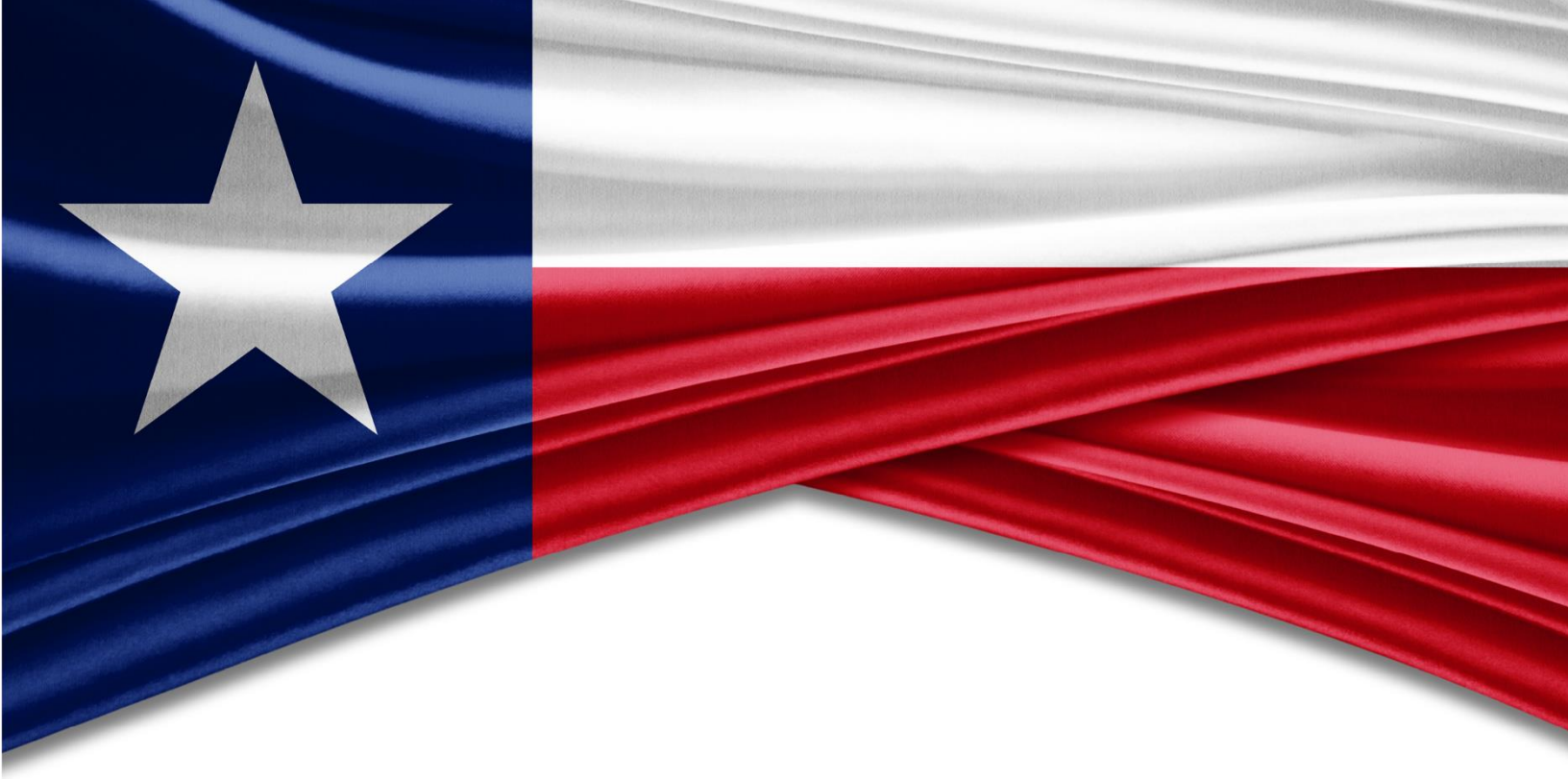

2020 Texas Report

Governor's Broadband Development Council

Office of the Governor | Economic Development & Tourism

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Table of Contents

I. EXECUTIVE SUMMARY WITH RECOMMENDATIONS

Executive Summary:
The Governor's Broadband Development Council, in accordance with Texas Government Code Sec. 490.007, is mandated to submit an annual report no later than November 1 of each year, beginning in 2020. The report serves to identify findings and recommendations based on the Council's duties, outlined in Texas Government Code Sec. 490.006.

There are many challenges to broadband connectivity in rural and unserved areas of the state, and currently Texas is one of six states that does not have a statewide broadband plan. In 2020, the novel coronavirus (COVID-19) pandemic has highlighted issues regarding broadband internet in many ways, and now more than ever it is apparent that broadband connectivity is a critical issue for the rural and unserved areas of our state.

In studying the progress of broadband development in unserved areas, the Council found that over 300,000 locations in Texas are unserved.[1] As of July 2020, an estimated 926,859 Texans do not have access to broadband at home. This is particularly problematic for those who need to attend school virtually, visit a doctor online, or work remotely, either due to the COVID-19 pandemic or other factors. The Council found that Texas' rural population represents approximately 90 percent of all Texans without broadband access.

The Council also studied barriers to broadband development in Texas. Some of the main barriers identified include regulatory, economic, and technical factors, such as population density and geography, infrastructure investment, profitability, and "backhaul" costs. Other barriers include a low rate of broadband adoption, lack of collaboration between stakeholders, and insufficient statewide coordination.

In order to identify recommendations regarding broadband connectivity in rural and unserved areas, the Council studied broadband practices taking place in other states, as well as initiatives at the federal level.

The Council found that the Pew Charitable Trusts, an independent nonprofit research organization, identified several promising practices adopted by other states to address issues regarding broadband internet. These practices include: state and local stakeholder outreach and engagement; policy frameworks with well-defined goals; planning and capacity building; funding programs; and program evaluation.

In addition, the federal government has several programs administered by the Federal Communications Commission (FCC) and the U.S. Department of Agriculture (USDA) to incentivize carriers to build broadband in high-cost areas.

It is also important to identify technology-neutral solutions to expand broadband connectivity, including digital literacy trainings, certifications for broadband-ready communities, and/or building upon current technology-neutral programs.

The issue of broadband connectivity in the state's rural and unserved areas is vital to economic development, education, health care, and safety in Texas. According to the FCC's National Broadband Plan, broadband internet is critical "…for economic growth, job creation, global competitiveness, and a better way of life."[2] The benefits of statewide access to broadband include: increased access to worldwide markets, e-commerce growth, improved agricultural practices, enhanced educational opportunities, more effective emergency preparedness communication, and expanded access to medical professionals via telemedicine.

Recommendations:

The Governor's Broadband Development Council has researched the progress of broadband development in unserved areas; identified barriers to residential and commercial broadband deployment in unserved areas; studied technology-neutral solutions to overcome barriers; and analyzed how statewide access to broadband would benefit economic development, higher education and public education, state and local law enforcement, state emergency preparedness, and health care services. Resulting from this research, the Council recommends that the Texas Legislature take the following action:

- Create a state broadband plan; and
- Establish a state broadband office.

The Council also believes that the following action could benefit the broadband landscape in Texas and therefore recommends its continued study:

- Develop a state broadband funding program to incentivize deployment in unserved areas.

II. BACKGROUND

The internet continues to dramatically impact commerce, education, health care, innovation, and entertainment for Texans. Today, the internet, specifically broadband or high-speed internet, is no longer a luxury or convenience, but rather a necessity.[3] While the definition of broadband internet has changed over time,[4] broadband internet is currently defined by the FCC as a 25 Megabits per second (Mbps) download speed and 3 Mbps upload speed (25/3 Mbps).[5] According to the FCC's National Broadband Plan, broadband internet is critical "…for economic growth, job creation, global competitiveness, and a better way of life."[6]

The future economic success of Texas communities, and the state in general, will likely be dependent on how Texas uses and expands access to broadband internet.[7] Currently, Texas is one of six states that does not have a state broadband plan. This means Texas is not comprehensively planning for internet expansion to meet current or future needs and is losing out on potential funding opportunities.[8]

It is important to note that broadband access and broadband adoption are different issues. Broadband access refers to an individual's ability to physically connect to broadband internet. If an individual does not have the ability to access the internet at the rate of 25/3 Mbps then that individual would be considered "unserved."[9] House Bill 1960 (HB 1960) considers an area "unserved" when there is a "census block without broadband capable of providing" 25/3 Mbps. If broadband service is provided anywhere within a census block, even if service is provided to only one connection or household within the census block, then that census block is considered a broadband "served" area.[10] This means that even though a census block may be considered broadband-capable or a "served" area, not every individual in that census block may have access to broadband internet.

Broadband adoption is the choice made by an individual, business, or institution to embrace and use broadband and its related technologies. Broadband adoption cannot occur without access to high-speed infrastructure; however, even with access to the internet, broadband adoption may not follow. While more than nine out of ten Texas households have access to broadband service, not all choose to subscribe. According to the 2019 American Community Survey from the United States Census Bureau, only 67.6 percent of Texas households subscribe to fixed broadband service such as DSL, cable, or fiber at home. This places Texas below the national average of 70.8 percent of households, and at 34th in adoption behind California, New York, Florida, and 30 other states. Texas does, however, have a larger share of fixed broadband subscribers than any of its neighboring states.

In 2019, the Texas Legislature filed several bills related to broadband. HB 1960, Senate Bill 14 (SB 14), and House Bill 2422 (HB 2422) were passed by the Texas Legislature and signed by Governor Greg Abbott.

HB 1960 created the Governor's Broadband Development Council and established that it would exist for 10 years. HB 1960 also set out the duties of the Council. According to HB 1960, the Council shall:[11]

1. Research the progress of broadband development in unserved areas;
2. Identify barriers to residential and commercial broadband deployment in unserved areas;
3. Study technology-neutral solutions to overcome barriers identified under Subdivision (2); and
4. 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 health care services, including telemedicine and telehealth.

On January 10, 2020, Governor Abbott appointed the following individuals to the Governor's Broadband Development Council for terms set to expire on August 31, 2024:

- Juli Blanda,
- Frank Moreno,
- Lindsey Lee,
- Marshall Harrison,
- Marty Lucke,
- Kirk Petty,
- Thomas J. Kim, M.D.,
- William "Bill" Sproull,
- Saurin Patel, M.D.,
- Greg Pittman,
- Jennifer K. Harris,
- Kenny Scudder,
- Mike Easley,
- Edward Smith, and
- Steven Johnson, Ph.D.[12]

SB 14 amended the Utilities Code to authorize electric cooperatives or their affiliates to construct, operate, and maintain fiber-optic cables and other facilities for providing high-speed internet service to their customers using the cooperative's existing electricity easements. The bill set out parameters for the administration of such internet services, including rate setting.[13]

HB 2422 does the following:[14]

1. Amends the Transportation Code to require the Texas Department of Transportation (TxDOT) to provide online notice of ongoing and planned highway

construction projects for which TxDOT will provide voluntary joint trenching opportunities in the state's right-of-way for broadband providers.
2. Authorizes a broadband provider to collaborate with TxDOT to deploy a broadband conduit or other broadband facilities in those rights-of-way.
3. Requires TxDOT to give special consideration to broadband deployment that is likely to improve broadband access in rural or underserved communities.
4. Requires TxDOT to submit to the Legislature an annual report detailing TxDOT's actions in carrying out the provisions of the bill, any gains in broadband speed or access associated with voluntary joint trenching opportunities, and any costs or cost savings to the state, private entities, or end users of broadband services associated with such opportunities.

A fourth broadband related bill, House Bill 2423 (HB 2423), was passed by the Texas House but was not voted on by the Texas Senate.[15] HB 2423 would have created a broadband office and a broadband service investment program.

In 2020, the COVID-19 pandemic has highlighted issues regarding broadband internet in several ways:

1. Broadband internet is a critical tool for city, state, and federal governments, businesses, and households.[16]
2. Business closures and social distancing efforts enhanced the already growing e-commerce economy. According to the Texas Comptroller, in June and July 2020, sales tax collections from e-commerce “rose significantly” in June 2020 and “were up sharply” again in July 2020.[17]
3. According to AARP Texas Director Tina Tran, “broadband can ease social isolation, [support] mobility solutions and enhance access to telemedicine and other services” for Texas’ elderly population.[18]
4. In 2020, many Texas schools have transitioned to virtual classrooms, which has increased the demand for broadband access. According to a survey of Texas educators, “one of every six public school students in Texas does not have access to high-speed internet.”[19] United States Senator John Cornyn of Texas argues that more must be done “to ensure that students across Texas and across the nation have access to reliable broadband.”[20]
5. The U.S. Chamber of Commerce asserts that, “Broadband will be crucial to economic recovery, especially for small businesses.”[21]

<u>Recent Successes</u>

In response to connectivity concerns, Governor Greg Abbott has taken significant strides to address the digital divide across the state since the beginning of the pandemic. In May 2020, Governor Abbott, the Texas Education Agency (TEA), and Dallas Independent School District launched Operation Connectivity, a statewide initiative to deliver internet connectivity and device solutions for school districts, families, and students in Texas. In July 2020, Governor Abbott, Lieutenant Governor Dan Patrick, House Speaker Dennis Bonnen, and other state leaders announced that the State of Texas would allocate $200 million in CARES Act funding to TEA for the

purchase of eLearning devices and home internet solutions to enable remote learning during the COVID-19 pandemic for Texas students who lack connectivity. Governor Abbott said, “As school districts delay the start of in-person instruction for the 2020-2021 school year due to COVID-19, it is essential that we work to provide Texas students with the devices they need to connect and communicate online for classroom instruction.”[22]

In August 2020, Governor Abbott announced that TEA, in partnership with local education agencies, had procured more than one million personal devices and internet WiFi hotspots as part of the State's Operation Connectivity initiative. Governor Abbott stated, “Securing personal devices and WiFi hotspots will help meet the connectivity needs of students across the state,” and emphasized how critical it was for the State of Texas to “close the digital divide and ensure access to virtual education for students who are learning at home.”[23] Furthermore, in October 2020, Governor Abbott issued a statement of support for Senator John Cornyn’s ‘Eliminate the Digital Divide Act’—legislation that would expand broadband access across the country by sending federal dollars to states for the purpose of developing programs that fund broadband projects in underserved areas.[24] Governor Abbott stated that, “at a time when high-speed internet is increasingly important to Texans’ daily lives, it is essential that we continue to expand broadband access throughout the state,” and that Senator Cornyn’s legislation would “offer a strategic path forward to bridge the broadband gap and improve access to high-speed internet for all Texans, especially those in rural or underserved communities.”

III. LESSONS LEARNED[25]

In February 2020, the Pew Charitable Trusts examined state broadband programs nationwide. While it is clear that there is no one-size-fits-all approach for state expansion efforts, some measures that many states have taken are proving effective.

These promising practices are as follows.

Stakeholder outreach and engagement. All states with broadband programs are working to engage stakeholders at both the state and local levels. At the state level, this includes broadband task forces and councils, as well as partnerships among state agencies. At the local level, it includes support for broadband committees and education of local stakeholders.

Policy framework. Many states have created a policy framework for broadband deployment by setting well-defined goals and a clear policy direction in legislation and tasking agencies, or by setting up separate offices to lead statewide broadband programs. These states are identifying and addressing barriers to facilitate broadband deployment in unserved and underserved areas. They are also connecting broadband to other policy priorities, including economic development, transportation, health care, and agriculture, to build partnerships and leverage more funding for expansion efforts.

Planning and capacity building. Half of the states have plans that define goals and objectives that provide a baseline against which to measure progress. Some also support local and regional planning efforts that help educate community members and build the local capacity necessary for successful broadband infrastructure projects. Local and regional planning efforts can help communities identify their needs and goals, start conversations with providers, evaluate options, and move toward implementing infrastructure projects.

Funding and operations. Some states are providing funding to support broadband deployment in unserved areas through grant programs that fund a portion of the cost of deployment in these communities. They are also ensuring accountability by requiring that grantees demonstrate they are providing the service they were funded to deliver while also providing the state with the data needed to evaluate the program and progress toward defined goals.

Program evaluation and evolution. States that are supporting planning efforts and funding infrastructure projects are evaluating the performance of these efforts and incorporating lessons learned. States continue to update program goals and activities as their programs mature, addressing broadband adoption and working to help communities make full use of their broadband infrastructure.

IV. FEDERAL FUNDS

The federal government has several programs administered by the FCC and USDA to help carriers build broadband in high-cost areas. Most of these federally funded grants and loans go directly to providers and other entities, not directly to the states. In 2019, the FCC authorized more than $8.3 billion in funds to support states through its Universal Service Fund.[26] Additionally, through USDA's ReConnect program, more than $744 million in funds have been awarded through March 2020 to support more than 80 broadband projects benefiting more than 430,000 rural residents in 34 states.[27] In February 2020, the USDA announced it would invest $19 million in broadband for rural Texas communities.[28]

Federal Communications Commission (FCC)

Universal Service Fund[29]

The Universal Service Fund (USF) is the largest and most sustained federal funding source for broadband. It is a multi-billion dollar, multifaceted program funded by fees assessed on certain telecommunications providers. Usually these fees end up being passed on to end-user customers. The USF was originally intended to subsidize telephone services to low-income households and high-cost areas. Today, the USF works to implement the principle that all Americans should have access to communications services (i.e. "universal service"). The FCC has established four distinct programs within the USF, including: Connect America Fund, Lifeline, Schools and Libraries (E-rate), and Rural Health Care.[30] All of these programs are coordinated by the Universal Service Administrative Company (USAC), an independent not-for-profit designated by the FCC. In 2019, these programs totaled $8.3 billion in authorized USF support to states.[31]

Connect America Fund[32]

The Connect America Fund (CAF), also known as the High-Cost Program, is designed to ensure that consumers in rural, insular, and high-cost areas have access to modern communications networks capable of providing voice and broadband service, both fixed and mobile, at rates that are reasonably comparable to those in urban areas. The program fulfills this universal service goal by allowing eligible carriers who serve these areas to recover some of their costs from the USF. In 2019, the CAF program totaled over $5 billion in authorized USF support to states.

Lifeline[33]

The Lifeline program provides a discount on phone and internet service for qualifying low-income consumers to ensure that all Americans have the opportunities and security that phone service brings. The Lifeline program is available to eligible low-income consumers in every state, territory, and commonwealth, and on tribal lands. To participate in Lifeline, households must be at or below 135 percent of the federal poverty guidelines or participate in

certain programs like SNAP and Medicaid. In 2019, the Lifeline program totaled nearly $1 billion in authorized USF support to states.

Schools and Libraries (E-Rate)[34]
The Schools and Libraries universal service support program, or the E-rate program, helps schools and libraries obtain affordable broadband.

According to the FCC, “Eligible schools, school districts and libraries may apply individually or as part of a consortium. Funding may be requested under two categories of service: category one services to a school or library (telecommunications, telecommunications services and internet access), and category two services that deliver internet access within schools and libraries (internal connections, basic maintenance of internal connections, and managed internal broadband services). Discounts for support depend on the level of poverty and whether the school or library is located in an urban or rural area. The discounts range from 20% to 90% of the costs of eligible services.” For the Funding Year 2020, the E-rate program has an annual cap of $4.23 billion, but is based on demand.[35] In 2019, the Schools and Libraries program totaled nearly $2 billion in authorized USF support to states.[36]

Rural Health Care[37]
The Rural Health Care Program provides funding to eligible health care providers (HCPs) for telecommunications and broadband services necessary for the provision of health care. The Program aims to “improve the quality of health care available to patients in rural communities by ensuring that eligible HCPs have access to telecommunications and broadband services.”

The Rural Health Care Program has an annual cap of $605 million for Funding Year 2020 and is made up of two programs: the Healthcare Connect Fund and the Telecommunications Program.[38] In 2019, the Rural Health Care Program totaled over $251 million in authorized USF support to states.[39]

Rural Digital Opportunity Fund[40]
On August 1, 2019, the FCC adopted a Notice of Proposed Rulemaking (NPRM) which proposed the establishment of the $20.4 billion Rural Digital Opportunity Fund (RDOF) to bring high-speed fixed broadband service to rural homes and small businesses that lack it. On January 30, 2020, the Commission adopted the *Rural Digital Opportunity Fund Report and Order*, which establishes the framework for the RDOF and builds on the success of the CAF Phase II auction by using reverse auctions in two phases. A reverse auction refers to the process in which providers bid at the prices at which they are willing to sell their service.

Areas eligible for the RDOF include census blocks where no provider is offering service of at least 25/3 Mbps or has committed to offering internet service at this speed via the CAF II auction, the USDA ReConnect program, or state-specific programs.

Broadband DATA Act

On July 16, 2020, the FCC voted to adopt a *Second Report and Order* and *Third Further Notice of Proposed Rulemaking* that sets in motion the rollout of Form 477 modernization and paves the way for better broadband mapping and data from the Commission.[41] These actions followed the passage of the Broadband Deployment Accuracy and Technological Availability (DATA) Act, passed by Congress on March 10, 2020, which set the stage for sweeping reform on how broadband data is collected, verified, and mapped by the FCC. This legislation, according to the FCC, "largely ratified the Digital Opportunity Data Collection's approach to broadband mapping," thus allowing for next steps on the FCC's work towards better broadband maps. As part of the Broadband DATA Act, the FCC is required to issue final rules for collecting granular data from providers regarding the availability and quality of broadband to create publicly available coverage maps, to establish processes for members of the public and other entities to challenge and verify the coverage maps, and to create a common dataset of all locations where fixed broadband internet access service can be installed.

Topics included in the FCC's *Second Report and Order* include how mobile and fixed providers are required to submit their coverage data to the FCC, verification of that data, the creation of broadband coverage maps, and the development of a serviceable location fabric (the Fabric). The geocoded information in the Fabric will serve as the foundation on which all other fixed broadband internet access service availability data is collected. The FCC is required to update the Fabric at least every six months.

In the *Third Further Notice of Proposed Rulemaking*, the FCC requested comments on a number of questions, including what steps are necessary to implement certain provisions of the Broadband DATA Act, and how to develop certain aspects of the Fabric. The *Notice* also asked the extent to which measures already adopted by the FCC meet the requirements of Broadband DATA Act legislation.

The FCC is expected to finalize rules for the Digital Opportunity Data Collection in late 2020.

United States Department of Agriculture

Rural eConnectivity Pilot Program (ReConnect)[42]

ReConnect offers three types of funding options for broadband infrastructure to connect rural families, businesses, farms, ranches, schools, libraries, and public safety facilities to modern, high-speed internet. A rural area is eligible if it currently does not have sufficient access to broadband.

Grants, grant and loan combinations, and low-interest loans can be used for the following:

- Construction or improvement of buildings, land, and other facilities that are required to provide broadband service;
- Reasonable pre-application expenses;

- Acquisition and improvement of an existing system that is currently providing insufficient broadband service (eligible for 100 percent loan requests only); and
- Terrestrial-based facilities that support the provision of satellite broadband service.

Eligible applicants include most state and local governments, federally recognized tribes, commercial internet service providers, nonprofits, small businesses, rural recipients, electric utilities and co-ops, and financial institutions.

Community Connect Grants[43]
The USDA's Community Connect Grants help fund broadband deployment into rural communities where it is not yet economically viable for private-sector providers to deliver service. Rural areas that lack any existing broadband speed of at least 10 Mbps downstream and 1 Mbps upstream are eligible.

The funds may be used for the following:
- The construction, acquisition, or leasing of facilities, spectrum, land, or buildings used to deploy broadband service for:
    - all residential and business customers located within the Proposed Funded Service Area (PFSA), and
    - all participating critical community facilities (such as public schools, fire stations, and public libraries);
- The cost of providing broadband service free of charge to the critical community facilities for two years; and
- Less than 10 percent of the grant amount, or up to $150,000, may be used for the improvement, expansion, construction, or acquisition of a community center that provides online access to the public.

Eligible applicants include most state and local governments, federally recognized tribes, and both nonprofit and for-profit corporations. Matching funds of at least 15 percent from non-federal sources are required and can be used for operating costs.

Distance Learning and Telemedicine Grants[44]
The USDA's Distance Learning and Telemedicine Grants (DLT) help rural communities use the unique capabilities of telecommunications to connect to each other and to the world, overcoming the effects of remoteness and low population density. The program can link teachers and medical service providers in one area to students and patients in another.

Grant funds may be used for:
- Acquisition of eligible capital assets, such as:
    - Broadband transmission facilities,
    - Audio, video, and interactive video equipment,
    - Terminal and data terminal equipment,
    - Computer hardware, network components, and software, and
    - Inside wiring and similar infrastructure that further DLT services;

- Acquisition of instructional programming that is a capital asset; and
- Acquisition of technical assistance and instruction for using eligible equipment.

Eligible applicants include most entities that provide education or health care through telecommunications, including: most state and local governmental entities, federally recognized tribes, nonprofits, for-profit businesses, and a consortia of other eligible entities. Applications are accepted through a competitive process, and applicants are required to provide a minimum 15 percent match. Awards can range from $50,000 to $1,000,000.

Farm Bill Broadband Loans and Loan Guarantees[45]
The Rural Broadband Access Loan and Loan Guarantees Program (Broadband Program) furnishes loans and loan guarantees to provide funds for the costs of construction, improvement, or acquisition of facilities and equipment needed to provide service at the broadband lending speed in eligible rural areas.

Broadband loans provide funding on a technology-neutral basis for financing:
- The construction, improvement, and acquisition of facilities required to provide service at the broadband lending speed, including facilities required for providing other services through the same facilities;
- The cost of leasing facilities required to provide service at the broadband lending speed if such lease qualifies as a capital lease under Generally Accepted Accounting Principles (GAAP); and
- An acquisition, under certain circumstances and with restrictions.

To be eligible for a broadband loan, an applicant may be either a nonprofit or for-profit organization and must take one of the following forms: corporation, limited liability company, cooperative or mutual organization, a state or local government, or Indian tribe or tribal organization.

Eligible area stipulations include:
- Proposed funded service areas must be completely contained within a rural area or composed of multiple rural areas.
- At least 15 percent of the households in the proposed funded service area are unserved.
- No part of the proposed funded service area has three or more “incumbent service providers.”
- No part of the proposed funded service area overlaps with the service area of current Rural Utilities Service (RUS) borrowers or the service areas of grantees that were funded by RUS.
- Communities where USDA’s RUS has previously provided funding for construction of broadband infrastructure may not be eligible.

Telecommunications Infrastructure Loans and Guarantees[46]
The Telecommunications Infrastructure Loans and Loan Guarantees program provides financing for the construction, maintenance, improvement, and expansion of telephone service and broadband in rural areas.

Eligible applicants include most entities that provide telecommunications in qualified rural areas including state and local governmental entities; federally recognized tribes; nonprofits, including cooperatives and limited dividend or mutual associations; and for-profit businesses (must be a corporation or limited liability company).

Funds may be used to finance broadband-capable telecommunications service improvements, expansions, construction, acquisitions (in certain cases), and refinancing (in certain cases).

The types of loans available include:

- Cost-of-Money Loans are direct loans from USDA's RUS;
- Loan Guarantees of up to 80 percent allow private lenders, including the Federal Financing Bank (FFB), to extend credit to qualified borrowers in rural areas; and
- Hardship Loans may be used, at the sole discretion of USDA's RUS, to assist applicants in meeting financial feasibility requirements for applications to serve underserved areas.

Other Federal Activity

FirstNet[47]
The Middle Class Tax Relief and Job Creation Act of 2012 created the First Responder Network Authority, or FirstNet, which is tasked with ensuring the establishment of a nationwide interoperable public safety broadband network. According to the FCC, "the governor of each state may choose to have FirstNet build, operate, maintain, and improve the network within the state (opt-in) or it may choose to build, operate, maintain, and improve its own radio access network (RAN) within the state (opt-out), so long as the network is interoperable with FirstNet's nationwide network and meets the criteria prescribed in the Act."[48]

In March 2017, FirstNet awarded a 25-year contract to AT&T to carry out the work, and in September of that year, FirstNet delivered buildout plans which triggered a 90-day period for states and territories to decide whether to opt in or opt out of the program. As of the December 28, 2017 deadline, no states or territories had chosen to opt out, indicating that all 50 states and the District of Columbia will participate in the network. Texas opted in to the network deployment plan offered by FirstNet in September 2017.[49] In 2018, FirstNet launched nationwide through AT&T.

V. TEXAS UNIVERSAL SERVICE FUND[50]

The Texas Universal Service Fund (TUSF) was originally created by the Texas Legislature in 1987 and has since undergone many changes. TUSF is administered by the Public Utility Commission of Texas (PUC) and oversees an annual fund of approximately $200 to $220 million that supports 11 programs created by the Texas Legislature related to rural, high-cost, educational, and low-income service to ensure that Texans have access to affordable voice services.

The purpose of TUSF is to implement a competitively neutral mechanism to enable telecommunications providers to provide basic local telephone service at reasonable rates in high-cost rural areas of the state. TUSF accomplishes this purpose by providing financial support to eligible telecommunications providers to assist in the provision of basic local telephone service at reasonable rates to customers in high-cost rural areas and to qualifying low-income and disabled customers. Because of low population density and high fixed-network costs, many rural areas of the state simply would not have any service but for TUSF support. It is important to note that state law does not allow the TUSF to fund internet service.

TUSF is funded by a statewide uniform charge or assessment, payable by each telecommunications provider. However, telecommunications providers are allowed to recover the amount of the assessment from retail customers. The assessment is a percentage of each telecommunications provider's actual intrastate telecommunications service receipts. The current TUSF assessment rate is 3.3 percent. Over the years, TUSF high-cost disbursements have shrunk from a high of $572 million in 2006 to $198 million in 2019, excluding administrative expenses.

The two largest programs are the Texas High Cost Universal Service Plan and the Small and Rural Incumbent Local Exchange Company (ILEC) Universal Service Plan. The Texas High Cost Universal Service Plan was established to provide support in markets served by the larger ILECs in Texas. The Small and Rural ILEC Universal Service Plan provides support in the rural markets served by the smaller ILECs.

Current Status of TUSF Funding

- The TUSF surcharge of 3.3 percent of intrastate taxable telecommunications receipts is no longer sufficient to fund the monthly obligations of the TUSF. Currently, the TUSF fund balance is being used to supplement the monthly receipts so that the fund can meet the monthly obligations.
- Even though the fund has shrunk significantly, the intrastate taxable telecommunications receipts have decreased significantly due to the change in the composition of customers' bills by some contributors.
- PUC recently elected not to increase the revenue-based assessment rate and TUSF is expected to be unable to fund programs at current levels in the fourth quarter of 2020.

VI. PROGRESS OF BROADBAND DEVELOPMENT IN UNSERVED AREAS

According to the July 2020 Texas statewide broadband availability estimates by speed tier (Table 1), provided by Connected Nation (CN) Texas, approximately 96.27 percent of households in Texas have access at 25/3 Mbps.[51] However, at least 333,071 households remain unserved at the minimum speed considered broadband.[52] This means an estimated 926,859 Texans do not have access to broadband at home, which prevents them from being able to telework, have access to virtual schooling for their children, or be able to take advantage of telemedicine appointments.

Table 1

Texas Statewide Broadband Availability Estimates by Speed Tier Among Fixed Technologies: Cable, DSL, Fiber, Fixed Wireless			
Speeds	Unserved Households	Served Households	Percent of Households Served
10 Mbps Download x 1 Mbps Upload	121,134	8,801,799	98.64%
25 Mbps Download x 3 Mbps Upload	333,071	8,589,862	96.27%
50 Mbps Download x 5 Mbps Upload	566,253	8,356,680	93.65%
100 Mbps Download x 10 Mbps Upload	1,026,071	7,896,862	88.5%

The current FCC definition of broadband is a minimum speed of 25 Mbps download and 3 Mbps upload.
Help improve the maps: https://connectednation.org/texas/feedback
Source: *Connected Nation Texas, July 2020.*

According to the Texas rural broadband availability estimates by speed tier (Table 2), approximately 297,032 of these homes are in rural Texas. This means an estimated 823,920 rural Texans do not have access to broadband at home. This also means that approximately 100,000 urban Texans do not have access to broadband. Texas' rural population represents approximately 90 percent of all Texans without broadband access.

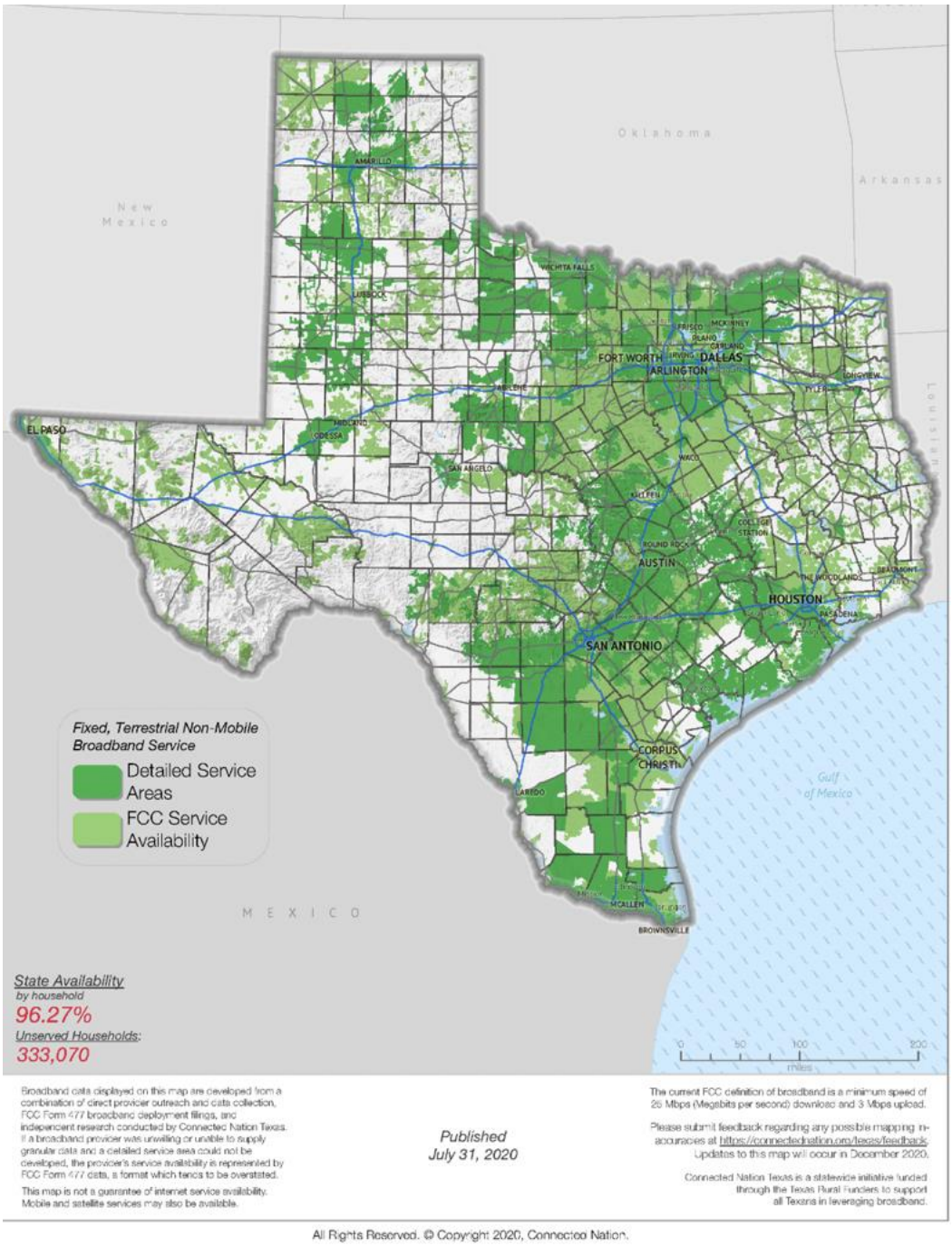
Table 2

RURAL Texas Statewide Broadband Availability Estimates by Speed Tier Among Fixed Technologies: Cable, DSL, Fiber, Fixed Wireless			
Speeds	Unserved Rural Households	Served Rural Households	Percent of Rural Households Served
10 Mbps Download x 1 Mbps Upload	90,431	2,816,192	96.89%
25 Mbps Download x 3 Mbps Upload	297,032	2,609,591	89.78%
50 Mbps Download x 5 Mbps Upload	524,174	2,382,449	81.97%
100 Mbps Download x 10 Mbps Upload	908,484	1,998,139	68.74%

The current FCC definition of broadband is a minimum speed of 25 Mbps download and 3 Mbps upload.
Help improve the maps: https://connectednation.org/texas/feedback
Source: *Connected Nation Texas, July 2020.*

Figure 1 provides a visual representation of where broadband service with speeds of at least 25/3 Mbps is available throughout the state. Many rural areas of Texas are shown to not have access to broadband.

Figure 1:
Broadband Service with Speeds of at Least 25/3 Mbps[53]



Broadband Data Collection Methodology

Broadband providers are required to file with the FCC a list of census blocks covered by their services twice annually. Under this current census block methodology, if even one household in a given block is served, the entire block is marked as having service. In rural areas, these blocks can be extremely large, increasing the likelihood of an overstatement of service in the very areas that need help the most. For example, nationally, there are more than 3,200 census blocks that are larger than the entire District of Columbia (68 square miles in area) and five blocks that are larger than the entire state of Connecticut (5,567 square miles in area). Additionally, broadband providers that do not have geographic information system (GIS) capabilities are not able to visualize the spreadsheet-based file of census block IDs being filed through the FCC's Form 477 process to ensure accuracy, resulting in overstated and/or understated coverage reporting. Additionally, some providers are simply missing from the Form 477 dataset entirely. Fixed wireless coverage is also reported as full census blocks, instead of service areas developed from propagation modeling, as was produced during the National Telecommunications and Information Administration's (NTIA) State Broadband Initiative program (2010-2014). The FCC continues the problematic use of census blocks as the unit of measure for reporting, and thus accepts the well-established and inherent overstatements and understatements that such reporting yields.

CN Texas employs a confidence methodology to identify areas that are likely to be overstated and attempts to work with providers in those areas to refine their coverage areas. However, there is no requirement for broadband providers to offer more granular data. Some broadband providers in Texas are more willing than others to offer more granular data or refine their coverage areas. Finally, CN Texas also conducts on-the-ground field validation of broadband coverage and wireless availability when possible. Drive testing and field validation offer an opportunity to reduce overstatement and create a more accurate map; however, this process is time and resource intensive. Data displayed in map form and as tabular data is developed from a combination of direct provider outreach and data collection, FCC Form 477 filings, and independent research conducted by CN Texas. As such, broadband availability at an exact address location cannot be guaranteed, and the aggregate household availability statistics are estimates made using the most up-to-date and accurate information available.

VII. BARRIERS TO BROADBAND ADOPTION AND DEPLOYMENT[54]

Broadband internet service has become a virtual necessity for modern life, from education to health care to workforce readiness. While the need for access is ubiquitous around the state, the same cannot be said of broadband availability. The sheer size of the state creates unique challenges to bridging the digital divide. The Internet has been shown to effectively bridge geographic and socio-economic barriers, which historically have caused limited access to health care, education, and social services, helping increase access to these services for even the most rural areas of the state. As such, it can be argued that rural households in Texas stand to gain the most from broadband internet while also being the least likely to have access to it. Closing this digital divide will require creative approaches to remove the barriers inhibiting investment in and deployment of broadband infrastructure across rural areas of the state.

The Barriers to Broadband Development Subcommittee of the Governor's Broadband Development Council researched and identified several primary barriers to broadband development in Texas: (1) Regulatory, Economic, Market, and Technical Factors; (2) Lack of Collaboration/Transparency; (3) Insufficient Statewide Coordination; and (4) Low Rate of Adoption.

(1) Regulatory, Economic, Market, and Technical Factors

Perhaps the most common barriers to deployment are market demand and the economics of population density. Since broadband infrastructure and related technologies are often driven by consumer and commercial markets, in many rural and unserved areas of Texas there is insufficient market opportunity for internet service providers (ISPs) to be profitable, given the large investment required to build the infrastructure. Without strong economic incentives, ISPs have disincentives to offer affordable rates for commercial and residential broadband adoption in those areas.

Building broadband infrastructure in areas where people live a larger distance apart costs significantly more than building infrastructure to serve the same number of people in an urban setting. As such, highly rural areas, which generally have low population density, can be costly to serve. Consequently, densely populated and more urbanized locations are more likely to have access to broadband service than less densely populated and rural locations.[55]

Another significant barrier which compounds the issue of low market demand are "backhaul" costs. These are generally higher for rural areas and can affect the deployment of broadband networks in these areas. Backhaul refers to the transmission of information or data from any of a company's aggregation points to an Internet backbone provider that will then transmit that data to any point on the Internet. This is also sometimes referred to as the "middle mile." Internet traffic originating from rural areas may need to travel a long distance to a larger city to connect to a major Internet backbone provider. Because the cost of transmitting over this distance can be high, one stakeholder noted that backhaul costs are another barrier to deployment in rural areas.[56]

Texas' varied terrain can also serve as a multiplier to the previously discussed barriers. Buildout is more expensive in mountainous and forested areas and less expensive in flat terrain. Similarly, terrain has a significant effect on the efficacy of wireless technologies, particularly those requiring line of sight and satellite connectivity. Regulatory barriers, such as restrictive or burdensome local and state permitting processes, can unnecessarily delay broadband buildouts, slow transitions from legacy networks and services to the next generation networks, and impede wireless infrastructure projects to deploy advanced networks.[57] High costs and lengthy processes for utilizing facilities along the path of deployment can also prove problematic.

(2) Lack of Collaboration/Transparency

There currently exists a lack of awareness—perhaps fueled by insufficient data—around existing middle-mile infrastructure, particularly as it relates to "dark fiber." Dark fiber is a term used to describe unused fiber-optic cable. A more complete data set surrounding existing dark fiber could prevent unnecessary duplication of work and assist stakeholders in planning investments in broadband infrastructure.

(3) Insufficient Statewide Coordination

Previous broadband development efforts in Texas, including federal initiatives, have predominantly focused on infrastructure development, which incentivized ISPs to build infrastructure capacity. These efforts were an important and necessary step, but alone, do not facilitate adoption and usage.

Additionally, many prior initiatives were limited to specific industries, such as education, government, or health care. While these efforts were beneficial in assisting those specific industries, they were not sufficiently widely coordinated to avoid the duplication of effort, and therefore negatively impacted long-term sustainability.

Previous initiatives have focused on a single approach, such as Telecommunications Infrastructure Loans for infrastructure build-out, or reducing rates for subscription via federal programs like E-rate for schools and libraries. While each of these initiatives have been successful in their own way to varying degrees, they have collectively lacked a holistic approach to address the spectrum of broadband barriers across the state.

Given the vast geographic area of Texas, the technical complexities of infrastructure, and the need to holistically develop both access and adoption, Texas would benefit from better coordination across the state. The absence of both cohesive, statewide development plans as well as a statewide broadband office with dedicated staff to coordinate efforts in Texas have contributed to the previous broadband initiatives failing to reach the potential they could have with greater policy and funding coordination.

The research suggests that greater statewide coordination will support better collaboration between stakeholders, creating a more cohesive statewide effort to increase deployment of broadband infrastructure.

(4) Low Rate of Adoption

Another barrier to broadband development has to do with the key differences between broadband *access* and broadband *adoption*. Previous broadband development efforts in Texas have connected the bulk of communities through anchor institutions such as schools and libraries, but in many areas, *access* to broadband is only the first piece in a larger picture to ensure *adoption* of the available service.

Even when broadband infrastructure has expanded, Texans have been slow to adopt the technology.[58] Not all communities have the financial means to access high-speed internet services. For some it is too expensive, and others do not have access to a computer, or they lack digital literacy. There are also individuals who have learned, or chosen, to live without internet.

Broadband adoption declines as age increases. Many elderly Texans view internet access as having little value, which may be attributed to a lack of comfort using the technology (digital literacy) or the high price of broadband service (affordability). As income declines, so does the broadband adoption rate.[59] The more elderly and lower-income the population, the harder it is to achieve broadband adoption.[60] Rural Texas residents tend to be more elderly and have lower income than their urban counterparts. Rural, elderly, and low-income populations of Texas also have limited opportunities to increase their digital literacy. A lack of digital literacy skills and an inability to navigate digital information present a barrier to adoption.

Therefore, one of the key barriers for broadband adoption is that previous infrastructure deployment efforts focused solely on making service available rather than a holistic approach that included the necessary components of adoption and utilization. Adoption strategies are distinct from deployment strategies and must be considered independently to give each issue sufficient attention.

VIII. TECHNOLOGY-NEUTRAL SOLUTIONS TO OVERCOME IDENTIFIED BARRIERS

Types of Broadband Connections[61]

There are many different technologies used to deliver broadband, but what is available to a particular subscriber is highly dependent on terrain. Texas is a large state with different communities that are separated by both great distances and dramatically different terrain, from the piney woods of East Texas to the rocky terrain in Central and West Texas and everything in between. Types of broadband connections include several high-speed transmission technologies such as:

- Digital Subscriber Line (DSL)
- Cable
- Fiber
- Wireless
- Satellite

The broadband technology chosen by a subscriber will depend on a number of factors. These may include whether the home or business is located in an urban or rural area, how broadband internet access is packaged with other services (such as voice telephone and home entertainment), price, and availability.

Digital Subscriber Line (DSL)

DSL is a wireline transmission technology that transmits data faster over traditional copper telephone lines already installed to homes and businesses. DSL-based broadband provides transmission speeds ranging from 1 Mbps up to 100 Mbps.[62] The availability and speed of DSL service may depend on a home or business's distance to the closest telephone company facility.

Cable

Cable internet service provides broadband using the same coaxial cables that deliver sound and video to cable television subscribers. Transmission speeds vary depending on the type of cable modem, cable network, and traffic load.

Fiber[63]

Fiber-optic technology converts electrical signals carrying data to light and sends the light through transparent glass fibers about the diameter of a human hair. The biggest difference between fiber and all other internet types is speed. Fiber is faster and will typically outperform DSL, cable, fixed wireless, and satellite connections.

However, due to cost, having a fiber connection to every home or business may be not be possible. A majority of homes and businesses can be fully served by other existing technologies as the final connection point.

There are various methods of using fiber technology. First, fiber can be used all the way to the customer's home or business, which is known as fiber to the premises (FTTP). Second, fiber to the curb (FTTC) can be used to connect a customer indirectly by

running fiber to a “distribution point generally within 1,000 feet” from the customer’s premises. From there, lines from the distribution point then run to the home or business. Fiber-optic service speed can vary, depending on how the “last mile” of service enters the premises.[64]

Wireless[65]
Wireless broadband connects a home or business to the Internet using a radio link between the customer’s location and the service provider’s facility. Wireless technologies using longer-range directional equipment provide broadband service in remote or sparsely populated areas where DSL or cable modem service would be costly to provide. Wireless speeds are generally comparable to DSL and cable modem service. An external antenna is usually required, and wireless broadband can be mobile or fixed.

Mobile broadband internet transmits data through radio waves from cellular towers to deliver an internet signal without using cables.[66] Air cards, SIM cards, “my-fi” devices, and “Wi-Fi” cards are also used to receive mobile broadband. Mobile wireless internet access makes email access and web searching possible at residences that have no DSL, cable, or fixed wireless alternatives.[67] According to a 2019 Pew Research Center study, approximately 37 percent of Americans mostly use a smartphone to go online.[68]

Fixed wireless broadband is a method of delivering Internet connection to consumers over the airwaves. This is accomplished via radio waves from an access point (usually mounted on a tower) to reception dishes at consumer residences. Similar to DSL and cable Internet, fixed wireless is a “last mile” technology that bridges the relatively short gap between the mainstream internet “backbone” and consumer residences. Fixed wireless can deliver gigabit connection speeds rivaling fiber connections.[69]

Satellite[70]
Just as satellites orbiting the earth provide necessary links for telephone and television service, they can also provide links for broadband. Satellite broadband is another form of wireless broadband, and is also useful for serving remote or sparsely populated areas.

Downstream and upstream speeds for satellite broadband depend on several factors, including the provider and service package purchased, the consumer’s line of sight to the orbiting satellite, and the weather. Typically a consumer can expect to receive (download) at a speed of about 500 Kilobits per second (Kbps) and send (upload) at a speed of about 80 Kbps. These speeds may be slower than DSL or cable modem service, but they are about 10 times faster than the download speed with dial-up internet access. Service can be disrupted in extreme weather conditions.

Low Earth orbit (LEO) satellites are able to provide fast, low-latency backhaul connectivity to areas that remain unserved by terrestrial middle-mile deployments. Unlike traditional geostationary satellites which are located more than 22,000 miles above the Earth’s surface, LEO satellites orbit only 1,200 miles above Earth’s surface.

Given their closer proximity to Earth, LEO satellites are able to offer faster data speeds, but thousands more satellites are needed to ensure coverage. LEO satellites could be a solution to bridge the digital divide, as they would be able to reach remote parts of the country with high-speed data connectivity. While LEO satellites' launch costs are much cheaper than geostationary satellites, their ground costs are higher.

Technology-Neutral Solutions to Consider

Digital Literacy Training

While high-speed transmission technologies are needed to overcome the identified development barriers for broadband access, implementation of digital literacy training can assist with broadband adoption. Digital literacy is the ability to use a computer or other handheld devices for a wide variety of applications, such as telemedicine, banking, and social media interaction. A holistic approach to broadband deployment that includes adoption and education components would benefit Texans.

No single technology can effectively deploy broadband across the vast geography and diverse communities of Texas. However, libraries across the state could serve as anchors for this holistic approach by training and educating their communities in digital literacy. They might be able to set up programs to lend equipment, such as Educational Broadband Service receivers or even tablets and other end-user devices. Libraries could also serve as partnering institutions for connectivity to local government, businesses, and the community at-large in reaching the "last mile" of service access and adoption. Leveraging statewide coordination of libraries and other educational entities would help improve digital literacy across the state.

Broadband Ready Community Designations

The State could promote broadband investment in local communities by publicly recognizing communities that have established low barriers for entry. Communities could be awarded a "broadband-ready community" designation, thus making providers aware that many burdensome and prohibitive barriers for investment have been eliminated. Additionally, the designation could encourage other communities to follow suit in order to attract future investment.

IX. BENEFITS TO STATEWIDE ACCESS TO BROADBAND

The Governor's Broadband Development Council was tasked by the Legislature to look at how broadband benefits the State of Texas in the five following areas: (1) economic development; (2) the delivery of educational opportunities in higher education and public education; (3) state and local law enforcement; (4) state emergency preparedness; and (5) the delivery of health care services, including telemedicine and telehealth. The five designated benefits are just the tip of the iceberg when it comes to statewide broadband access.

(1) Economic Development

Statewide access to broadband will increase economic opportunities by allowing access to a worldwide market. The ability to efficiently and effectively advertise, communicate, and inform relies upon a network that is fast and reliable. In today's markets, many sales are made because the seller is able to communicate in real time with a potential buyer who is shopping or comparing services. A fast and reliable broadband network also allows for the expansion of distribution points, which reduces shipping time and costs, all the while creating and/or sustaining jobs and more economic opportunity. The ability to access broadband statewide also creates the ability to telework for large groups of people, thus reducing traffic congestion, pollution, and wasted hours stuck in traffic. It also means that in the future, many Texans will be able to live further away from city centers and urban areas because they can work from home instead of commuting to an office. This could lead to the economic development of smaller communities that are not located near large cities.

Broadband access in rural areas will also enhance precision agriculture practices and could provide incentives for young people to remain in or return to their rural community for career opportunities. Precision agriculture practices can lead to lower fuel costs because of the efficiency of GPS tracking of tractors and the ability to control irrigation pivots and drip stations from smart phones, tablets, and computers.

Regarding Texas entrepreneurship, it is important to recognize that broadband access will enable both rural and urban households to access and participate in e-commerce by either purchasing or marketing and selling services and products. For example, in connection with the benefits of precision agricultural practices, farmers can use the savings as a result of broadband access to assist their families in establishing businesses that can be marketed through the use of broadband technology. Broadband access can also be used to market agriculture products; whether it is live cattle, vegetables, or other products, the market increases with statewide broadband access.

Broadband access is an intricate part of the infrastructure needed for economic development, both in urban and rural locations.

(2) The delivery of educational opportunities in higher education and public education

Just as broadband access aids economic development, it can also provide educational opportunities outside the traditional classroom. For example, it might allow a teacher to work on a master's degree from home instead of spending extra time and resources travelling back and forth to attend in-person classes. Additionally, it might allow for a student in a small school district to take an Advanced Placement class not provided locally.

The current pandemic has shown the importance of broadband access with regards to consistent broadband-based educational services for both K-12 and higher education. Without broadband access, slow download and upload speeds impede many of the educational opportunities that rely on interactive learning. For example, a lesson that should take 15 minutes, but stretches into two hours due to connectivity issues, leaves less time for other lessons.

(3) State and local law enforcement and (4) State emergency preparedness

The benefits of broadband access to state and local law enforcement and state emergency preparedness are interconnected. The access to statewide broadband can allow local and state law enforcement agencies to communicate and keep each other aware of situations ranging from severe weather events, protests, and major crime occurrences, to locating offenders that are a threat to the safety of the public by the use of in-car computer systems.

It can also allow local and state law enforcement to communicate with members of the State's emergency management division during major occurrences, not limited to just severe weather, wildfires, and other natural disasters. Statewide access can allow the officers on scene to communicate needs, dangers, and potential hazards via in-car computers. The use of the in-car computers during an event can set the groundwork for what resources are needed and where they are needed.

(5) The delivery of health care services, including telemedicine and telehealth

The benefits of broadband access in the delivery of health care to Texas living in rural areas cannot be overstated. Hospitals are required to have electronic health records and bill electronically. In order to ensure accuracy, the medical records have to be reviewed by medical record coders who are often not in the rural community. Radiology scans are interpreted by radiologists who often work remotely. Real time sharing of records means the hospitals must have dependable, high-speed electronic communications.

In the current pandemic, access to telemedicine can limit the unnecessary contact between patients and their doctors, thereby lowering the risk of infection and keeping patients and providers healthier.[71] In many rural areas, access to telemedicine is

especially important for older residents who have limited mobility and limited access to public transportation.

As rural communities struggle to recruit and retain physicians, there is a more frequent use of Advanced Practice Practitioners (APPs) who are Advanced Practice Registered Nurses and Physician Assistants. In the most rural parts of Texas, these APPs support the physicians who are practicing. This support and supervision can be of any physician on staff at the hospital, so it is not limited to a physician practicing in the community. Thus, telemedicine provides some relief for the very few physicians who actually practice in very rural Texas communities.[72]

Additionally, telemedicine allows for tele-hospitalists to care for in-patients. This allows critically ill patients to be cared for closer to home, and allows the local hospital to get the revenue this care generates.[73]

Smaller, rural hospitals typically have a limited number of medical staff and specialists. Their physicians are often family practice or internal medicine physicians who are called on to provide a full scope of care, especially in the emergency room. Broadband can provide access to specialists for consultation.

This is especially critical in the emergency room where a family practice physician may go years without intubating a patient and then have multiple intubations in a single night. Having Board-Certified emergency medicine physicians to assist via telemedicine greatly enhances the chances for a positive outcome. In view of this, the Texas Department of State Health Services revised the requirement for Level 4 Trauma Hospitals to allow for the use of telemedicine to support APPs when they are working in the emergency department.

The ability to administer mental health services via telehealth can lead to better quality of life for the many Texans who suffer from mental illness. During the pandemic, the United States has seen a dramatic increase in the suicide rate.[74] Telemedicine could be an essential factor that may save the lives of many Texans needing mental health support during this time.

“Total wellness” not only relies on telemedicine and telehealth, but on the continued access to social interaction.[75] Internet access can help individuals overcome social isolation brought on by the pandemic, or other factors. It can assist in maintaining the mental and social health of elderly Texans by allowing them to have virtual contact with others while social distancing. Affordable, reliable high-speed internet access is important to enable all Texans to enhance their quality of life.

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