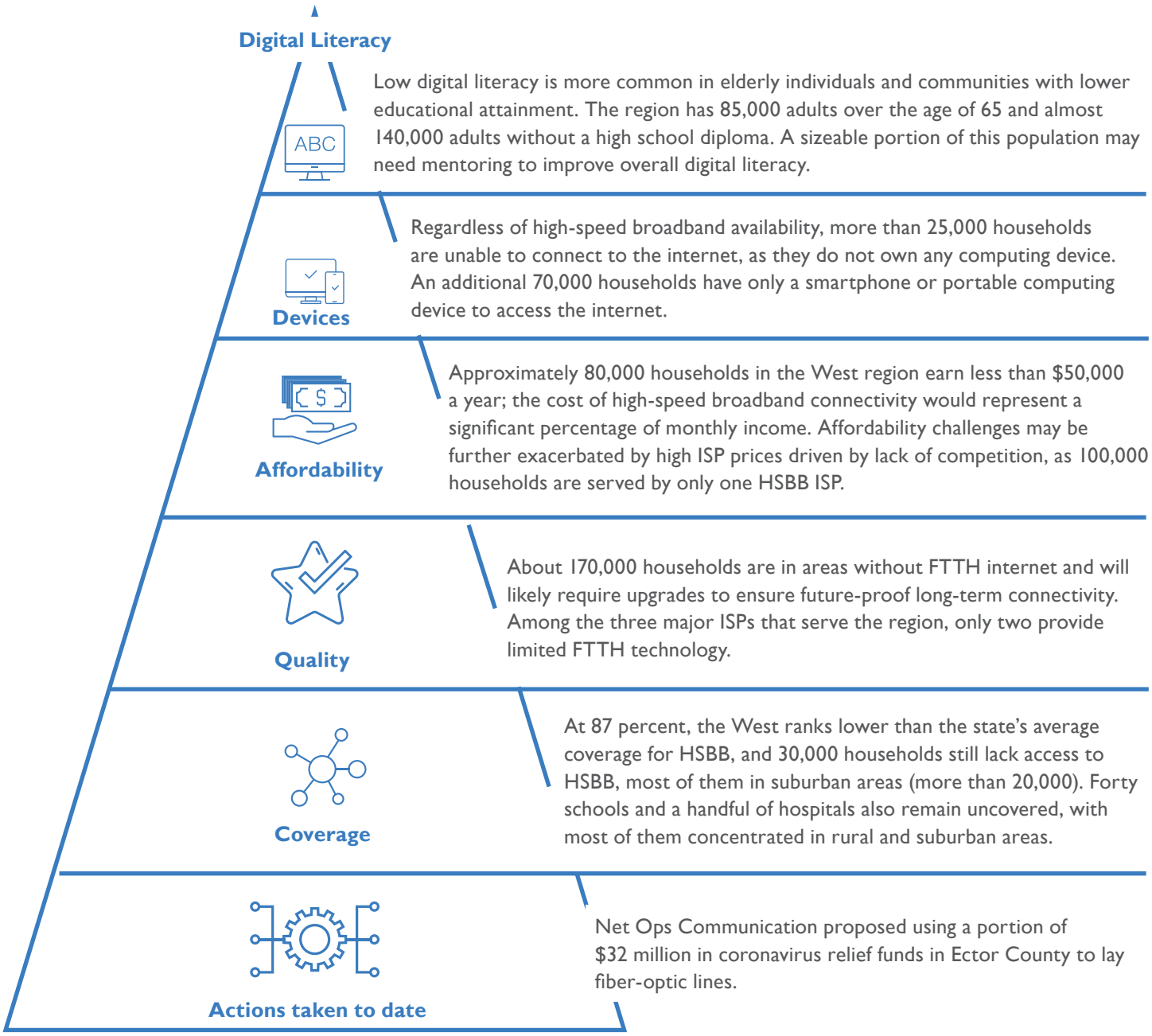
Population >25y/o w/o HS diploma

KEY INDICATORS	TOTAL	RURAL	SUBURBAN	URBAN
Households	226,000	68,000	153,000	6,000
Households w/ income < $50k	35%	32%	36%	34%
Households w/o any computing device	12%	12%	12%	7%
Households w/o laptop/desktop	31%	31%	32%	27%
Population	666,000	223,000	428,000	16,000
Population 65 y/o or older	13%	13%	13%	10%
Population w/o a HS diploma (age 25+)	21%	22%	20%	14%

Region 11 | West

Digital Divide Findings

The West region is a low-density region with a higher median annual income level than most regions. While digital divide challenges exist, they are not as significant as other regions.



West Stakeholder Commentary

Stakeholders demand that today's solutions should also meet future needs. Access to fiber is not enough.

- **Broadband demand** requires that high-speed service meets the needs of the future. Any solutions to demand should be able to evolve accordingly.

"The biggest challenge is it's still cost prohibitive for phone companies to come out and provide services."

- Chief Technology Officer, Independent School District

"We're watching a change in how people live and work. For example, work from home, remote schooling, etc."

- General Manager, Telecommunications Provider

"Thinking about the ongoing realities of rural areas - some areas are experiencing growth, some are staying the same, some are declining. We have to be thinking of ways to get services there and how to maintain them for years to come."

- VP of Regulatory Compliance, ISP

- **Broadband supply** and expansion costs are being driven up by evolving challenges. Despite some rural communities being supplied broadband at schools, students still don't have access at home.

"The biggest challenge is that it's still cost prohibitive for phone companies to come out and provide services in some areas."

- Chief Technology Officer, Independent School District

"Outside of the four walls of the school, broadband drops. We're seeking partnerships, donations, and funding on the front end, but long-term sustainability for the parents in a rural town will be a challenge. The private sector is underwriting the cost for driving broadband to rural areas."

- Superintendent, Independent School District

"Schools have great high-speed internet at campuses, but many kids don't have access to high-speed internet at home. You might have one high-speed internet provider, and it's probably not reliable and the advertised speeds aren't accurate."

- Instructional Technologist, Independent School District

- **Digital divide** challenges in digital literacy exist throughout the region. Solutions to the challenge of access need to be dynamic and multifaceted. Fiber installation won't completely solve access challenges.

"The level of digital literacy in the region is all over the place."

- Chief Technology Officer, Independent School District

"The solution doesn't need to be all one, it could be a combination of what makes sense for that area. Wireless or fiber, depends on the terrain and density. I wouldn't tag it as one technology."

- General Manager, Telecommunications Provider

"Fiber in the ground does not solve the problem."

- VP of Regulatory Compliance, ISP

Region 12 | Upper Rio Grande

Baseline Demographics

The Upper Rio Grande is a large region by area but a small region by population size. It also has a low median household income.

- Bordering both Mexico and New Mexico, the Upper Rio Grande is the westernmost region in Texas; it includes six counties and only one MSA. Its major city is El Paso.
- With almost 900,000 people (3 percent of the state's population) distributed across 300,000 households, the Upper Rio Grande has a low population size.
- The Upper Rio Grande is one of the largest regions in the state by area, which contributes to making it one of the least-dense regions in Texas.
- Households in the Upper Rio Grande have the second-lowest median income. At $49,000, they are considerably below Texas' $69,000 median income.
- About two-thirds of the Upper Rio Grande population live in the suburbs around El Paso. The rest are split between urban and rural, with urban almost double the number of rural.

Location

Area Morphology

KEY INDICATORS[1]	TOTAL	RURAL	SUBURBAN	URBAN
Population (millions)	0.9	0.1	0.6	0.2
Households (millions)	0.3	0.0	0.2	0.1
Median household income[2] ($ thousand)	49	50	51	41

1. Assessed at census block group level: rural: < 600 people/sq. mi.; suburban: 600-7,500 people/sq. mi.; urban: >7,500 people/sq. mi.
2. Represents a population-weighted median income – aggregated from census block group level

Region 12 | Upper Rio Grande

Broadband Demand Snapshot

The Upper Rio Grande is a low-density region by household and business, with most residents located in suburban and urban areas.

- The Upper Rio Grande region is a low-density region by household and business, with a density rate of 14 households and one business per square mile, well below the 39 and 3.5 state rates for households and businesses, respectively. The rural areas have the lowest density of any rural area in the state.
- The Upper Rio Grande region has a low number of schools, and the lowest number of hospitals and public service facilities in the state. At 265 schools serving 132,000 students, it is the fourth least-dense region in the state. More than three-quarters of the schools in the region are in the suburbs. Comparatively, half of the regions in the state have more than 400 schools. There are 24 healthcare institutions in the region, almost 80 percent of which are in the suburbs. The top three regions in the state have between 70 and 200 hospitals. There are more than 90 public safety facilities. Two-thirds of these facilities are in suburban areas. The top three regions in the state have more than 450.

Household Density

Business Density

Education & Healthcare Centers

Public Safety Facilities

KEY INDICATORS	TOTAL	RURAL	SUBURBAN	URBAN
Household density (per sq. mi.)	14	1	838	3,174
Business density (per sq. mi.)	1	0	75	97
# Education centers	265	37	205	23
# Healthcare centers	24	3	19	2
# Public safety facilities	93	23	61	9

Region 12 | Upper Rio Grande

Broadband Supply Snapshot

The Upper Rio Grande region has the highest HSBB coverage in the state, with very high access to fiber; however, it also has the lowest number of distinct ISPs.

- The Upper Rio Grande has the highest HSBB coverage rate in Texas. At 96 percent, 287,000 households in the region have access to HSBB; however, about 13,000 remain unserved, almost 9,000 of these in suburban areas.
- The Upper Rio Grande has an average FTTH coverage rate. At 44 percent, the region offers fiber to 132,000 households. This is compared to the state average of 46 percent but still higher than some other regions that only cover up to 12 percent. However, there are still 170,000 households without FTTH and only one of the top three ISPs provides some level of FTTH coverage.
- The Upper Rio Grande region has the lowest number of distinct HSBB providers in the state and a high share of households served only by one ISP. At nine, Upper Rio Grande is the only region with a single-digit number of distinct HSBB ISPs. Most regions have more than 20 distinct ISPs. Fifty-three percent of households are served by only one ISP.
- The Upper Rio Grande has the highest rate of school coverage in the state. At 98 percent, only five schools are not covered. Similarly, at 96 percent, it has a high rate of coverage for hospitals.

Availability of HSBB (households)

Availability of HSBB (businesses)

HSBB Offering by Tech

Number of HSBB Providers

PERCENT WITH ACCESS TO HSBB	TOTAL	RURAL	SUBURBAN	URBAN
Households	96%	63%	99%	100%
Education facilities	98%	89%	100%	100%
Healthcare facilities	96%	67%	100%	100%

Region 12 | Upper Rio Grande

Digital Divide Indicators

A relatively high share of the Upper Rio Grande population is low-income, lacks internet devices and do not hold a high school diploma.

- The Upper Rio Grande region has the second highest percentage of low-income households in the state. Forty-five percent (136,000) of the region's households have annual income below $50,000 – this rate is higher than the median (41 percent) and the state's rate of 35 percent.
- The Upper Rio Grande has a high share of households lacking proper devices to connect to the internet. Thirty-three percent (99,000) own only a mobile device to connect to the internet, and 14 percent (41,000) report not having any computing device. This is in contrast with 25 percent and 9 percent, respectively, for the entire state.
- The Upper Rio Grande region has the second highest share of population over 25 without a high school diploma, but an average share of population older than 65. Twenty-three percent (200,000) of residents of the region are people 25 and older who do not hold a high school diploma, and 13 percent (114,000 people) are over the age of 65, compared to 16 percent and 13 percent, respectively, for the state.
- The digital divide percentages are evenly distributed among rural, suburban and urban areas. The largest margin of difference is 10 percent between rural and urban households with annual income under $50,000. In all other metrics, the margin is 5 percent or less.

Households w/ income <$50k

Households w/o computing device

Population > 65y/o

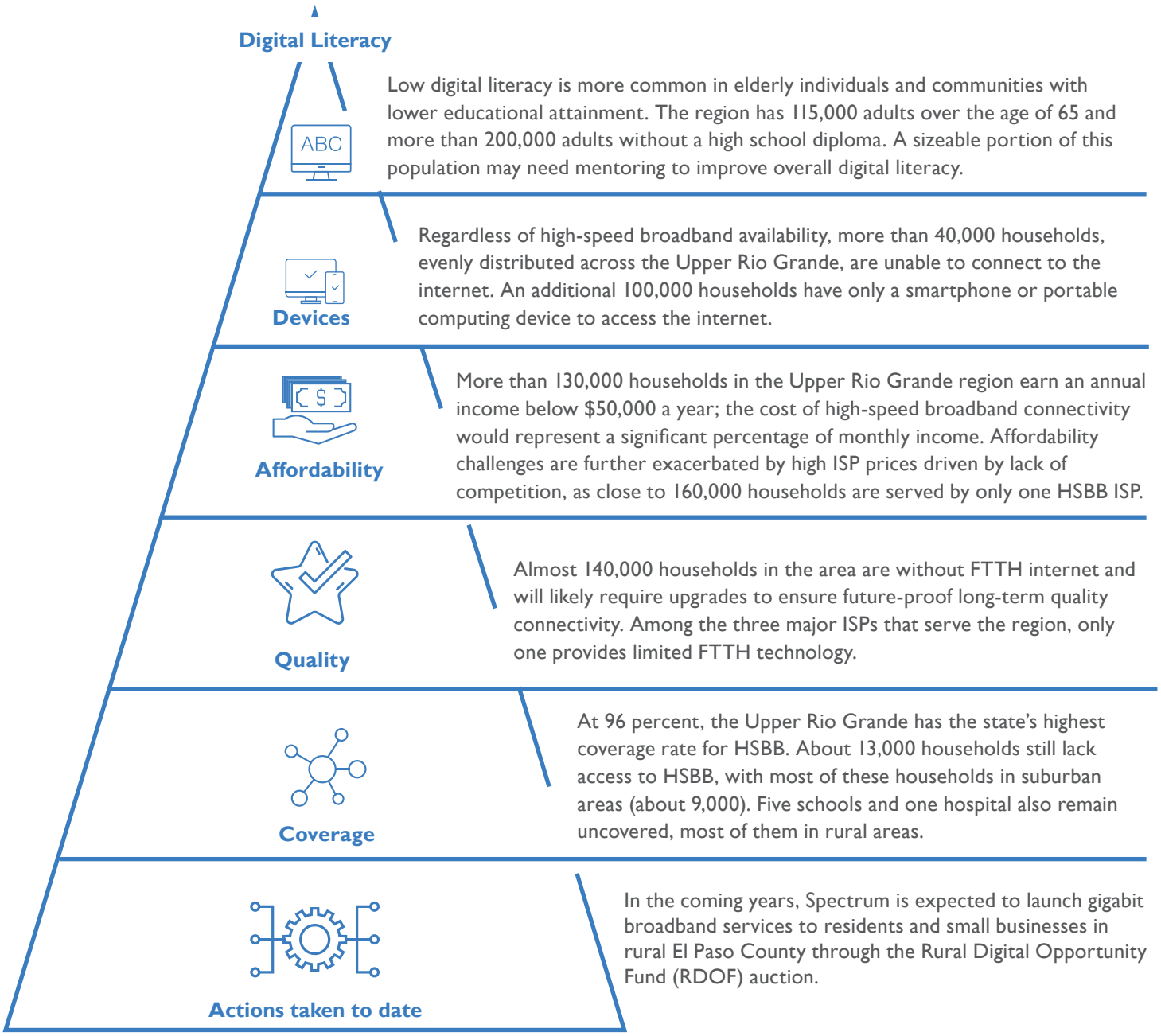
Population >25y/o w/o HS diploma

KEY INDICATORS	TOTAL	RURAL	SUBURBAN	URBAN
Households	300,000	31,000	199,000	70,000
Households w/ income < $50k	45%	42%	43%	52%
Households w/o any computing device	14%	12%	13%	17%
Households w/o laptop/desktop	33%	33%	31%	38%
Population	866,000	83,000	575,000	207,000
Population 65 y/o or older	13%	10%	14%	14%
Population w/o a HS diploma (age 25+)	23%	25%	22%	25%

Region 12 | Upper Rio Grande

Digital Divide Findings

Affordability is an important digital divide challenge for the Upper Rio Grande region, closely followed by digital literacy.



Upper Rio Grande Stakeholder Commentary

Businesses demand broadband for development, ISPs may not see economic value in low-density areas and stakeholders are not confident their needs will be met.

- **Broadband demand** has been increasing alongside businesses and competition. Stakeholders ask the BDO to think about demand as more than population density and to consider the unique needs of low-density areas.

"Lots more proposals start including broadband requirements. If they're competing for business and can't say they have reliable internet then they won't be selected. Business won't come without internet, but also, you can't pay for internet without business."

- Economic Developer

"Again, we need to look at the business case and can't just think about deployment, we need to sustain. I don't think it's wise for municipalities to deploy something they're now on the hook to maintain for forever, the right PPP could relieve that pressure and have the provider sustain a network."

- ISP Representative

"A critical piece is that tech support must be willing to provide time and support, not just check a box. We need systems that are more robust, less dependent on user interaction and less costly to deploy."

- Nonprofit Representative

- **Broadband supply** is expensive and low-quality. ISPs do not see economic value in deploying broadband in these low-density areas. Stakeholders agree that fiber is best but are open to temporary solutions.

"Affordability and reliability are two key factors in our community. There are not a lot of choices and most of them are painfully slow and expensive."

- Educator

"When we look at allocation of capital, we hope we're vetting everyone to ensure we can provide and sustain the solution, so there's some density factor involved. Middle-mile is solved in a lot of areas, what needs to be solved is the really expensive rural connection."

- ISP Representative

"Fixed wireless offers a good fit for the market based on cost – in the case of fiber, each home needs to pay $4,000 each, wireless is way more affordable and is useful in filling in the gaps – however, fiber is the ultimate long-term solution."

- ISP Representative

- **Digital divide** is prevalent in this region. Based on previous experiences, many stakeholders are not confident that the state will consider their specific needs.

"Speaking of digital literacy, most of the younger generation have phones or Chromebooks. It's mainly the older generation that doesn't fully understand access."

- Educator

"No one has listened to us before, why are they going to listen to us now?"

- Public Servant

"I don't have a lot of confidence that the funds will make it out to the city level, this is Texas after all."

- Educator

Appendix B: Governance

Governance identifies the organizations involved in framing the discussion and formalizing the decision-making processes among institutions. The broadband initiative has commitments from the highest levels of state leadership and has further enlisted the support of agencies and stakeholders throughout Texas.

The following organizations are involved in the governance of this important initiative:

Broadband Development Office

The BDO was established in 2021 by HB 5, 87th Legislature, Regular Session, to facilitate the state's broadband initiative. In accordance with the legislation, the office has responsibility to:

- Create an accurate broadband map of eligible versus ineligible areas for financial assistance. The map will have a challenge process to dispute any perceived inaccuracies.
- Establish a long-term, statewide plan that addresses strategies and goals for expanding access to and further adoption of broadband service.
- Award grants or other financial instruments to meet the goals of the plan.
- Set the effective threshold speed for broadband service.
- Engage in outreach to communities regarding the expansion of broadband.
- Address barriers for future expansion efforts.

The Broadband Development Office Board of Advisors (the Board of Advisors), also created by HB 5, provides guidance to the BDO regarding the expansion, adoption, affordability and use of broadband service and those programs administered by the office.

The Board of Advisors is comprised of 10 members, is chaired by the Texas Comptroller and includes a representative of the BDO as a non-voting member. The other members are appointed by the Texas Governor, Texas Lieutenant Governor and the Speaker of the House.

Governor's Broadband Development Council

The Governor's Broadband Development Council was established in 2019 by the 86th Legislature to study and identify ways to provide internet access to unserved areas of Texas. Duties of the council include: research the progress of broadband development in unserved areas; identify barriers to residential and commercial broadband deployment in unserved areas; study technology-neutral solutions to overcome barriers identified; and analyze how statewide access to broadband would benefit: (A) economic development; (B) the delivery of educational opportunities in higher education and public education; (C) state and local law enforcement; (D) state emergency preparedness; and (E) the delivery of healthcare services, including telemedicine and telehealth.

The council is composed of 21 voting members appointed by the Governor of Texas and one nonvoting member appointed by the BDO.

State Agency Stakeholders

Broadband crosses a number of industries and sectors and thus requires coordination across a number of state agencies and organizations to coordinate efforts and minimize duplication.

Public Utility Commission of Texas

The Public Utility Commission (PUC) does not regulate broadband service; however, it permits electric utilities to lease their excess fiber capacity to ISPs to provide broadband in unserved and underserved areas of Texas. PUC provides the designation of common carriers as Eligible Telecommunications Carriers to receive federal universal service funds. In 2022, PUC adopted the first middle-mile broadband rule for the state of Texas. The rule permits electric utilities to lease their excess fiber capacity to ISPs to provide broadband in unserved and underserved areas of Texas.

Appendix B: Governance

Texas Department of Transportation

The Texas Department of Transportation (TxDOT) handles broadband deployment at a district (25 regional offices) and at an enterprise level.

For private entities seeking to place broadband assets in TxDOT right-of-way, within each district, maintenance staff processes permits and coordinates installation. SB 507, 87th Legislature, directs TxDOT to allow broadband-only providers to use state rights-of-way in the same manner as other utilities.

For TxDOT-owned broadband assets, local design, construction and operations staff identify TxDOT broadband access needs and the appropriateness of including supporting infrastructure in any TxDOT construction project. At an enterprise level, several divisions within TxDOT work together in supporting district broadband operations for traffic operations and the TxDOT business network.

TxDOT initiatives include:

- Coordinating "dig once" opportunities via an ArcGIS Web Application
- Tracking owned broadband assets via OSPinsight
- Encouraging conduit installation along all new or reconstructed Tier 1 roadways in Texas
- Working with private-sector entities for broadband access, including using new broadband technologies
- Planning future roadway needs and seeking to collaborate with other public agencies

Challenges:

- The remoteness of certain TxDOT offices and length of roadways cannot reasonably be supported by traditional broadband options
- The size of TxDOT would require a large investment for full coverage
- Connected vehicles and infrastructure introduce an uncertainty to TxDOT planning

Texas Department of Public Safety

Since 2011, the Department of Public Safety (DPS) has had an integral part in developing public safety broadband infrastructure in Texas. This effort has included petitioning Congress to allocate spectrum in the 700MHz band and a large data collection effort prioritizing locations. FirstNet was the outcome of legislation passed in 2013, and a contract with AT&T to build the network was signed in 2017. DPS is now focusing on devices that use the public safety spectrum (Band 14) and the development of interoperability standards for applications and data sharing. The Texas Interoperable Communications Coalition released a position paper on Interoperable Public Safety Messaging in 2019.

DPS's current broadband projects are aimed at improving coverage and communications resiliency for the agency, especially during response operations. One focus is on deploying high-power user equipment (HPUE) for some rural teams. HPUE is exclusive to FirstNet's Band-14 LTE spectrum. It allows authorized devices to transmit at higher powers than commercial cellular, which increases range and data throughput. DPS is putting this equipment on select boats and patrol vehicles and is developing a portable form factor. DPS is also building on the small, affordable, deployable network concept via a partnership with the new Global Center for Coordinated Response and Resilience at the University of Texas. DPS is in the early stages of scoping out a project to build a network-in-a-box deployable for first responders.

Texas State Library & Archives Commission

The Texas State Library and Archives Commission (TSLAC) has provided assistance to libraries needing high-speed internet since 1998. TSLAC's principal broadband initiatives provide technical assistance, training and resources to libraries around the state that address barriers of access and affordability. In addition to conducting regular broadband speed tests for Texas libraries, TSLAC provides guidance in accessing the federal E-rate discount program for broadband and, more recently, assisted libraries in accessing the Emergency Connectivity Funds (ECF). TSLAC provides multiple grant programs so that libraries can obtain resources to expand

Appendix B: Governance

broadband capacity and digital literacy initiatives, including $1.5 million from the CARES Act funding and $1.8 million in ARPA funding, which includes investment in telehealth and digital navigator pilot projects.

TSLAC also provides resources and programming in support of digital literacy for library workers and the communities they serve through a suite of foundational technology training programs focusing on needs related to hardware and network skills, technology planning skills and teaching digital literacy skills. TSLAC partnered with the Texas Workforce Commission to create and distribute a free, multilingual, digital literacy toolkit to libraries and adult literacy providers to be updated in the next year. TSLAC is poised to make an additional investment in workforce development in public libraries to address needs related to digital literacy and the digital skills gap by adding dedicated staff and targeted electronic resources.

Texas Department of Information Resources

The Texas Department of Information Resources (DIR) provides IT-related cooperative contracts for use by public-sector entities that include an expansive portfolio of wired, wireless and data services. In addition, DIR offers public-sector entities a variety of applicable network solutions provided through the Texas Agency Network (TexAN). These solutions are provided through a variety of vendors that offer voice, data, wireless and internet services that have been negotiated based on the aggregated purchasing power of the state.

DIR also oversees Texas.gov, the state's official website and a trusted resource for government information and transactions. Texas.gov enables state agencies, local government and institutes of higher education to provide simple, accessible and secure digital government solutions.

Texas by Texas (or TxT) is a new, mobile-first digital government experience that offers a faster and more secure way for Texans to conduct government business. TxT offers a single destination for constituents to create an account; verify their identity; establish a profile with their name, address, contact and payment information; and conduct their government transactions.

Texas Parks and Wildlife Department

The Texas Parks and Wildlife Department (TPWD) is a field-based agency with more than 200 remote offices across the state. Within the last six years, TPWD has transitioned all but two remote offices from T1 circuits to broadband or cellular service to reduce cost, improve reliability and increase performance. TPWD currently has multiple projects underway to address network performance and efficiency, including:

- Statewide router/switch refreshes
- Ongoing upgrades to better broadband ISP services
- Investing in fiber-based infrastructure
- Implementing enhanced network monitoring and access controls

Like many field-based agencies, one major challenge TPWD has identified is finding adequate internet service in rural areas. In many cases, access to these services requires a significant construction investment along with a high recurring cost, neither of which are sustainable given current budgets. The rural nature of many of TPWD facilities means DIR-approved ISPs are not always available. The exemption process and solicitation of vendors from the CMBL has proven to be challenging and time-consuming. TPWD officials believe that opportunities to partner and upgrade to reliable, secure, faster and affordable connectivity is a major factor in offering improved digital services for the agency as well as Texas residents.

Texas Health and Human Services

SB 633, 86th Legislature, Regular Session directed the Health and Human Services Commission (HHSC) to collaborate with rural-serving local mental health authorities (LMHAs) and local behavioral health authorities (LBHAs) to focus on expanding access to mental health services in rural Texas. SB 454, 87th Legislature, Regular Session directed HHSC to continue this effort on an ongoing basis. HHSC calls the bill implementation of SB 633 and SB 454 "All Texas Access."

Appendix B: Governance

Broadband and telehealth have been significant topics of exploration in the All Texas Access initiative. For the initiative, HHSC has:

- Studied challenges for telehealth and telemedicine in rural communities
- Hosted focus groups with local LMHAs/LBHAs about telehealth and telemedicine
- Collaborated with the Texas Department of Insurance and Texas Medical Board regarding telephonic services for behavioral health services
- Received a technical assistance training grant from the National Academy for State Health Policy (NAHSP) concerning rural mental health crisis response

Members of the All Texas Access initiative are also participating in the implementation of HB 4, 87th Legislature, Regular Session. This bill concerns the provision and delivery of telehealth and telemedicine services in Texas with the Medicaid program, including the potential development of an audio-only telehealth benefit for behavioral health.

Texas Department of Agriculture

Texas Department of Agriculture (TDA) is focused on supporting economic development in rural communities and promoting healthy living. TDA and the Texas Agricultural Finance Authority (TAFA) will soon be launching a rural economic development finance initiative to include two proposed loan programs:

- **Texas Rural Community Loan** – provides financing to rural political subdivisions and economic development corporations to address economic development priorities and support the agricultural industry.
- **Agricultural and Community Economic Development Loan** – provides financing in partnership with financial institutions to nonprofit and for-profit entities that are significantly supporting or impacting the agricultural industry or furthering rural economic development.

Either or both of these programs might be leveraged for local broadband initiatives depending upon the nature of each project and the participants involved.

In the past, TDA worked with Connected Nation to help identify rural stakeholders and communities interested in broadband development. More recently, TDA has partnered with Connected Nation to conduct a needs analysis of rural Texas hospitals to understand existing broadband connectivity and capacity and to determine future requirements.

Texas Education Agency

Operation Connectivity is a partnership that includes Governor Greg Abbott, the Dallas Independent School District and the Texas Education Agency to connect all of Texas' 5.5 million public school students with both a device and reliable internet connection. This three-phase program was launched in May 2020.

Phase one dedicated almost $1 billion in state and federal funds to purchase more than 4.5 million e-learning devices, including 874,000 hotspots, which were delivered for Texas' students to use at home. Phases two and three were launched in 2021, first to map the connectivity needs of students and their communities and then to develop solutions that address both served and unserved populations.

Texas General Land Office

The Texas General Land Office (GLO) is the agency responsible for all Community Development Block Grant (CDBG) Disaster Recovery (DR) and Mitigation (MIT) funding on behalf of the state of Texas. As such, GLO has approximately $13 billion in grants supporting disaster recovery dating back to Hurricane Ike in 2008. Generally, the GLO allocates funds locally based on disaster-specific distress factors or competitions. Applicants select projects for which to use their direct allocations or in which to apply for available funds so long as CDBG grant requirements are met. Most recently, GLO has issued more than $1.1 billion in mitigation funds across 140 counties in Texas, which includes two broadband-related projects. Subrecipients have completed a broadband-related study in the Deep East Texas Region.

Appendix B: Governance

Lower Colorado River Authority

The Lower Colorado River Authority (LCRA) is a quasi-state agency created by the state legislature to enhance the lives of Texans through water stewardship, energy and community service. LCRA's services include managing the water supply of the lower Colorado River basin, generating and delivering electricity, and managing more than 40 parks throughout the basin.

In May 2021, the state legislature passed SB 632, 87th Legislature, which authorizes LCRA to provide fiber broadband capacity and facilities to improve broadband service. The legislation authorizes LCRA to provide middle-mile and backhaul fiber access to third parties, prohibits LCRA from providing retail broadband (i.e., LCRA cannot be an ISP), and allows LCRA to build fiber and related facilities to provide access points to connect retail ISPs seeking to provide last-mile connectivity to communities in need. LCRA is seeking partners to deliver last-mile broadband to rural communities.

Appendix C: Listening Tour Locations

The 12-stop Texas Broadband Listening Tour was designed to collect testimony from citizens across Texas. CPA and BDO worked with local community leaders to organize and participate in each event. Hosts provided venues that could seat at least 100 people and opened their doors to the public for a town hall-style event. CPA, community organizations, universities, elected officials and ISPs assisted BDO in promoting awareness of each event and driving attendance. CPA and BDO are grateful for the support received from local hosts and the candid perspectives from attendees.

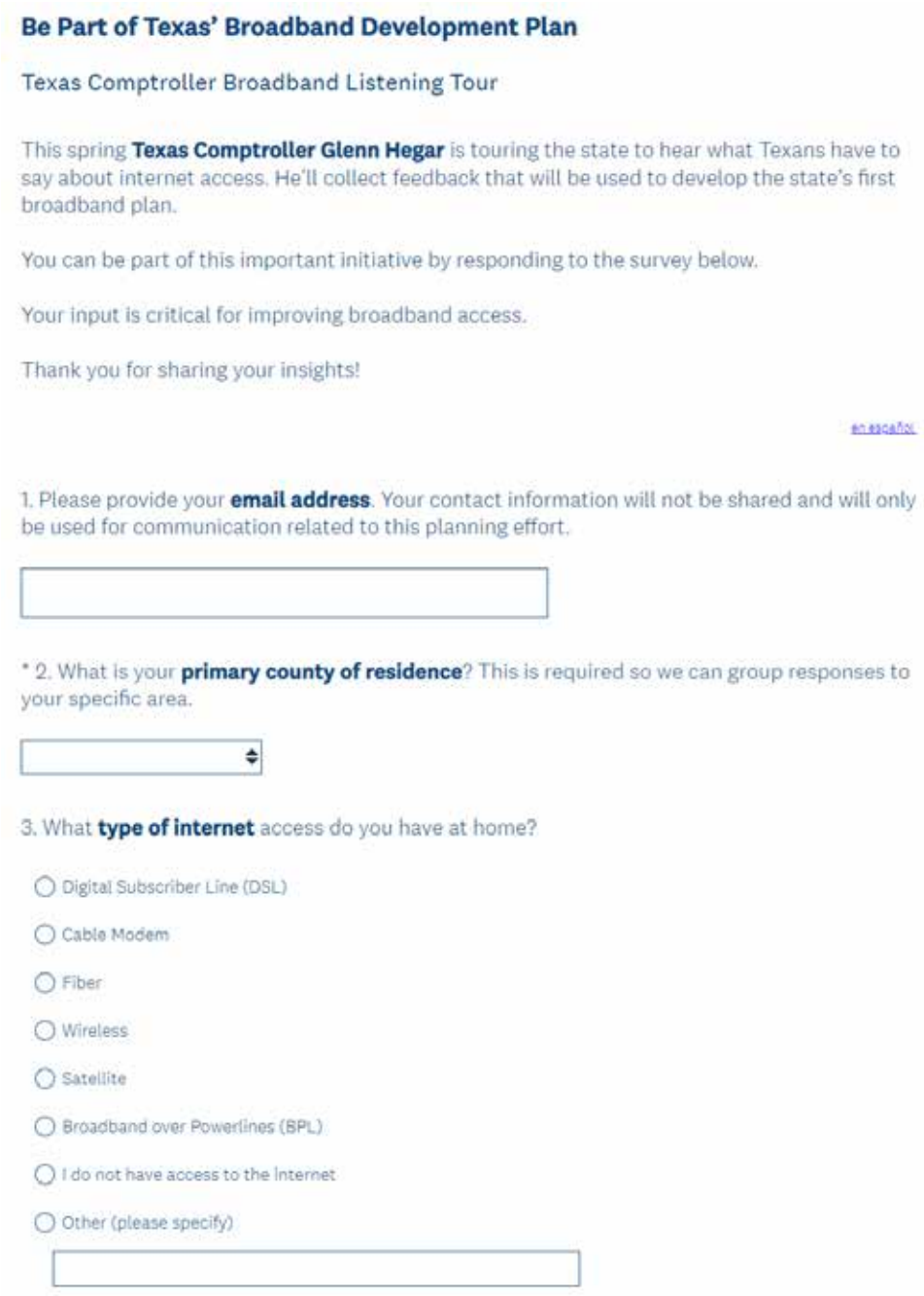
Locations included the following:

Date	City	Location	Region
March 1	Prairie View	Prairie View A&M University	Gulf Coast Region
March 7	Victoria	University of Houston Victoria	Alamo Region
March 10	Austin	Capital Area Council of Governments	Capital Region
March 22	Ft Worth	Fort Worth Convention Center	Metroplex Region
March 24	Amarillo	Amarillo Civic Center	High Plains Region
March 31	Beaumont	Jefferson Theatre	Southeast Region
April 4	Waco	Waco Convention Center	Central Texas Region
April 6	Tyler	The University of Texas at Tyler	Upper East Region
April 7	Abilene	Expo Center of Taylor County	Northwest Region
April 11	El Paso	The University of Texas at El Paso	Upper Rio Grande Region
April 26	Edinburg	The University of Texas Rio Grande Valley	South Texas Region
April 28	San Angelo	Angelo State University	West Texas Region

Appendix D: Surveys Conducted

General Public Survey

A data-driven survey – in both digital and printed forms – supplemented the in-person component of the Listening Tour. The following survey, which was available at the public meetings and electronically distributed and managed by the BDO, sought to capture the public's sentiment across four main barriers to broadband expansion: access, adoption, affordability, and digital literacy.



Be Part of Texas' Broadband Development Plan

Texas Comptroller Broadband Listening Tour

This spring **Texas Comptroller Glenn Hegar** is touring the state to hear what Texans have to say about internet access. He'll collect feedback that will be used to develop the state's first broadband plan.

You can be part of this important initiative by responding to the survey below.

Your input is critical for improving broadband access.

Thank you for sharing your insights!

en español

1. Please provide your **email address**. Your contact information will not be shared and will only be used for communication related to this planning effort.

* 2. What is your **primary county of residence**? This is required so we can group responses to your specific area.

3. What **type of internet** access do you have at home?

- Digital Subscriber Line (DSL)
- Cable Modem
- Fiber
- Wireless
- Satellite
- Broadband over Powerlines (BPL)
- I do not have access to the Internet
- Other (please specify)

Appendix D: Surveys Conducted

General Public Survey

Continued:

4. Tell us about internet access at your place of residence.

	Yes	No	Don't Know
Do you have an internet connection at home?	○	○	○
Do you have a tablet device you can use at home?	○	○	○
Do you have a desktop or laptop computer you can use at home?	○	○	○
Does your family own and use smartphones?	○	○	○

5. Please indicate how much you **agree or disagree** with the following statements as they pertain to broadband access:

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Does not apply
My ability to access the internet makes it easy for me or my family to **attend school or complete homework.**	○	○	○	○	○	○
My ability to access the internet makes it easy for me or my family to **seek healthcare advice or access medication.**	○	○	○	○	○	○

6. Please indicate how much you **agree or disagree** with the following statements as they pertain to broadband access:

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Does not apply
High-speed broadband is available at my residence.	○	○	○	○	○	○
An internet connection is affordable.	○	○	○	○	○	○

Appendix D: Surveys Conducted

General Public Survey

Options from question 6 continued:

I do not want or need internet service at home.	○	○	○	○	○	○
I do not need to go online because I have someone who will do it for me.	○	○	○	○	○	○
I want someone to teach me how to use the internet.	○	○	○	○	○	○
Using the internet is too difficult	○	○	○	○	○	○
I worry that I may not be able to pay my internet service provider bills.	○	○	○	○	○	○
My smartphone lets me do everything I need to do online.	○	○	○	○	○	○
I have other options for internet access outside my home.	○	○	○	○	○	○

Other (please specify)

Appendix D: Surveys Conducted

General Public Survey

Continued:

7. **Please share any additional thoughts you may have on the future of broadband access in your community.**

8. What is your age range?

9. How many K-12 students live at your home?

10. What is your **race/ethnicity**?

11. What is your **household income**?

12. What is the **highest level of education** you have completed?

13. Is English your primary language?

Appendix D: Surveys Conducted

Elected Official Survey

As policy makers, elected officials play a critical role in the development of the State Broadband Plan. To avoid legal restrictions related to gathering a quorum during a public engagement, feedback from elected officials was limited to a targeted elected leadership survey. The following survey was electronically distributed to officials in every economic region.

Local Leaders: Be Part of Texas' Broadband Development Plan

Texas Comptroller Broadband Listening Tour

This spring Texas Comptroller Glenn Hegar is touring the state to hear what Texans have to say about internet access. He'll collect feedback that will be used to develop the state's first broadband plan.

Hearing directly from elected officials is critical to understanding needs in your community and what initiatives you are currently pursuing. Thank you for sharing your insights!

1. What is **your name**?

2. Over **what city or county jurisdiction** do you preside?

3. What is **your elected position**?

4. Please provide **your email address**. Your contact information will not be shared.

5. Please rank the following **broadband issues** based on their priority for your community, with 1 being the highest priority.

- Access
- Adoption
- Affordability
- Digital Literacy

Appendix D: Surveys Conducted

Elected Official Survey

Continued:

6. Tell us about **broadband planning** in your community:

	Yes	No	I don't Know
Do you have a broadband plan in place or are currently developing one?	○	○	○
Does your city/county staff have the technical skills needed to address this topic?	○	○	○
Do you have the financial resources necessary to address your broadband needs?	○	○	○
Are you collaborating with other government agencies in your region to address this topic?	○	○	○
Do you see your local internet service providers as collaborative partners?	○	○	○

7. Did you apply for **National Telecommunication and Information (NTIA)** funding?

- ○ Yes
- ○ No
- ○ Uncertain

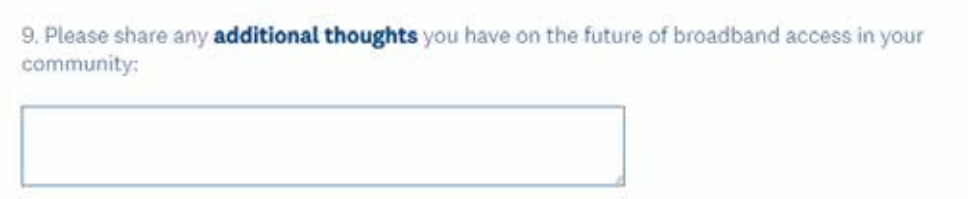
8. Are you utilizing **American Rescue Plan Act (ARPA) or other federal funding** sources to address broadband in your jurisdiction?

- ○ Yes
- ○ No
- ○ Uncertain

Appendix D: Surveys Conducted

Elected Official Survey

Continued:



TEXAS BROADBAND DEVELOPMENT OFFICE

For more information, visit our website:

BroadbandForTexas.com

In compliance with the Americans with Disabilities Act, this document may be requested in alternative formats by calling toll free 800-252-5555.

Sign up to receive email updates on the Comptroller topics of your choice at comptroller.texas.gov/subscribe/.

Texas Comptroller of Public Accounts
Publication #96-1875
June 2022