UTAH BROADBAND CENTER
CONNECTING UTAH

Utah Education and Telehealth Network (UETN)
LOCAL BROADBAND PLAN

Table of Contents

Executive Summary ..... **iii**

1 Overview of the Local Broadband Plan **1**

1.1 Vision **1**

1.2 Goals and Objectives **2**

1.2.1 Obtain or produce an accurate and anonymized list of unserved and underserved student locations. 3

1.2.2 Obtain or produce a map of the closest broadband service provider network endpoints in areas identified as unserved/underserved. 4

1.2.3 Create gap analysis with partners and identify potential technological solutions. 5

1.2.4 Work with partners to identify potential financial models that leverage multiple state and federal programs for providing services. 6

2 Background **6**

2.1 Scope of Broadband Plan **6**

2.2 What is Broadband? **7**

2.2.1 Broadband Network Distribution 8

2.2.2 Types of Broadband 8

2.2.3 Benefits of Broadband 10

3 Current State of Broadband and Digital access **11**

3.1 Methods to Determine the Current State of Broadband **11**

3.1.1 Public Outreach 12

3.1.2 Public Surveys 14

3.1.3 Internet Speed Tests 15

3.1.4 Stakeholder Meetings 16

3.1.5 Internet Service Provider Meetings 17

3.1.6 Existing Assets Assessment 18

3.1.7 Disparity Analysis and Geographic Information System (GIS) Mapping 19

3.2 Existing Resources **20**

3.3 Partnerships **22**

3.4 Asset Inventory **24**

3.4.1 Broadband Availability 24

3.4.2 Digital Access 25

3.4.3 Broadband Affordability 27

3.5 Needs and Gaps Assessment **27**

3.5.1 Broadband Availability 27

3.5.2 Digital Access 34

3.5.3 Lack of representation from USBE's Career & Technical Education program and Utah Department of Workforce Services 36

3.5.4 Broadband Affordability 36

4 Obstacles or Barriers **37**

4.1 Geography That Impedes High-Speed Internet **38**

4.2 Misalignment Regarding Key Data Repositories and Common Processes 38
4.3 Incomplete FCC Fabric Data.....39
4.4 Gaps in Available and Affordable Service 40
4.5 Lack of Broadband service provider Fiber Information.....41
4.6 Inconsistencies of Student User Experience 41
4.7 Lack of Advocacy for Students and their Network Challenges.....42
4.8 Student Data Privacy Concerns 44
4.9 Overloaded Education IT Staff and Library staff.....45
5 Implementation Plan.....46
5.1 Priorities.....46
5.2 Planned Activities.....47
5.2.1 Bonneville Internet Speed Week—A Speed Testing Push 47
5.3 Key Execution Strategies.....48
5.3.1 Obtain or produce an accurate and anonymized list of unserved and underserved student locations.....48
5.3.2 Obtain or produce a map of the closest network endpoints in areas identified as unserved/underserved. 49
5.3.3 Complete gap analysis with partners and identify potential technological solutions...50
5.3.4 Work with partners to identify potential financial models that leverage multiple state and federal programs for providing services. 52
5.3.5 Identify available last-mile technologies for different student use cases. 54
5.4 Ongoing Stakeholder Engagement 56
5.5 Estimated Timeline for Universal Service.....59
5.6 Estimated Cost for Universal Service 61
5.7 Alignment.....63
5.8 Technical Assistance 64
6 Conclusion 65
Appendix A: Glossary of Terms.....66
Appendix B: Infographics.....74

EXECUTIVE SUMMARY

Imagine a high schooler on the Navajo Nation Reservation in San Juan County. He wants to be the first person in his family to attend college. But he's been struggling to upload his university application for hours because the internet connection at his remote home is spotty.

Imagine a middle schooler living in central Utah. It's a snow day, so she has to use a videoconferencing app for school today. Her mom lent her a mobile phone to try to call in, but between the bad Wi-Fi and her difficulty with the app, she can't participate in her favorite class.

Imagine an elementary school student living on the Wasatch Front. She knows she's supposed to turn in an assignment about ancient Egyptians tomorrow, but she and her mom are going to have to sleep in their van tonight, and she doesn't know how she can do any research, much less download the worksheet she's supposed to fill out.

These are three stories among thousands—among 43,000 Utah students who don't have access to broadband internet at home.

Since March 2020, when the COVID-19 pandemic shut down schools throughout the state, the delivery of education to Utah students changed permanently: **access to high-speed internet is required, and many students do not have it**. Technologies including videoconferencing, online homework submissions, collaborative writing tools, mobile device access to education resources, and peer/team messaging—just to name a few—went from a convenience to a necessity in less than a year.

Since COVID-19, this change in student expectations is reflected in the traffic on the Utah Education and Telehealth Network (UETN) which has increased by 33 percent. These innovations in educational delivery because of technology, albeit unexpected, have been transformational. However, as many as 43,000 students throughout the state still have either no access or underperforming access.

The move toward greater technology use in education was well underway before 2020. Initiatives like "one-to-one devices" in Utah and "Reimagining the Role of Technology in Education" nationally were largely aspirational. The pandemic hastened those aspirations into reality—an unsure reality as snow days turned into remote learning days and everyday education continues to integrate technology into normal educational delivery. However, a gap persists: thousands of students in Utah still don't have the now-expected access to reliable broadband internet to successfully perform academically, participate adequately in extracurricular opportunities, and ultimately access necessary resources to achieve their college and career goals. Bridging this "homework gap," as Federal Communications Commission (FCC) Chairwoman Jessica Rosenworcel calls it, is the **only** way the state can provide an equitable public education opportunity to every student.

UETN is dedicated to bridging this gap. The core of UETN's statutory mission is to "provide high-quality, cost-effective internet access for schools on behalf of public and higher education."

That mission now extends beyond the walls of schools and into the homes of students and their families. UETN fully values its critical partner relationships with other public entities and broadband internet service providers. We hope to leverage these partnerships to expand broadband access, harness new innovation, and continue providing reliable access to those critical educational and career opportunities to enable Utah's workforce of tomorrow.

To fulfill this mission, we submit the current planning grant in support of—and to inform funding tied to—grant opportunities funded by the Infrastructure Investment and Jobs Act (IIJA), to include the Broadband Equity, Access, and Deployment (BEAD) Program. This planning grant will establish a standardized methodology to equitably address the most acute barriers to reliable broadband internet for Utah students, comprised of the following objectives:

- Identify locations of unserved/underserved students and families.
- Develop a representative map associated with those locations to identify gaps and solutions.
- Work with partners and leverage programs to resources to expand reliable broadband services.
- Tailor last-mile solutions for student needs.

UETN has a big vision and an ambitious plan, but with funding it is achievable to get broadband internet to every student who needs it. The following table sketches the overview of our plan, and we share details about each section in the rest of the proposal.

VISION	**Every Utah student has equitable access to broadband internet that is accessible, affordable, and reliable.**

	Geography	**Collaboration**	**Information**	**Affordability**
KEY BARRIERS	Utah's geography is expansive and rugged, and remote households make wired connections an expensive challenge.	If a large number of agencies and broadband service providers compete instead of collaborating, some efforts will be duplicated while other communities are missed.	Basic data barriers keep stakeholders from accessing good data that can enable provider and state leaders to make the most effective use of limited resources.	Affordable internet remains a major barrier for many Utah families.

COVERED POPULATIONS	UETN works to provide equitable internet access to every student in Utah, from K-12 through higher education, including adults through nontraditional programs like continuing education and vocational rehabilitation. This population is large, diverse, and widespread. A variety of students are unserved across those demographics, meaning they have no access to broadband at all, and some students are underserved, meaning they have access, but it fails to meet the FCC's 100/20 Mbps minimum standard.			
GOALS	**Generating and Gathering Data** Synthesize two primary types of reliable data from authoritative sources, statewide: student location information and broadband availability.	**Performing Gap Analysis** Identify and prioritize the most acute gaps in reliable broadband service to the homes of Utah students and their families.	**Coordinating Teams** Utilize existing partnerships and the leadership of the Utah Broadband Commission and supporting the Utah Broadband Center to formalize this analysis.	**Providing Access** Leverage state leadership to prioritize and assign resources—public, private, at all levels (local, state, national, etc.)—to design initiatives that address prioritized gaps.
KEY STRATEGIES	Obtain or produce an accurate and anonymized list of unserved/underserved student locations and the closest network endpoints in areas identified as unserved/underserved.	Complete gap analysis with partner agencies and broadband service providers and identify potential technological solutions.	Work with partners and providers to identify potential financial models that leverage multiple state and federal programs for providing services.	Identify viable last-mile technologies for hard-to-reach locations and individual student use cases.

1 OVERVIEW OF THE LOCAL BROADBAND PLAN

1.1 VISION

The Broadband Equity, Accessibility, and Deployment (BEAD) program, part of the Infrastructure Investment and Jobs Act (IIJA), sets an ambitious goal—getting access to affordable, reliable, high-speed internet service for every American by 2030.[1] This program will use a combination of federal funding and state-based efforts to achieve that goal. This infrastructure investment is intended to pay dividends for our economy, our health-care system, and our schools.

Perhaps no other sector will be as positively affected by the program as education. The COVID-19 pandemic brought into sharp relief the critical and painful gap between those students who have access to reliable, high-speed internet and those who do not. While rural areas are disproportionately affected by this gap, coverage gaps exist in all areas of Utah because high-speed internet is not affordable for all families, even in heavily urbanized areas. We have identified two populations that require particular attention: students who have no internet at all (unserved) and students who live in situations where multiple adults and/or children are sharing inadequate bandwidth (underserved). IIJA funds will help us close this gap for unserved and underserved households, but the effort will require ingenuity and cooperation by multiple state and local agencies.

Since 1996, the Utah Education and Telehealth Network (UETN) has worked to provide education-related network connectivity to every school in the state of Utah. From kindergartners accessing reading software to high school seniors investigating career and college opportunities, we have three decades of experience connecting students to the resources they need. The core of UETN's statutory mission is to "provide high-quality, cost-effective internet access for schools on behalf of public and higher education," and we recognize that now it extends to helping local education agencies (LEAs) provide broadband access to students' homes when they cannot access broadband any other way.

During the school shutdowns for COVID-19, UETN and LEAs found a variety of ways to extend school networks to connect students outside of school campuses and normal operating hours in support of remote learning mandates. For example, school buses outfitted with Wi-Fi were deployed to neighborhoods with limited home internet availability, and in other cases LEAs provided mobile hot spot devices or private wireless networks (PLTE) for unserved and underserved homes.

[1] https://www.whitehouse.gov/briefing-room/statements-releases/2023/06/26/fact-sheet-biden-harris-administration-announces-over-40-billion-to-connect-everyone-in-america-to-affordable-reliable-high-speed-internet/

Even though collaborations with the Utah Department of Transportation (UDOT) and broadband service providers such as members of the Utah Rural Telecom Association (URTA) both provided innovative expansion of remote classroom capabilities, more than 43,000 Utah students (approximately 8 percent of all students) still have no reliable connection to school networks or remote learning opportunities at the federally defined minimum broadband speed of 100 Mbps upload/20 Mbps download.

While the COVID-19 crisis required innovative solutions to deliver temporary internet services to all Utah students, the shutdowns just accelerated a trend that was already underway—an increasing reliance on technology for students learning at home. UETN's mission requires us to help LEAs establish permanent solutions that will provide high-speed internet access to every student in Utah to support their educational needs.

As a result, one of UETN's ongoing efforts is to formalize SchoolNET, a mediated internet model that in the ideal deployment, mirrors the experience students receive in the classroom. When a student accesses SchoolNET from home, they should be able to use all the software available to them as if physically at school. Similarly, their browser online activity is restricted to prevent access to inappropriate material. This kind of access is essential for remote learning in underserved and unserved broadband areas in particular. SchoolNET looks a little different for each student because it extends the learning materials available at the local school or LEA, but the functionality is consistent from student to student.

To make sure students can access SchoolNET, UETN first seeks to work with private fiber broadband providers and then private wireless broadband providers. If those options cannot provide available, affordable, and reliable broadband, we look for other solutions, and we have developed a variety of solutions in concert with LEAs throughout the state. San Juan School District, for example, developed its own wireless network to extend SchoolNET to the more than 600 students living on the Navajo Nation reservation. Other times we help LEAs deploy single towers that supply wireless broadband to a given area so that SchoolNET can reach students there. Although we support and encourage the efforts of private companies to provide critical fiber infrastructure, SchoolNET provides a bridge for students and their families who cannot currently access high-speed broadband networks.

Our vision is for every student in Utah to have access to broadband internet so that they can participate equally in the education their LEAs offer. With help from the Utah Broadband Center (UBC), we believe we can make this vision a reality.

1.2 GOALS AND OBJECTIVES

To create a road map to this vision, UETN and its public and private partners have engaged in several preliminary efforts:

- Meeting with local and state agencies to gather accurate unserved/underserved student statistics

- Exploring how to obtain accurate broadband network endpoint data in relevant areas
- Exploring potential financial models which make use of existing state and federal programs
- Researching and prototyping alternate last-mile network technology options

These meetings, explorations, and discussions have led to the following plans:

- Create a list of unserved/underserved student locations.
- Create a map of UDOT/UETN/broadband service provider network endpoints.
- Identify gaps between student needs and provider fiber locations as well as reasonable to-the-home solutions.
- Work with partners to leverage the Affordable Connectivity Program (ACP) and other financial[2] programs to provide services.
- Tailor last-mile solutions for different student needs.

The remainder of Section 1 explores the details of these objectives and how we will achieve them.

1.2.1 Obtain or produce an accurate and anonymized list of unserved and underserved student locations.

Challenge: Different sources of data report different numbers of unserved and underserved students and households. Specifically, the Federal Communications Commission (FCC) Broadband Serviceable Location Fabric (Fabric) map data does not match the 2022 Census block data.

Objective: Prioritize an anonymized list of unserved/underserved locations based on the best data available from LEAs and the Utah state education system.

Detail: One of the largest and most immediate challenges we face is accurately determining the granular details of the broadband gap. The latest 2022 US Census data for Utah, the official FCC Fabric, and the UETN K-12 Technology Inventory all produce inconsistent numbers of unserved and underserved groups. Furthermore, much of this data lacks the granularity of anonymized locations required for actionable network broadband mapping and gap analysis.

[2] The Affordable Connectivity Program is an FCC benefit program that helps ensure that households can afford the broadband they need for work, school, healthcare and more. 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. https://www.fcc.gov/acp

For example, the Utah US Census data for 2022 puts the total number of households at 1,033,651 with an average of 3.08 persons per home. These households self-reported that 9.2 percent, or 95,956 people, do not have a broadband internet subscription, but for the purposes of this grant, we do not know how many students live in each household. We can only approximate based on the average number of persons per home. In contrast, the FCC Fabric shows that Utah has 48,950 unserved households, with an additional 26,619 underserved households, for a total of 75,569, which is an overall difference of more than 21 percent, or 20,387 homes. In this case, as well, we do not know how many students live in each household.

UETN's K-12 Technology Inventory for the same year does not tally households but focuses instead on individual students, estimating that approximately 8 percent (approximately 53,972) of all students in Utah do not have "adequate home internet service."[3] This lack of access greatly impacts their ability to successfully complete assignments and projects outside of the regular school day.

Utah schools, school districts, LEAs, and their bus transportation services have local, personal relationships and firsthand knowledge of all their students, including unserved/underserved students. They regularly report this data to the Utah State Board of Education (USBE), which maintains a central database of student records called the Utah eTranscript and Record Exchange (UTREx). UETN seeks to work with the schools, LEAs, bus systems, and USBE to resolve these data source disparities by curating an authoritative source of students who are unserved/underserved.

1.2.2 Obtain or produce a map of the closest broadband service provider network endpoints in areas identified as unserved/underserved.

Challenge: As a corollary to the first goal, we need to get an accurate picture of Utah's current high-speed internet infrastructure so we can connect our students to available networks where possible. Utah code § 63N-3-501 (2019) states that sharing broadband service provider fiber path data is voluntary, so most broadband provider fiber data is protected by nondisclosure agreements, making it difficult or impossible to gain needed access to this information. The Utah Geospatial Resource Center (UGRC) updates its broadband data every six months with voluntary broadband service provider-supplied improvements.

Objective: Create a visual geographic representation of broadband endpoints in relation to student households.

Detail: Currently, Horrocks, an engineering firm, has the largest single collection of private broadband network information. However, even this collection is not complete. UETN will partner with the Governor's Office of Economic Opportunity (GOEO) Utah

[3] *2021 Utah School Technology Inventory Report*, UETN, February 2022, https://www.uen.org/digital-learning/downloads/2021/21_UETN_Technology_Report.pdf

Broadband Center (UBC), Horrocks, UGRC, local providers, and public partners to iteratively update map information.

1.2.3 Create gap analysis with partners and identify potential technological solutions.

Challenge: This goal will tie together the results of our first two goals to create an accurate gap analysis that supports our ongoing efforts. An official statewide geospatial dataset for student housing does not yet exist.

Objective: Create an anonymized ArcGIS layer for a UBC gap analysis through partnerships with USBE and UGRC.

Detail: UETN is in discussions with USBE to access statewide student household location information. Using this data to identify gaps in broadband availability to student households is a *legitimate educational interest.* UETN, pursuing its legislative mandate, is convening this effort on behalf of Utah's LEAs. This information, overlayed with internet service provider (ISP) broadband availability information, should enable the UBC to analyze the gap between reported broadband endpoints and households with students.

UETN is also working with UGRC and a limited number of LEAs to prototype this gap analysis while UETN pursues ongoing formal access with LEAs. UETN intends to continue to pursue this research until we can provide a "best practice" template and procedure for LEAs to use twice annually: once after the October 1 student count in the fall and again in the spring just before online testing begins.

Additionally, UETN used a proof-of-concept speed test designed to take advantage of Utah's LEAs that allow their 1-to-1 devices to go home with students each night. This modification of the UBC statewide speed test does not require students to input an address, but rather uses their LEA login account information to cross-reference the home location maintained in the LEAs student information system (SIS) system. Preliminary runs of this speed test were able to capture 2,000 total tests in a ten-day trial period from mid-May 2023 to the end of the school year, with a high valid address rate.

UETN plans to modify this speed test to use Plus Codes to automatically capture the geographic location of future speed tests. This modification could eliminate the need to cross-reference any user data to the school/district/LEA SIS system. Even though the FCC does not allow speed testing to challenge broadband availability data for its broadband fabric, the National Telecommunications and Information Administration (NTIA) has both allowed and encouraged states to use speed testing to challenge FCC maps for the BEAD grant. Preliminary tests show promise, but we do not yet have an acceptably consistent method of distinguishing test locations.

UETN intends to share this data with LEAs and UBC to inform decisions about how to improve the real-world experience of Utah students.

1.2.4 Work with partners to identify potential financial models that leverage multiple state and federal programs for providing services.

Challenge: The $42.6 billion allocated for BEAD funding over the next five years, and specifically the $317 million Utah will receive, is widely recognized as inadequate to accomplish the stated goals of “internet for all” and “fiber to the home.” Utah must systematically allocate funding for last-mile services and be opportunistic in securing additional state and federal funding to complete this project.

Objective: UBC, USBE, and UETN have a mutual economic incentive and moral imperative to connect affordable broadband to students in the state of Utah. As such, these agencies will need to work from a single master plan and find multiple revenue streams to provide affordable broadband access to all students.

Detail: UETN intends to leverage every available means to provide SchoolNET access to Utah students, one of which is working directly with UDOT to adjust their five-year statewide transportation improvement program (STIP) priorities. UETN also intends to continue working directly with UBC and broadband service providers to prioritize locations and communities with unserved/underserved student populations.

1.2.5 Identify available last-mile technologies for different student use cases.

Challenge: While fiber to the home is the most efficient way to deliver high-speed bandwidth to a residence, this method is not feasible for all areas due to geography, lack of conduit, sparsely populated areas, and other factors that drive up costs significantly.

Objective: Create an array of potential last-mile solutions with a variety of public–private broadband service providers, which allows UETN and its partner providers to help LEAs deliver SchoolNET to their students both reliably and affordably.

Detail: Providers use different last-mile technologies to deliver services to their customers. UETN and its public–private partners have leveraged multiple technologies through the years to access difficult-to-reach areas. UETN will continue to work with LEAs and its partners to provide the most cost-effective ways to reach unserved and underserved students through the investigation of upcoming and new technologies.

2 BACKGROUND

2.1 SCOPE OF BROADBAND PLAN

While this proposal covers all students that are unserved or underserved in the state of Utah, it emphasizes Beaver County, Daggett, Iron County, Kane County, Logan City, and San Juan School Districts because these districts have provided the most accurate sample student data required for this gap analysis. **However, note that these six districts do not show the full**

scope of need. If successful, in fall 2023 UETN will expand this gap analysis and include more school and district student data.

According to the Utah State Board of Education (USBE), in 2021 Utah had approximately 674,650 students enrolled in public education. The districts that provided data for this analysis represent approximately 5 percent of that number. UETN plans to continue working with key stakeholders to locate a majority, if not all, of the students in the state and identify those

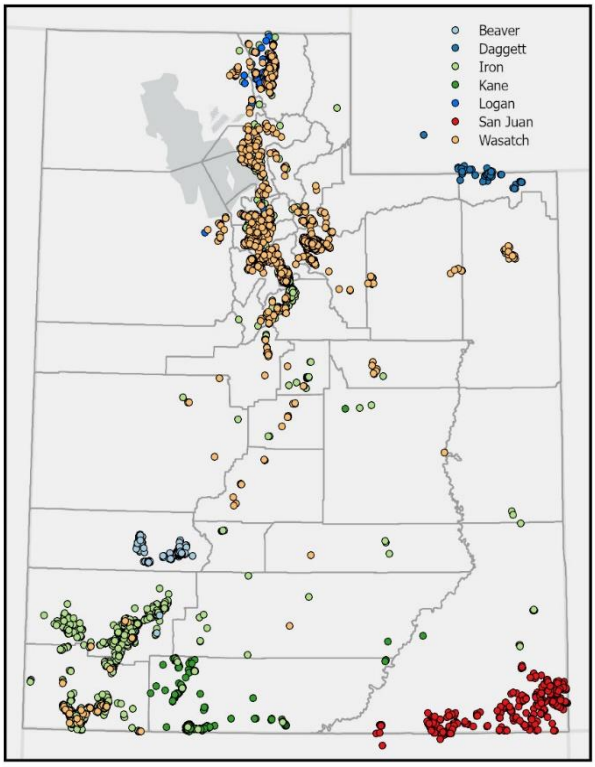


Figure 2.1. A Slice of the Unserved and Underserved Students in Utah. *This map shows unserved and underserved students in just seven school districts in the state (each district is shown in a different colored dot). When we perform a complete gap analysis, we will identify many more.*

students, by anonymized location, that are either unserved or underserved according to NTIA's definition of 100/20 Mbps minimum broadband standard and work with the local education agency (LEA) to provide SchoolNET access to those students.

2.2 WHAT IS BROADBAND?

Broadband is a dedicated connection to high-speed internet. The threshold for what is defined as high-speed internet changes according to the standards presented by the FCC. Currently, minimum broadband is defined as any speeds above 25 megabits per second (Mbps) download and 3 Mbps upload (25/3 Mbps). The FCC is proposing to redefine minimum broadband as 100/20 Mbps.

Using this standard, the Broadband Equity, Access, and Deployment (BEAD) Program defines households with less than 25/3 Mbps as **unserved** locations and those with less than 100/20 Mbps as **underserved** locations. Community anchor institutions (CAIs) with less than 1/1 gigabits per second (Gbps) speeds are also considered underserved, as defined by Section 60102 of the Infrastructure Investment and Jobs Act (IIJA), which also sets forth the BEAD Program.

2.2.1 Broadband Network Distribution

The infrastructure that data travels along is called a network. Similar to other public utilities such as roads or water pipes, the network infrastructure is carefully planned and then built according to how many people need to be served in both the present and the future. Within the network, data is carried across fiber, wires, or radio signals in the air (i.e., wireless). These various means of carrying data have different capacities and speeds. The part of the network used to transport data between cities or across cities is known as middle-mile infrastructure. The middle-mile network connects to hubs built throughout a city. The part of the network that connects from a hub to the end user is called final-mile or last-mile infrastructure.

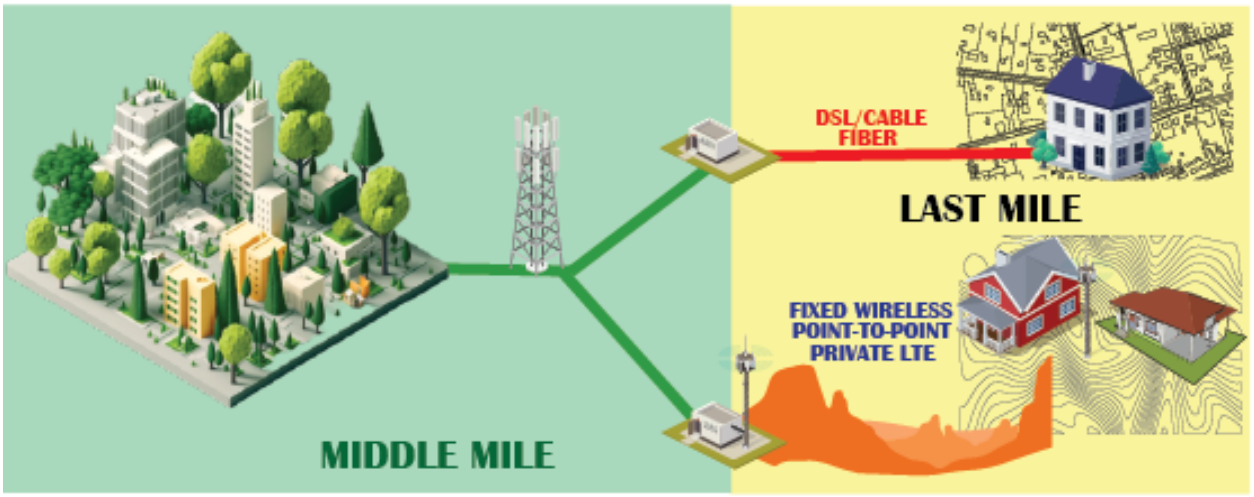


Figure 2.2. Middle-Mile and Last-Mile Infrastructure. *The green lines connecting the city to the hubs represent middle-mile infrastructure. The red line connecting the hubs to the residential houses represent final-mile infrastructure.*

2.2.2 Types of Broadband

There are various technologies that can deliver high-speed broadband internet, such as fiber optic, digital subscriber line (DSL), cable modem (coax), and wireless technologies. Each form of technology has pros and cons.

2.2.2.1 Fiber Optic

Fiber-optic technology sends digital signals carrying data as light through cables made of glass fibers. It provides the fastest, most reliable networks. Because fiber is a newer technology, many areas do not have fiber networks developed, so this type of network can require building new infrastructure. Fiber-optic cables can be placed on existing power poles or inside conduit buried in the ground. If the network is designed and installed correctly, speeds can be up to 1 Gbps. **Fiber optic is the gold standard for high-speed broadband internet as it provides the fastest speeds and can support emerging digital technologies into the future.**

2.2.2.2 DSL

DSL uses existing copper telephone cables to transmit data. Speeds vary widely based on local providers, as they can be less than 1 Mbps or up to 100 Mbps. Households with this connection are typically considered “served” with high-speed broadband internet. With maximum DSL speeds at 100 Mbps, DSL does not meet the ever-growing needs of future technologies, so it is not a preferred option when building modern broadband infrastructure.

2.2.2.3 Cable Modem (Coax)

Cable modem delivers similar speeds as DSL, but it uses the coaxial cables used for cable televisions to transmit broadband data. Like DSL, it is not a preferred option when building new broadband infrastructure, but it can be used where existing infrastructure is in place.

2.2.2.4 Wireless

Wireless broadband includes several technologies, including satellite broadband, wireless local area networks (WLANs), Wi-Fi, and cellular 4G, 5G, and LTE. These technologies use radio spectrum to transmit broadband data. Please note that BEAD funding can only be used to build wireless broadband technology when it is connected to a terrestrial middle-mile network and cannot be used on satellite broadband technologies.

Satellite Broadband—Satellite broadband involves satellites that orbit the earth transmitting long-range signals. It is primarily a middle-mile wireless solution. It is often used in rural locations where there are no other terrestrial networks available. Satellite broadband has a higher latency (also known as lag), making video calls extremely difficult on this type of broadband. When using satellite connection, speeds vary based on location, and weather can cause outages.

WLANs—WLANs are the last-mile networks used at homes or businesses to distribute internet to phones, computers, and other devices through radio signals. Wi-Fi and hot spots are both examples of a WLAN. Connection speeds are dependent on the service provided at the access point.

Cellular 4G, 5G, and LTE—Cellular 4G, 5G, and LTE involve cell towers transmitting radio signals of high-speed broadband internet data, which are then picked up through the modems in cellular phones, mobile routers, cellular antennas, or various signal boosters. The cell towers are often connected to a middle-mile fiber network and provide a final-mile connection for

anyone near the signal. The speeds can often reach speeds of 600 Mbps if specialized equipment is used to boost the signal. This is usually the fastest high-speed broadband internet available for users who do not have access to fiber-optic technology. **Note that BEAD funding can be used to build infrastructure for wireless towers as long as they are connected to a terrestrial middle-mile network.**

2.2.3 Benefits of Broadband

High-speed broadband internet has transformed the way the world does business and has become an integral part of society, critical for work, education, telehealth, and the completion of everyday tasks. There are few businesses that can operate today without the internet, and while some can get by with a low-speed connection, high-speed internet is becoming more and more necessary. A Pew Research Center survey conducted in April 2021 found that 90 percent of adults surveyed considered internet "essential or important for them personally during the [COVID-19] pandemic." High-speed broadband internet has allowed for remote work possibilities, which opens the possibility of highly skilled workers relocating to smaller communities and benefiting the economies of those communities, which the governor's Rural Online Initiative Program encourages. And readily available access to the internet has allowed businesses to widen their customer base to a global market.

UETN's vision is to improve education and health care in Utah by connecting people and technologies. We do this by providing high-quality, cost-effective access for Utah's K-12 schools and higher education through high-speed broadband connections to more than 1,900 schools, libraries, or CAIs around the state. SchoolNET, a subset of the CAI service, helps LEAs extend their local school networks to connect students when affordable broadband services are not available. Increasing high-speed broadband internet access increases economic opportunities for low-income families.

Developing digital skills as a student has become increasingly important, and high-speed broadband internet is now an integral tool in modern education and preparation for the future workforce. In Utah, where digital teaching and learning (DTL) is funded and supported statewide, if a reliable high-speed broadband internet connection is not available, students quickly fall behind as they lose access to online classes, homework submissions, and research opportunities. Many districts are now utilizing online learning for snow days and other times when it isn't possible for students to attend in person. Online classes are also being made available for specialized subjects like foreign language or career and technical education (CTE) courses that do not have a local teacher available. The education of children without access to a broadband internet connection are the first casualties in these scenarios.

Other online resources are also becoming more important for communities. For example, telehealth is a tool that allows users to connect to doctors and medical providers without the need to travel to the provider's location. Some of the benefits of telehealth include decreased health-care costs, access to specialists not available locally, and reducing the risk of exposing others to viral infections. High-speed broadband internet access is necessary to have a productive video call with a health professional.

High-speed broadband internet has also become increasingly essential for daily tasks. People use high-speed internet to pay bills, access bank and retirement accounts, and apply and interview for jobs. It is needed for communicating with family and friends, especially when making a video call. Even using a smartphone with 4G or 5G service involves broadband technology.

While high-speed broadband internet is benefiting many regions across the globe, students living in communities or neighborhoods with inadequate broadband must not get left behind. There is a growing digital divide where those who do not have access to the internet do not learn the digital skills necessary for high-paying jobs, pushing them further into poverty.

3 CURRENT STATE OF BROADBAND AND DIGITAL ACCESS

3.1 METHODS TO DETERMINE THE CURRENT STATE OF BROADBAND

Because UETN's mandate is to serve the educational needs of Utah K-12 and higher education students (K-20), our approach to determining the current state of broadband access focuses on that specific population. While many efforts under this planning grant will examine broadband access for all state residents, our priority represents students whose interests may or may not be fully represented in other Utah Broadband Center (UBC) planning grants, and thus narrows the results of our findings to a population of children and young adults. That said, our goal remains ambitious because bringing high-speed internet to every one of the more than 675,000 students in Utah is a challenging prospect.

The UETN planning team took several steps to determine 1) the current state of high-speed broadband internet in Utah and 2) the gap between unserved and underserved student homes throughout the state. This plan includes input from the following individuals and/or organizations:

- Utah Rural Telecom Association (URTA)[4] members
- Utah Department of Transportation (UDOT)[5]
- K-12 school districts, including IT directors and key personnel around the state
- Statewide Private Long-Term Evolution (PLTE)/5G/Citizens Broadband Radio Service (CBRS) User Group, a project of UETN
- University of Utah POWDER project[6]
- Northeastern Utah Educational Services (NUES)[7]

[4] Utah Rural Telecom Association, https://urta.org/
[5] Utah Department of Transportation, https://www.udot.utah.gov/connect/
[6] University of Utah POWDER, https://powderwireless.net/
[7] Northeastern Utah Educational Services, https://nucenter.org/

- Southwest Educational Development Center (SEDC)[8]
- Southeast Education Service Center (SESC)[9]
- Central Utah Educational Services (CUES)[10]
- Utah State Board of Education (USBE)[11]
- Utah Geospatial Resource Center (UGRC)[12]
- Utah Broadband Center (UBC), a division of the Governor's Office of Economic Opportunity (GOEO)[13]

In the remainder of Section 3.1, we describe the various activities our teams performed to identify the current state of broadband access for students through twelfth grade (K-12) as well as the larger group of all students through higher education (K-20) in Utah.

3.1.1 Public Outreach[14]

Public outreach can take many forms, from large public hearings to one-on-one meetings with key stakeholders. Rather than conduct formal public outreach events, UETN worked with experts throughout the state who have local and technical knowledge that would lead us to successful outcomes. We leveraged our existing contact network and regularly established meeting schedules to ask these experts about specific gaps they are experiencing in student broadband connectivity and how we might produce an accurate statewide gap analysis.

UETN scheduled both one-on-one meetings and direct phone calls with district IT directors and key district personnel throughout the state, and their feedback gave us powerful insights into the challenges they face in their counties. Through formal agenda items at existing meetings, UETN also discussed student broadband access issues with regional educational service agency (RESA)[15] constituents and state user groups.

These engagements have led to valuable conversations that captured some of the extreme measures these groups have undertaken to extend SchoolNET access to the homes of their students and faculty. These efforts began in response to the COVID-19 pandemic, but as online access from home has become the new normal for students, so local education agencies (LEAs) have shifted to offering ever-increasing digital curriculum resources. These once-temporary measures have remained in place and are now viewed by parents and patrons as necessary for students to complete online learning throughout the state.

Some examples of SchoolNET deployments include San Juan School District (SJSD) and Beaver County School District (BCSD). During the 2020–2022 COVID-19 lockdowns, SJSD

[8] Southwest Educational Development Center, https://sedck12.org/
[9] Southeast Education Service Center, https://www.seschools.org
[10] Central Utah Educational Services, https://www.mycues.org
[11] Utah State Board of Education, https://schools.utah.gov/
[12] Utah Geospatial Resource Center, https://gis.utah.gov/
[13] Utah Broadband Center, https://business.utah.gov/broadband/
[14] Because our sections are each more than a page long, we opted to use the numbering system already provided in this template to separate these subsections rather than using the provided bullet points.
[15] RESA definition: https://cobi.utah.gov/2020/2736/overview

successfully used a combination of fiber and wireless technologies to provide home access to more than 600 students spread across 3,200 square miles along the Arizona/Colorado border. In another example, BCSD, which also covers a large rural area with geographic constraints, has recently succeeded in purchasing licensed educational broadband service (EBS) spectrum from the FCC. UETN has helped BCSD by providing technical support for their on-site surveys and formal planning for the placement of towers and radios to provide optimal coverage to reach their unserved and underserved students in the most cost-effective manner.

As a reminder, SchoolNET does not provide full, unrestricted internet access to the households it serves, nor does it allow parents/guardians to stream movies or simply "surf the net." SchoolNET provides the opportunity for remote students to have full engagement with their regular classrooms via the same content-filtered educational experience students have when using computers on their school campuses. In short, SchoolNET does not solve the problem of broadband access for *everyone* in the household, but it does provide essential digital equity broadband service to individual students.

The long-term goal of funding mechanisms like BEAD is to close these gaps with affordable fiber networks, which will provide these unserved and underserved households with full internet access. However, more work is still necessary to complete a full analysis of how to cost-effectively provide broadband to every student's home in these areas. UETN's efforts toward providing broadband to every student each year are mentioned in 3.1.5, Internet Service Provider Meetings, later in this section.

UETN's existing E-Rate relationships have also contributed to the collaborative dialogue surrounding broadband access to unserved/underserved students. UETN is the E-Rate consortium lead in applying for E-Rate funds received in Utah. UETN helps schools and libraries apply for discounts on broadband services and equipment through the E-Rate Category One and Category Two programs. This collaborative relationship and ongoing dialogue opened the door to multiple direct calls with IT directors and virtual meetings with LEAs around the state. UETN representatives have conducted candid conversations and gained key insights into the experience of student broadband needs within their respective areas. In addition, during these conversations, UETN was able to share the goals and intended purpose of the NTIA IIJA funding and the reasons for the partnerships with UDOT, Utah's broadband service providers, and UBC.

Since much of rural Utah has geographic barriers to fiber deployment, LEAs and schools often need wireless technologies to supplement last mile school connectivity. UETN facilitates user group discussions investigating these technologies, including discussions focused on gaps in student home access. These user groups meet regularly to share use case success stories,[16] how-to guides,[17] and best practices, and to discuss the challenges LEAs face with wireless deployments when necessary.

All of the respective phone calls, meetings, and discussions have ferreted out a comprehensive set of statewide concerns regarding broadband access for school educational purposes, which

[16] "Utah's Private LTE/5G Use Cases," CBRS/LTE Project website, UETN, https://uetn.org/network/cbrs/cases.php
[17] "How-To Guides and Other Reads," CBRS/LTE Project website, UETN, https://uetn.org/network/cbrs/howto.php

we will discuss in Section 4, Obstacles or Barriers. These meetings have also fostered conversations with broadband service providers throughout the state.

3.1.2 Public Surveys

Though UETN conducted no formal UBC surveys, UETN conducts the Utah School Technology Inventory biannually, which includes multiple questions directly related to the availability of internet access to students. UETN's 2021 Utah School Technology Inventory Report[18] includes fifty-five questions related to computing devices, internet access, home internet availability, and the current use of digital learning tools and resources in 168 Utah LEAs. These LEAs represent a total of 1,037 public schools statewide, serving almost 675,500 students. Of the fifty-five questions, we used the following questions to provide data for this plan:

> #17 To what percentage of students does your LEA provide remote internet access solutions/services?
>
> #30 What percentage of students do NOT have adequate internet access for real-time remote or off-campus learning? (Adequate access is defined as access that provides sufficient bandwidth and network reliability to support remote or off-campus learning.)
>
> #31 Please select the primary reason why adequate internet access is not available within the school's service boundaries:
>
> - Lack of adequate internet infrastructure (i.e., lack of service availability to some households)
> - Poor internet access service quality (e.g., low bandwidth, high latency, or service interruption issues)
> - Affordability (i.e., lack of affordable monthly service plans)
> - A high percentage of transient students (e.g., migrant students or homeless students)
> - A high percentage of parents who refuse to have internet access in the home
> - Too many people in a household accessing the internet at the same time
> - Not sure
> - Other [open-response field]
>
> #50 To what extent have mobile computing devices already been deployed in the school?
>
> - On a 1:1 basis (students can take the devices home at night)
> - On a 1:1 basis (devices cannot be removed from school)
> - On a cart for in-classroom use only
> - Only available for checkout from the school library, media center, or computer lab

[18] *2021 Utah School Technology Inventory Report*, UETN, February 2022, https://www.uen.org/digital-learning/downloads/2021/21_UETN_Technology_Report.pdf

● No school-owned mobile computing devices, but students are allowed to use their own personal mobile devices in school under a BYOD (bring-your-own-device) policy
● None

#51 How many devices are currently deployed and in active use in the school?

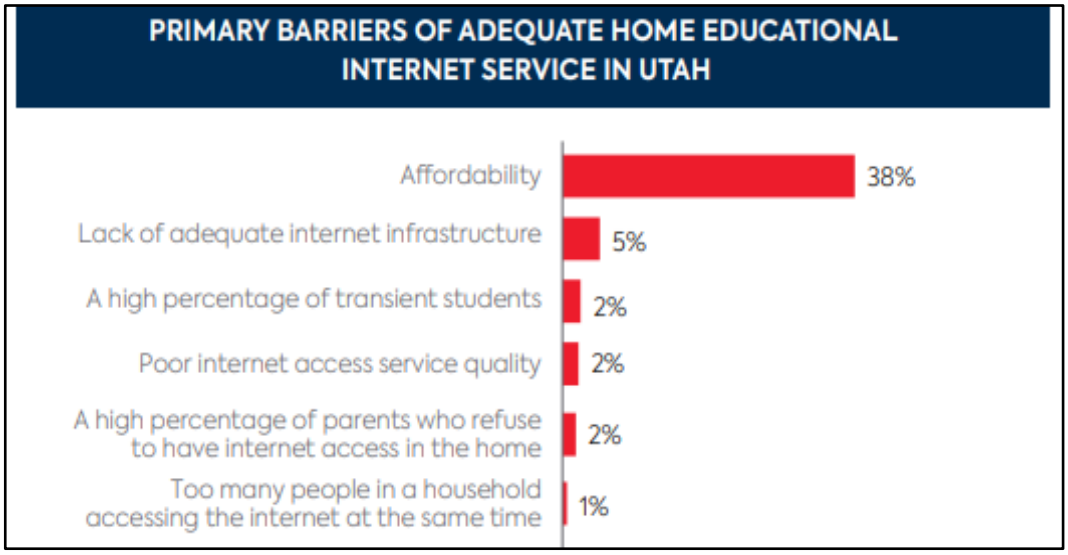


Figure 3.1. A Crisis of Affordability. *State and federal governments are beginning to give appropriate attention to the problem of high-speed fiber that is* ***accessible****, but for many households, the problem stems from whether fiber is* ***affordable****. When so much of student success depends on reliable access to high-speed internet, we cannot afford to ignore one of the biggest barriers.*

Student answers to question #30 indicate that approximately 8 percent do not have internet, and answers to question #31 indicate that 38 percent of them do not have internet service because of “affordability” issues. The issues represented in these answers are complex, and we will discuss them in detail in Section 3.4.3, Broadband Affordability.

3.1.3 Internet Speed Tests

Speed tests provide critical information about the accuracy of the FCC broadband map because while the larger polygons indicate the maximum possible reach of fiber within the map, speed tests address the quality of the individual end-user experience at a given location or neighborhood. While UETN continues working with LEAs to promote and populate the Utah Broadband Center speed tests, during the last month of school, Beaver, Davis, and Ogden School Districts partnered directly with their local UBC planning grants to publicize and encourage parents and patrons to participate in the official GOEO speed test. Through May and the beginning of June, the total count of reported test results increased from approximately 16,000 to approximately 20,000.

In addition, UETN engineers and IT specialists from Northeastern Utah Educational Services (NUES) and Southwest Educational Development Center (SEDC) have developed a student-centric version of the speed test that allows students to submit results by unique Google user[19] without entering a home address.

UETN and a number of LEAs have been piloting this speed test, pushing it out to LEA-owned Chromebooks and iPads via backend administrative tools. This semiautomated pilot generated over 2,000 test results through the first two weeks in May 2023. Based on this initial success, and after meetings with stakeholders in Beaver, Daggett, Iron, Kane, San Juan, and Wasatch County School Districts and Logan City School District, UETN has agreed to investigate the possibility of providing an improved speed test for all LEAs that wish to use it in the fall. These seven districts have tentatively agreed to do another push after Labor Day, marketed as Bonneville Internet Speed Week. This combined effort should provide a substantial increase to the number of end-user data points available and allow LEAs to verify data in the FCC Fabric.

3.1.4 Stakeholder Meetings

The task of getting broadband internet to every student in Utah is ambitious, and we will work with a range of partners to achieve it. Collaboration will drive the success of this broadband access expansion effort. UETN takes a highly collaborative approach to all its projects, working closely with local, state, and federal experts to combine the best information and resources for optimal results. The following list shows a partial list of the stakeholder meetings we have already held during 2023:

- PLTE User Group: March 9, April 13, and May 11
- Technology Coordinator Council (TCC): March 13
- PLTE-5G statewide research/leadership group: March 29, May 10, and June 8
- Southwest Regional PLTE pilot sites: March 30
- Northern Utah Districts/NUES PLTE pilot sites: March 31
- Wasatch Front Districts/Library PLTE pilot sites: April 4
- Sevier and Tooele County School Districts: April 12
- Weber Schools/Libraries PLTE pilot sites: April 13
- 5G Alliance: April 13
- UETN Internal PLTE User Group: April 13
- University of Utah POWDER project: April 13
- Utah State Board of Education, data sharing request: May 2
- Southwest Regional T-forum: May 18
- NTIA/GOEO “Confluence” meeting: June 7

We have also included a table that describes our future activities with these partners and others in Section 5.4.

[19] This version takes advantage of the fact that most districts issue Gmail accounts to their students.

3.1.5 Internet Service Provider Meetings

Although UETN acts as an E-Rate consortium, we are not an internet service provider (ISP) for individual households. As a result, we need to work closely with Utah's private ISPs, especially those that work in rural areas as carriers of last resort (COLRs) that must follow state and federal regulations regarding both the services they offer and the cost of their services.

To support this effort, UETN attended the URTA annual meeting in St. George, where UETN representatives spent the day listening and talking to various URTA members regarding how to best connect unserved/underserved students, as well as gathering URTA member perspectives on the issues and challenges created by these state and federal regulations. In addition, UETN representatives have engaged in conversations, phone calls, emails, and virtual meetings with past, current, and upcoming presidents of the URTA who represent CentraCom, Emery Telcom, and Beehive Broadband telcos respectively, to better understand the logistical, legal, financial, and business-impacting issues related to their ability to provide affordable student broadband.

These discussions enlightened our advisory group's understanding of URTA members' legal obligations regarding fee structures, tariffs, and the nuances of various state and federal laws for COLRs. They also helped to clarify the relationship between the Federal Universal Service Fund (USF), the Utah Division of Public Utilities, and the Utah Public Service Commission, all of which play major roles in the overall broadband affordability conversation for Utah students. These conversations included dialogue about NTIA's decision to allow individual states to define "affordable" and different programs available that might make broadband for Utah's low-income students net cost-free or close to free.

For example, for a student to receive 1 Gbps service that might have a base cost of $60, the following programs could apply:

- Federal Affordable Connectivity Program (ACP),[20] which contributes up to $30 toward broadband services
- Federal USF[21] Lifeline program, which contributes up to $9.25 toward fixed or mobile phone or internet services
- Utah Public Service Commission,[22] which allows up to $3.50 toward broadband services
- URTA, which has proposed an additional pass-through wholesale amount of $7

With these discounts and subsidies, the cost to a qualifying parent or guardian of a student might be as low as $10.25 per month for the 1 Gbps service, part of which might be covered even further by Utah Universal Service Funds (UUSF) with minor legislative rule changes.[23] While this proposal does not completely resolve the affordability issues most students face, it

---

[20] Federal Affordable Connectivity Program, https://business.utah.gov/broadband/acp/

[21] Federal USF Lifeline Program, https://ocs.utah.gov/assistance-programs/telecommunication-assistance/

[22] Brock Johansen and Chris Parker presentation at Broadband Advisory Commission Meeting, May 15, 2023. https://utah-gov.zoom.us/rec/share/dEsEPwfMU0uVYTKiqXz2Mo1b3tvDInXJPpxC0kfV9kqHvPscJJSB07BzkVRrUHQB.S20b9OdZ49kBwhjm?startTime=1684161956000 and GOEO June 7th Draft, p. 49–52.

23 Utah Office of Administrative Rules. (January 2022). Rule 8: Utah Universal Public Telecommunications Service Support Fund. https://adminrules.utah.gov/public/rule/R746-8/Current%20Rules?

has been an opportunity for UETN advisory committee stakeholders to openly discuss and learn about the many legal restrictions from prior legislation that URTA members faced in attempting to provide lower-cost broadband services.

3.1.6 Existing Assets Assessment

A true gap analysis of unserved/underserved students requires at least four primary sources of location information:

- Existing schools, libraries, and community anchor institutions
- Existing UDOT public fiber
- Student data
- Broadband service provider deployment paths/endpoints

Existing schools, libraries, and community anchor institutions. UETN, through its network maps and the UETN 2021 School Technology Inventory Report, already has the location data on the hardware/networks in more than 1,900 Utah schools, libraries, and community anchor institutions. We will perform this inventory again in fall 2023, increasing UETN's longitudinal data in this area. This data includes student technology access, mobile learning device deployments, Wi-Fi networks, and technology support staffing. Partner districts often supplement this information.

Existing UDOT public fiber. UDOT has already stepped forward and agreed to share both their five-year STIP plan and existing fiber so that conversations can be had about prioritizing projects that affect the most unserved/underserved students.

Student location data. The Utah State Board of Education (USBE) holds the location data for approximately 674,000 students for all 168 LEAs in the state. For a complete gap analysis for all 168 LEAs, an anonymized report from a single source is an ideal dataset. UETN is currently following USBE's formal processes to request that USBE work with UGRC to create this anonymized data. For the purposes of the planning grant, UETN worked directly with UGRC and seven individual stakeholder districts to produce a single smaller proof-of-concept dataset representative of approximately 32,000 anonymized locations. This data informs the recommendations in this grant but by no means shows the full extent of student needs within the state.

Broadband service provider fiber deployment paths/endpoints. Utah law[24] and nondisclosure agreements (NDAs) with broadband service providers and engineering firms protect the intellectual property of provider fiber deployment paths/endpoints data. Therefore, most provider fiber endpoint data is not readily available. UETN is working with broadband service providers and UBC to determine the appropriate processes to access this protected data.

For the purposes of the planning grant, UETN partnered with UGRC to produce a proof of concept based on a sample dataset of anonymized student locations. With this information,

[24] Utah Code 63N-3-501 (2019), https://le.utah.gov/xcode/Title63N/Chapter17/63N-17-S202.html in 2023 session.

UGRC performed a proof-of-concept gap analysis to identify which locations receive inadequate broadband services; for details, please see section 3.5.1 below.

3.1.7 Disparity Analysis and Geographic Information System (GIS) Mapping

The proof-of-concept gap analysis showed 1,806 unserved student locations out of the 32,000 anonymized samples. This number is approximately 5.6 percent of the total locations, and when added to the additional 2.1 percent of underserved locations, is comparable to the 8 percent called out in the 2021 Utah School Technology Inventory Report. UGRC compiles its broadband services data from information provided by service providers. In many instances, UGRC must make inferences or best guesses as to the geographic extent of each provider and service level, which introduces errors in the coverage.

This work provides an initial estimate or baseline view of what might be expected if a full statewide student dataset were available by showing a representative segment of unserved/underserved students. UGRC reported to UETN that this layer tends to overstate actual provider coverage; therefore, the numbers obtained from a complete gap analysis for all Utah students may be closer to the 8 percent reported in the 2021 Utah School Technology Inventory Report.[25]

[25] *2021 Utah School Technology Inventory Report*, UETN, February 2022, https://www.uen.org/digital-learning/downloads/2021/21_UETN_Technology_Report.pdf https://www.uen.org/digital-learning/downloads/2021/21_UETN_Technology_Report.pdf

3.2 EXISTING RESOURCES

UETN itself provides a significant resource for this effort. Originally conceived as educational radio/television in the 1950s and EDNET in the 1980s, the State Educational Telecom Operations Center (SETOC)[26] eventually evolved into UtahLINK[27] and then the Utah Education Network (UEN). It picked up an additional letter to its acronym during the 2014 legislative

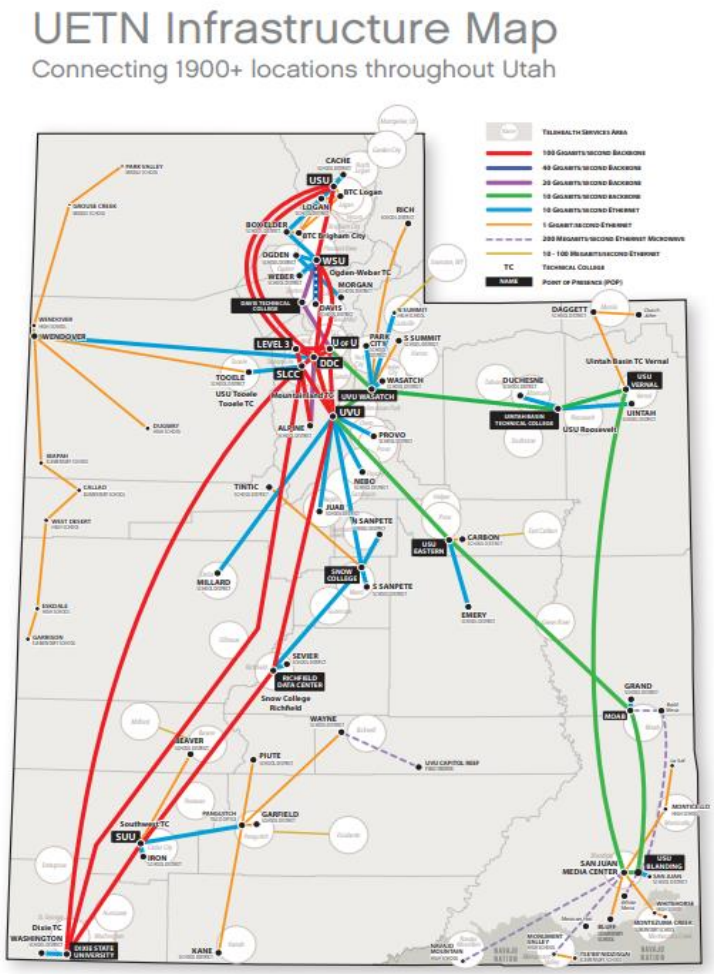


Figure 3.2. UETN's Robust Infrastructure Helps Serve Students. *This map shows more than 1,900 locations in Utah where UETN provides internet access via community anchor institutions (CAIs). These locations include K-12 schools, higher education institutions, and libraries.*

[26] UETN's History web page, https://uetn.org/publicinfo/history.php

[27] *Report to the Utah Legislature, Number 2005-04: Best Practices in Using Technology in Public Education*, February 2005, https://le.utah.gov/audit/05_04rpt.pdf, p. 4.

session when the University of Utah's Telehealth network officially became part of the Utah Education and Telehealth Network, or UETN.[28]

UETN provides broadband services for more than 1,900 K-12 schools, libraries, universities, state agencies, and telehealth clinics in Utah. UETN has more than 30 years of experience working with UDOT and Utah's broadband service providers on long-term lease agreements and dark fiber swaps throughout the state. This experience positions us as a supportive partner for community anchor institutions (CAIs) in most communities around the state.

UETN's statewide eduroam[29] deployment over the last few years is an example of our role as a trusted third party in negotiating security and network access and helping to solve network reliability issues between local LEAs and international networks. Eduroam is a worldwide Wi-Fi hot spot service used in thousands of locations in more than one hundred countries globally that allows students, researchers, teachers, and staff from participating college and K-12 schools to simply authenticate using the same network credentials they use at home with their local LEA, but be verified to the network and obtain secure network connectivity on any participating institutions' campuses. Our eduroam experience demonstrates our ability to get things done—a challenging, statewide project that required several years of consistent multi-LEA coordination among multiple K-12 and higher education stakeholders.

UETN supports delivery of college and career readiness opportunities to students and their families. Virtually all such resources including curriculum, UETN training to counselors, access to college materials (e.g., preparing, paying for, and applying to Utah colleges) and career opportunities are delivered exclusively online. To equitably provide these opportunities to all K-12 students, these opportunities must be available to both students and the parents/guardians at home. For example, the statewide Opportunity Scholarship, a legislatively supported scholarship that rewards Utah high school students for preparing academically for college, is an online-only application that requires a student's parent or guardian to be physically present during the application process. Furthermore, the Federal Application for Federal Student Aid (FAFSA), another online-only application furnished by the US Department of Education, is required for most college admissions applications and financial aid programs (including Opportunity Scholarship) and requires parents to provide accompanying income tax information.

Working with LEAs, UETN has already expanded broadband internet access to students at home to meet the needs of remote learning during the COVID-19 pandemic, a project we call SchoolNET. While these solutions don't replace the value of fiber-to-the-home broadband internet from an ISP, they do support immediate student learning needs.

As such, UETN leverages economies of scale in contract negotiations for LEAs across the state. This work includes broadband pricing at a state level, as well as video/e-book licensing, software, network equipment, and broadband pricing at a state level, saving stakeholders an

[28] UETN's History web page, https://uetn.org/publicinfo/history.php
[29] UETN's eduroam web page, https://uetn.org/network/eduroam

estimated $13.7[30] million annually, making it one of the most reliable and cost-efficient networks in the nation. UETN has also recently completed a statewide request for proposals (RFP), allowing for economies of scale for those LEAs that are ready to begin purchasing equipment for the deployment of private LTE networks.

Table 3.1. Current Broadband-Related Activities

ACTIVITY NAME	DESCRIPTION	INTENDED OUTCOME(S)
USBE/UGRC data	Secure, API connection for two student data fields	Computer-to-computer data conversion; UGRC to set up device at USBE for viewing/decision-making
Advisory committee	UDOT, URTA, RESA, UETN	Needs to happen every 2–3 weeks
Bonneville Internet Speed Week	Sept 18–23	Annually, minimum—should stay up for student troubleshooting all year

Table 3.2. Current and Planned Full-Time and Part-Time Employees

CURRENT / PLANNED	FULL TIME / PART TIME	POSITION	DESCRIPTION OF ROLE
C	1.5 FTE	Part-time project managers	Staff to work with 7 LEAs, USBE, UDOT, URTA, UBC, etc.
C	Brad/Amanda	URTA liaison	Coordinate with 47 Utah ISPs
C	0.5 FTE	Student interns	Data manipulation
P	Contract work	UGRC	GIS map work
P	2.5 FTE	Project managers	Staff to work with 168 LEAs, USBE, UDOT, URTA, UBC, etc.

3.3 PARTNERSHIPS

UETN's success is due in large part to its public–private partnership approach to working with Utah's broadband service providers to build its fiber-optic statewide network from a combination of leased circuits, indefeasible rights-of-use (IRUs) secured fiber, and UETN-owned and -managed dark fiber.

From its beginning, UETN has employed a collaborative approach that brings information and resources from a wide range of partners, a partial list of whom appears in Section 5.4 of this document. Without the inputs of LEAs, broadband providers, and other agency partners on both local and state levels, we will not be able to succeed in either our legislative mandate to provide internet service to LEAs or this ambitious new project of getting broadband access to every

[30] https://uetn.org/about/downloads/booklet.pdf

student in Utah. UETN uses primarily fiber-optic infrastructure but also leverages wireless where geography and unreasonable costs currently limit fiber access to accomplish its mission.

UETN has had consistent legislative support over the years because of its proven track record of leveraging public–private partnerships for more than three decades. UETN also has a good working relationship with Lynne Yocom, Utah Department of Transportation (UDOT)[31] fiber-optics director. As a former career & technical education (CTE) teacher and co-architect of the American Fork City fiber network, Director Yocom has helped UDOT pioneer various public–private partnerships (PPPs), allowing them to rapidly expand Utah's fiber-optic network along I-15 and other major highways using preexisting rights-of-way, resulting in one of the most robust networks in the nation. UDOT's fiber program allows local broadband service providers to utilize a public fiber backbone to connect remote communities.

For example, UDOT currently lays multiple conduits in the same trench during road construction along major roadways, a practice commonly known as "dig once," which allows ISPs to later pull fiber down them without additional traffic shutdowns or additional costs of retrenching. UDOT also uses new "micro-trenching" and micro-fiber technologies in areas where aerial or buried fiber runs are impractical. This work can also be done during regular road resurfacing projects in areas that do not have major reconstruction scheduled in their statewide transportation improvement plan (STIP).

The following two tables expand on our partnerships throughout the state. We have also discussed partnerships extensively in Sections 5.4 and 5.7.

Table 3.3. Local Community Partners and Community Anchor Institutions

COMMUNITY PARTNER /ANCHOR INSTITUTION	DESCRIPTION OF CURRENT OR PLANNED ROLE IN BROADBAND DEPLOYMENT AND ADOPTION
UETN has provided UBC with an Excel spreadsheet that includes more than 1,900 community anchor institutions as well as E-rate eligible entities. These groups are UETN core constituents, and we work with them on a regular basis to help them meet their broadband service needs.	

Table 3.4. Statewide Partners

NAME	CONTACT INFORMATION	ROLE IN BROADBAND DEPLOYMENT AND ADOPTION
Rebecca Dilg	rdilg@utah.gov (801) 538-8681	Utah Broadband Center Director *Governor's Office of Economic Opportunity*
Claire Warnick	cwarnick@utah.gov (801) 450-6682	Utah Broadband Center Program Manager *Governor's Office of Economic Opportunity (GOEO)*

[31] UDOT has ~3,252 miles of fiber throughout the state. UDOT regularly partners with UETN. UDOT also facilitates trades of unused or dark fibers between local ISPs for increased middle-mile access in other parts of the state.

NAME	CONTACT INFORMATION	ROLE IN BROADBAND DEPLOYMENT AND ADOPTION
Lynne Yocom	lyocom@utah.gov (801) 514-4565	Fiber Optics Director *Utah Department of Transportation (UDOT)*
Matt Peters	mpeters@utah.gov 385.202.3297	Director *Utah Geospatial Resource Center (UGRC)*
Katy Challis	katy_challis@schools.utah.gov 801.538.7894	Director of Privacy *Utah State Board of Education (USBE)*

3.4 ASSET INVENTORY

3.4.1 Broadband Availability

UETN provides one of the most extensive asset inventories in the nation, having commissioned a biannual report by Connected Nation for nearly a decade. The 2021 Utah School Technology Inventory shows that during the COVID-19 pandemic in 2020, approximately 27 percent of LEAs in Utah provided some kind of internet connection to students' homes.[32]

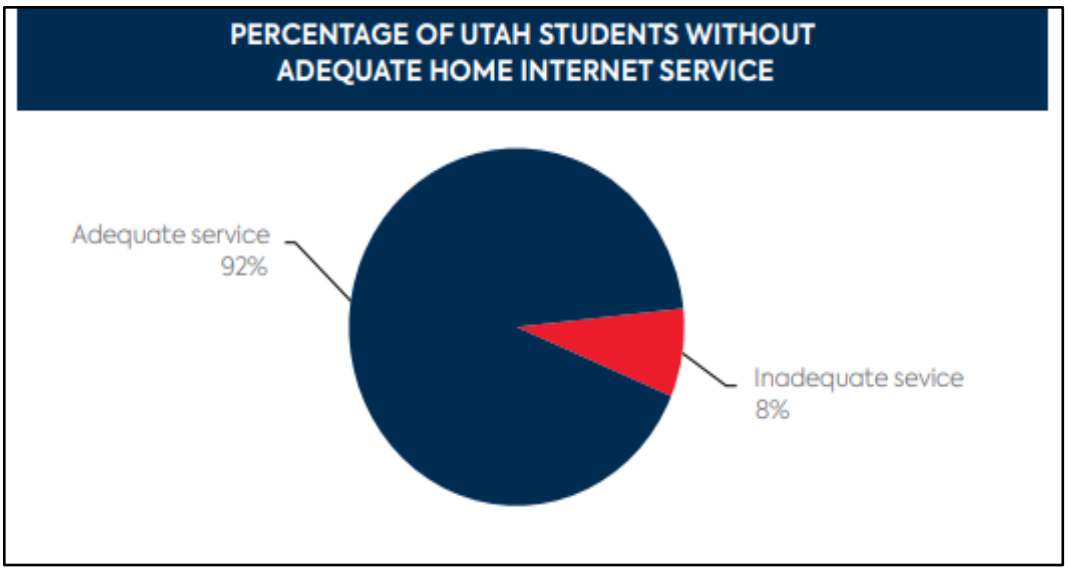


Figure 3.3. Too Many Students Lack Home Internet. *Although 92 percent of Utah students have access to adequate home internet service, 8 percent of students still do not, and 43,000-plus unserved students are too many.*

[32] *2021 Utah School Technology Inventory Report*, UETN, February 2022, https://www.uen.org/digital-learning/downloads/2021/21_UETN_Technology_Report.pdf

This same report states LEAs estimate that, on average, 8 percent of the students they serve do not have adequate access at home and report that the number one barrier to home adoption is affordability. That number will most likely increase with the recent NTIA suggestion that states redefine minimal broadband standards from 25/3 Mbps to 100/20 Mbps.[33]

The most recent biannual report that UETN commissioned contains data about distance learning, data connectivity for schools, districts, charter schools, institutions of higher education, telehealth services, libraries, online library services, and professional development services that serve more than 675,000 students throughout the state.[34] The data focus on devices, hardware and software age, teaching resources, and, for the first time this year, home broadband access.

3.4.2 Digital Access

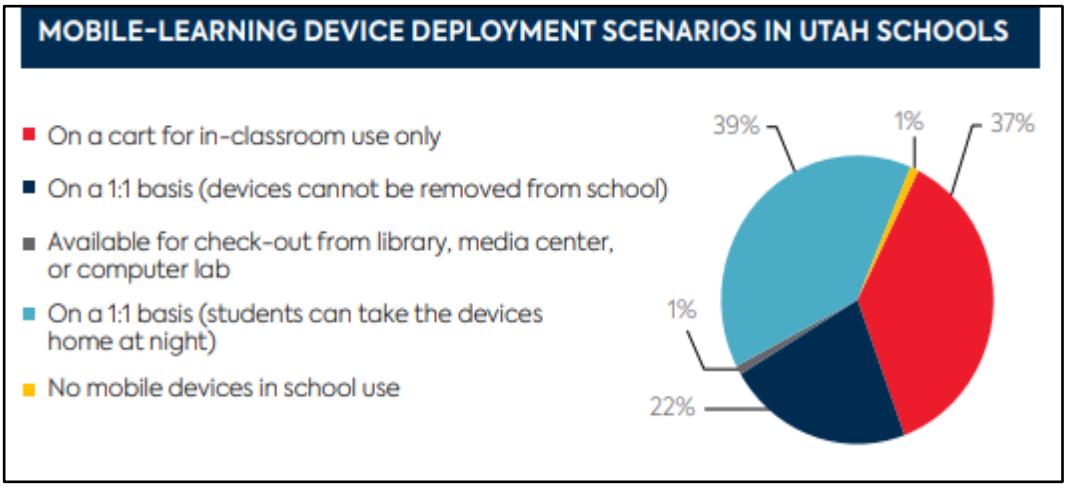


Figure 3.4. Mobile-Learning Devices Help Kids Take Learning Home. *Utah school districts mobilized quickly during the pandemic to provide students with devices they could take home. As a result, this also illustrated the need for all students to have adequate home internet.*

During the pandemic, LEAs reported that approximately 39 percent of Utah schools allowed their students to take devices home at night and on weekends. This pandemic-induced increase quickly brought to light the digital inequality among students that lived in homes that either had no internet at all (unserved) or lived in situations where multiple adults and/or siblings were sharing inadequate bandwidth (underserved).

One rural superintendent recently summarized many of the key broadband access issues faced by their parents, guardians, and students (the following points are all quoted text):

---

[33] "Proposed BEAD Challenge Process Guidance," p. 11, section 6.2, https://www.internet4all.gov/sites/default/files/2023-04/BEAD_Challenge_Process_Policy_Notice_-_Public_Comment_Draft_04.24.2023_0.pdf

[34] USBE, *Utah Fall Enrollment - 2021*, https://www.schools.utah.gov/file/5c8e2fac-55dc-4f0a-bf6a-6889133e4ffe

1. The FCC Fabric often shows internet service to areas at speeds no individual household is actually experiencing, but because a business or agency in the sector has service at the required minimum speed, the entire area is deemed as receiving adequate access.
2. Rather than getting fiber to where it is needed, our country has allowed each vendor to lay their own fiber, with the result being redundant and oftentimes inactive [dark] fiber running across the same neighborhoods/communities, while ignoring difficult-to-reach last-mile customers.
3. There are locations that simply make no business sense to service, but those areas still have students living in them who need SchoolNET access. Schools shouldn't necessarily be solving this problem, but no one else has or seems willing to do so.
4. Wireless spectrum that was designated by the FCC as being too valuable to leave with schools/universities a few years ago, like private LTE, radio, microwave, etc. will all have a role to play when we get serious about connecting everyone, everywhere. This spectrum is periodically auctioned by the FCC because it follows a use-it-or-lose-it model. Schools interested in acquiring private LTE frequencies should watch for future auction windows.

This superintendent continued: “Our district’s past approach has been to secure any cost-effective access available and attempt to work with industry partners as well as UETN to provide access to almost all of our students in the county. Our current effort has been to purchase the right to bandwidth [spectrum] from the FCC that will allow us to connect our unserved/underserved students wirelessly for roughly $1.50 per month.”

As this perspective shows, digital access is a complex picture with many contributing barriers that prevent students from gaining broadband access. Despite these barriers, UETN remains committed to bridging that gap for every student in the state.

We have removed the broadband speed tables included in the planning grant template because of our statewide focus. To fill them out, we would need to cover the entire state, which would make this planning grant cumbersome and overlong. Instead, we would like to direct readers to the lists of communities in Section 3 in the grants prepared by the following groups:

- Six County AOG Local Broadband Plan (Eureka, Mills, Harding Oasis, Sutherland, Woodrow, Indianola, etc.)
- San Juan County Local Broadband Plan (Aneth, Red Mesa, etc.)
- Beaver County Local Broadband Plan (Sulpherdale, Manderfield, North Creek, Frisco, etc.)
- Wallsburg Valley Local Broadband Plan

These plans will provide readers with useful, granular data for the specific regions and towns they cover. We also recognize that their desired outcomes in their grants overlap with UETN’s desired outcome to get broadband access to students in these regions.

3.4.3 Broadband Affordability

As mentioned previously, UETN's 2021 Utah School Technology Inventory reports that 38 percent of LEAs list broadband affordability as the primary reason why adequate internet access is not available to their unserved/underserved students. NTIA's stated goal for BEAD funds to provide affordable "fiber to the home" is a national recognition of this same gap between the current reality of actual broadband available to students and the ideal of ubiquitous 100/20 Mbps broadband availability in the US.

Both UETN and community LEAs have stated publicly that they have no desire to "become an ISP"—but because this broadband gap exacerbates an inequity for students who are already marginalized, rural LEAs are scrambling to provide SchoolNET access by any available means. Urban LEAs are also finding it difficult to provide access for low-income, migrant, immigrant, or English as a second language (ESL) students whose parents often find affordable housing in multiunit dwelling (MUD) apartment complexes where a flat fee ($60–$75 per month) for cable/internet is simply added to the tenant's monthly rent, making students in these units ineligible for the Affordable Connectivity Program (ACP).

These affordability challenges lead to a widening digital divide, so agencies like UETN and LEAs are stepping into the gap to provide connectivity for students who lack access to affordable broadband in Utah.

3.5 NEEDS AND GAPS ASSESSMENT

We must note that UETN has begun the process of gap analysis for broadband access, but that analysis currently only includes sample data from seven school districts out of forty-two districts in the state. A full gap analysis needs to encompass **all** 168 LEAs in the state to get an accurate analysis that will map the path forward. The figures shown in this section come from our proof-of-concept dataset, and we anticipate that a complete analysis will reveal many more unserved and underserved students.

3.5.1 Broadband Availability

As noted in Section 3.1, a true gap analysis of unserved/underserved students requires four primary sources of location information:

- Existing schools, libraries, and community anchor institutions
- UDOT fiber paths/endpoints
- Student data
- Broadband service provider fiber deployment paths/endpoints

Using anonymized student data provided by our seven partner districts, UETN asked the UGRC to perform a basic gap analysis identifying which of these locations receives inadequate broadband services using the Broadband Service layer from the State Geographic Information Database (SGID). The BEAD Notice of Funding defines "Reliable Service" in section IX.B.1.C.u, so for this analysis, UGRC filtered the broadband services data to only include fiber optic, cable,

DSL, and licensed fixed wireless technologies. UGRC compiles the broadband services data from information that broadband service providers voluntarily share.[35] In many instances, UGRC must make inferences or best guesses as to the geographic extent of each provider and service level, which introduces errors in the coverage.

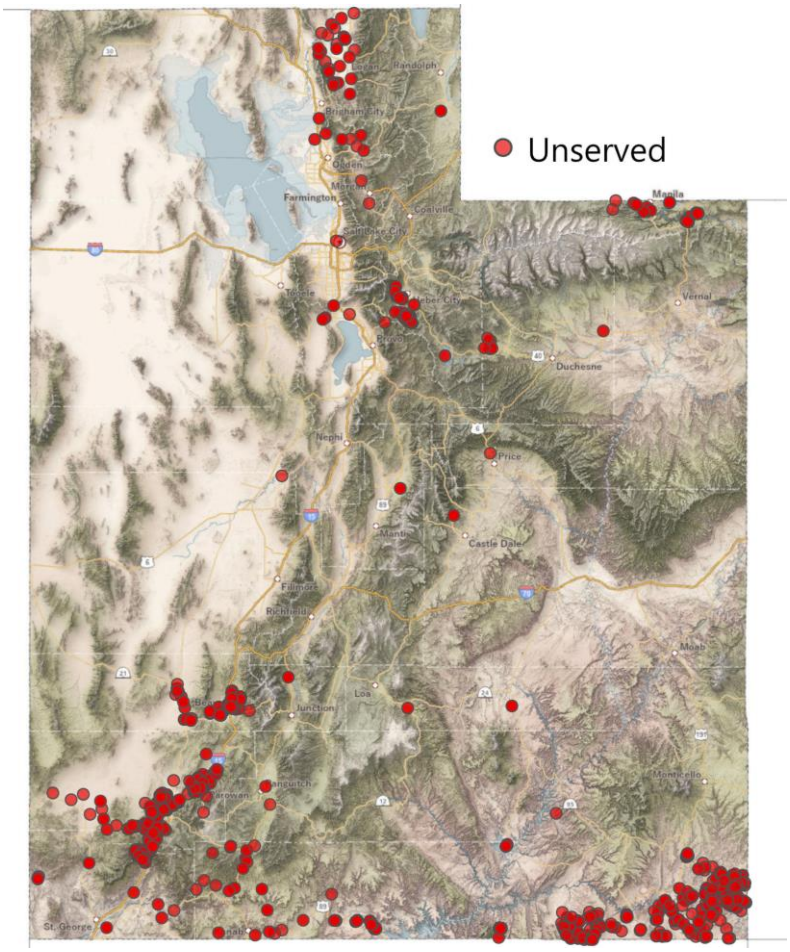


Figure 3.5. Unserved Students Live throughout the State. *As the many red dots on this map show, unserved students live not only in rural areas of the state but also in urban areas as well. Student access is influenced by both availability and affordability.*

Using the speed classifications defined in the BEAD Notice of Funding, this sample dataset contains 29,707 students that are served by broadband internet, 649 students that are underserved, and 1,806 students that are completely unserved. When we correlated these unserved (5.6 percent) and underserved (2.1 percent) student numbers from this sample

[35] UT Code § 63N-3-501 (2019): https://le.utah.gov/xcode/Title63N/Chapter17/63N-17-S202.html in 2023 session.

dataset to the 2021 Utah School Technology Inventory Report, they appear to confirm the 8 percent estimate previously given from that report.[36]

Student data needs to be carefully guarded to protect student privacy. Due to the sensitive nature of this dataset, we have not supplied many of the graphics that are as part of our analysis in this report. However, we do identify areas of immediate concern for the 2023–24 school year. It should be noted that these areas represent only a subset of all K-12 students within the state. We are confident that a complete gap analysis will identify additional students, in areas with possibly higher priorities.

The following sections detail several target regions identified in our preliminary analysis that have significant broadband access gaps.

[36] *2021 Utah School Technology Inventory Report*, UETN, February 2022, p. 7, https://www.uen.org/digital-learning/downloads/2021/21_UETN_Technology_Report.pdf

San Juan School District

At the beginning of the COVID-19 pandemic, San Juan School District (SJSD) was one of the few school districts that could identify the locations of more than 600 students who lacked the

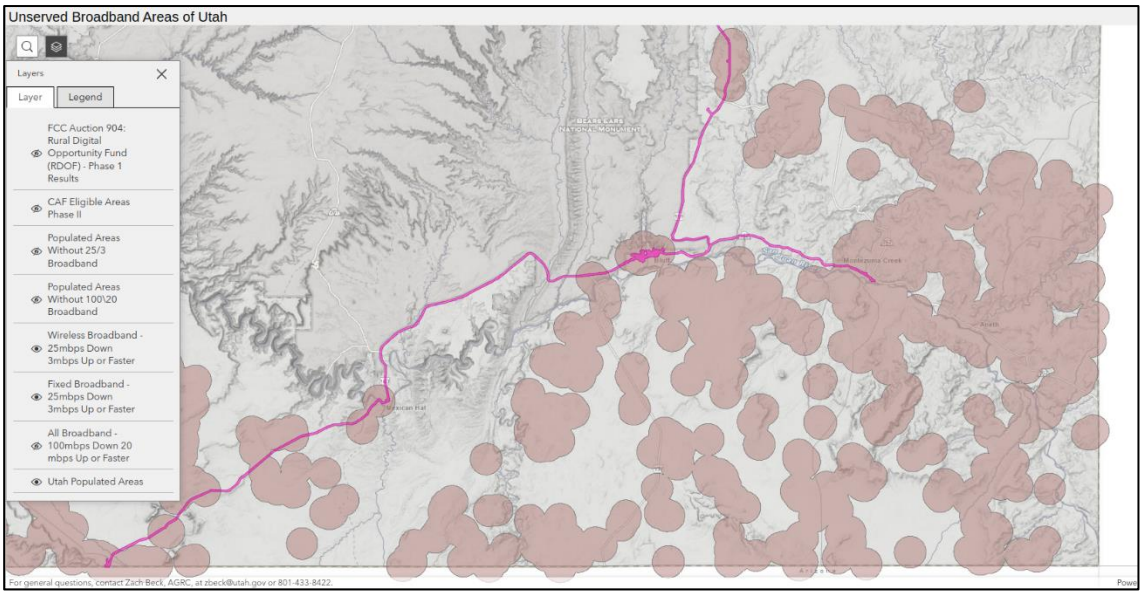


Figure 3.6. San Juan School District Students Are Often Unserved. *As one of the most remote areas in the state, San Juan County sits far outside the FCC Fabric that covers the urban parts of the state. When remote learning became necessary during the COVID-19 pandemic, the school district had to implement extreme measures to connect all its students.*

ability to continue their education online. To meet this need, using emergency funding provided by USBE, SJSD stood up a series of radio towers and Wi-Fi access points across ~3,200 square miles. This allowed SJSD to extend both SchoolNET and telehealth services to students and their families who were hardest hit by the pandemic.

This network needs proactive servicing and regular maintenance over the next five years until fiber or other commercial solutions can be run to these locations.[37] This network will also require systematic updates and radio replacements to deploy more reliable wireless technologies to these students over the same time period.

[37] See Table 15, 5.6, Estimated Cost for Universal Service, San Juan County GOEO plan for complete breakdown of costs of extending fiber to these principal communities. Total cost is higher to reach outlying areas and individual addresses.

Beaver County School District

The towns of Milford, Adamsville, and Greenville and the area north of Beaver to Manderfield illustrate one of the dilemmas of the FCC Fabric. In the following graphic, on the right one sees the Fabric view at a level of 15x magnification; on the left one sees a less intense level of magnification. On the right, the hundreds of red dots representing unserved households are visible, but at any lower magnification, one sees only honeycomb tiles, which gives the impression that no households are unserved or underserved. In addition, to see any of this information, one needs to know which combination of filters to apply (these filters are shown on the right). This problem exists throughout rural Utah.

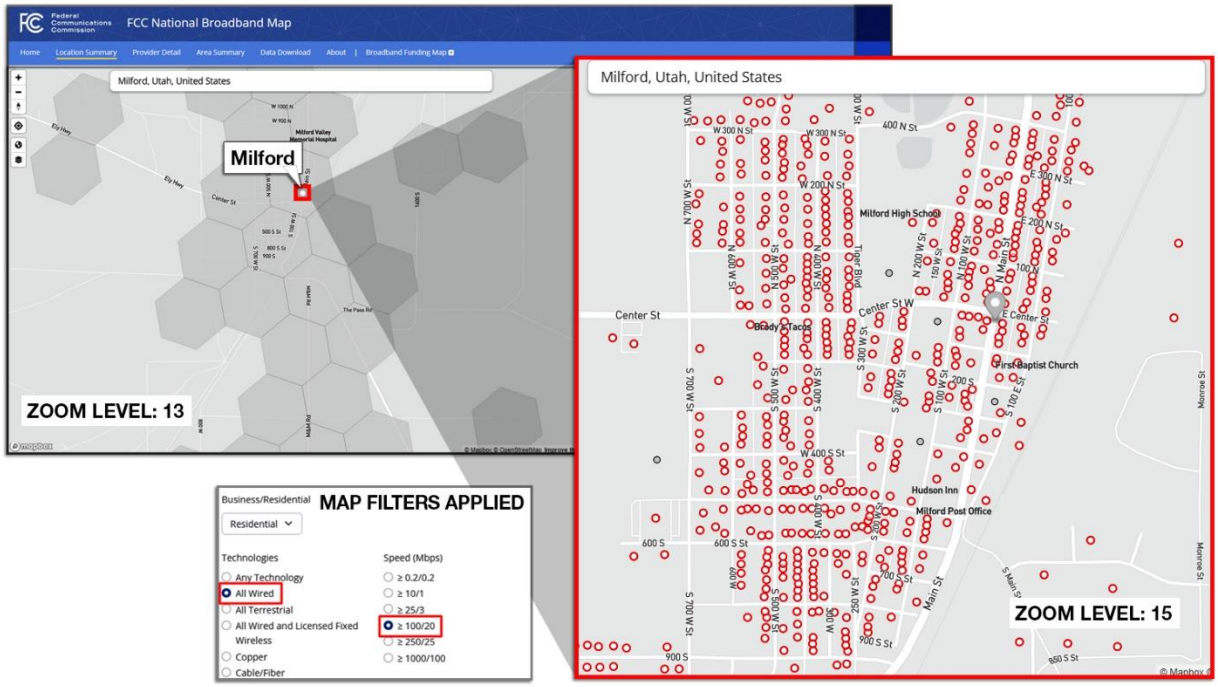


Figure 3.7. Different FCC Map Magnification Levels/Filters Tell Very Different Stories. *As these two maps of the same area show, when you magnify the map to the highest level (right, in red), you see many households that lack high-speed internet. When you adjust to any other level of magnification (top left), however, the map is empty, suggesting that no households lack high-speed internet in that part of the map. The smallest graphic shows the filters that must be applied to see the information at all (bottom left).*

Iron County School District

Unserved/underserved populations in this school district include the areas north of Parowan/ Paragonah as well as the towns of Iron Springs, Quichapa Lake, Hamilton Fort, Kanarraville, and New Harmony. As the following graphic shows, clusters of unserved households pepper the landscape in this area. Again, these neighborhoods do not appear on the FCC Fabric at all until you zoom in to the highest magnification level.

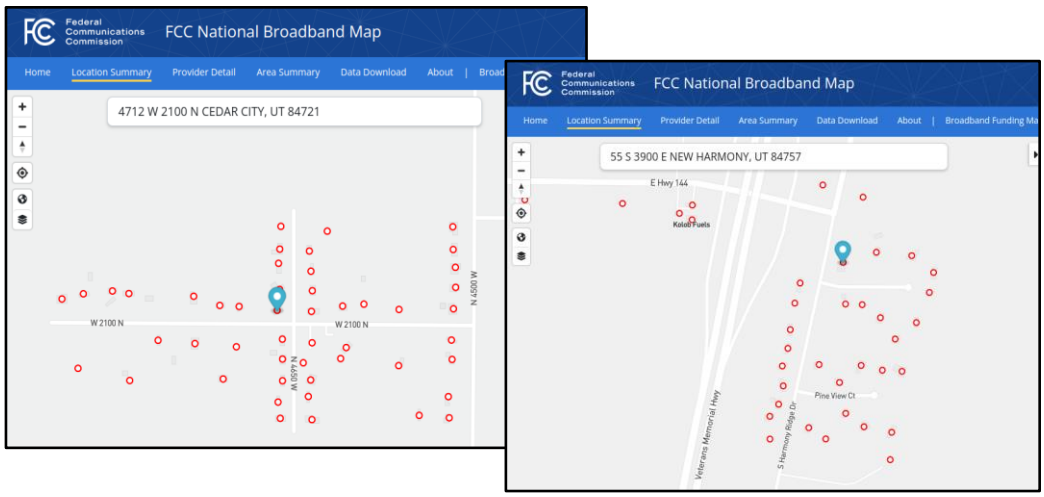


Figure 3.8. Small Communities Often Remain Unserved. *Although a major fiber backbone runs along the interstate through Iron County School District, many small communities next to this fiber network remain unconnected and unserved.*

Kane County School District

Examples of student need in this district include the towns of Big Water/Church Wells and Cedar Mountain as well as the Bullfrog marina. While our focus in this document is students, we want to note important telehealth needs as well, since this is part of our mission. Bullfrog, which is the home of one of the main marinas on Lake Powell, is unique in that it has few permanent residents but multiple thousands of visitors at various times of the year. When visitors descend, emergency services become critical, making communications and telehealth potentially lifesaving services.

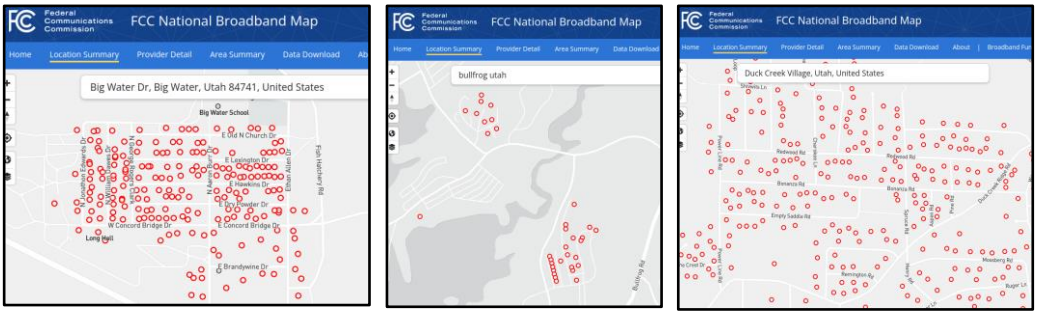


Figure 3.9. Telehealth and Education Needs Converge in Bullfrog. *Bullfrog, like many communities in rural Utah, is a hub for tourists at certain times of the year. These visitors bring valuable tourist dollars but occasionally need emergency services, making connectivity essential for these communities.*

3.5.2 Digital Access

"Digital Equity" means that every student in Utah has an equal opportunity and equal access to benefit from our education system. Bridging this affordable broadband gap for unserved/underserved students is imperative. UETN's stakeholders want to fast-track the "learn" priority of the "work, play, and learn" emphasis from IIJA funding for the BEAD program so every student can have the same chance to succeed in their communities.

Currently the NTIA challenge process addendum[38] for correcting errors in the FCC Fabric[39] puts the burden of proof on residents and homeowners, most of whom are unaware of this process. This process marginalizes the people most affected by errors in the FCC map, namely those without any internet service, those without adequate broadband, and 20–25 percent of unconnected households across the country who live in multi-family housing. Without accurate unit-by-unit data, this FCC map will significantly undercount the number of unserved/underserved households and negatively impact the IIJA program's stated goal of "fiber to every home."

This proof-of-concept pilot revealed that finding and verifying the availability of broadband to each student in Utah is an incredibly time-consuming process. At the moment, each student location must be independently verified through one of the 168 LEAs and currently requires no less than the following steps:

- We must obtain anonymized student location data from individual LEAs, which must first be stripped of any personally identifiable information (PII).[40]
- We convert these anonymized locations into nonhuman readable geocodes and that we then place into a geographic information system.
- We then check this data against known state/national geocoded datasets and manually make corrections to miscoded addresses.
- Once the data set is "clean," we can compare it to the FCC Fabric. However:
    - The FCC map contains proprietary technology that cannot be licensed to individuals/small communities who wish to use ArcGIS to automate this step.
    - The FCC map only shows individual unserved/underserved locations at a "plus 15" zoom level if making manual comparisons, which an investigator can only view in limited portions of a single neighborhood at a time.
    - Manual location verification requires an additional step of filtering by "All Wired" and either ">25/3" or ">100/20" to allow the investigator to see any mismatches between the FCC Fabric, which allows areas with satellite coverage to be counted as "served," and NTIA's BEAD NOFO, which does not allow satellite coverage to count as served.

[38] "Proposed BEAD Challenge Process Guidance," p. 11, section 6.2, https://www.internet4all.gov/sites/default/files/2023-04/BEAD_Challenge_Process_Policy_Notice_-_Public_Comment_Draft_04.24.2023_0.pdf

[39] FCC Fabric Map online, https://broadbandmap.fcc.gov/location-summary/fixed

[40] Personally Identifiable Information for Education Records, https://studentprivacy.ed.gov/content/personally-identifiable-information-education-records

- Then, we must compare the FCC Fabric—reported broadband availability to the UBC or UETN speed tests for students at these locations to find any discrepancies between provider-reported availability and actual user experience.
- When we find discrepancies, either non-existent locations or speed anomalies, we package these locations into a multiline spreadsheet that is sent to UGRC to combine with other challenge data from around the state, which is uploaded to the FCC during the next round of challenges and hope that the FCC will use our work to correct their data. This correction is not guaranteed. Of more than 100,000 challenges, to date Utah's UBC has the most successful correction rate of any state with slightly more than 50,000 corrections accepted by the FCC.

Because the scope of completing this level of analysis for all 675,000 K-12 students in Utah cannot fit within the UBC's current NTIA planning process timeline restrictions, UETN's advisory committee feels strongly that the UBC should set aside a portion of their unused BEAD planning process funds to complete a full student gap analysis so that a true needs assessment can be completed. The goal of this full analysis should be to find and include all students:

- Currently missing a valid home address
- Whose actual broadband speed is misrepresented in the FCC Fabric
- Who live in locations where fiber is *available* but is not practically *affordable* because of monthly rates, line extension fees, or hook-up fees
- Who are homeless or transient

The plight of students living in unserved/underserved homes became very poignant to UETN advisory committee members after hearing personal testimony from former students who experienced these challenges. Some students grew up in unstable family situations, not knowing where they would sleep at night, let alone where they might find internet access to complete their homework assignments. Many highly motivated students struggled to navigate the ACP enrollment process while living under these conditions, and they were unable to get their parents or guardians to fill out the paperwork, or if they did, afford the initial hook-up fee or line extension fee. Unserved students like these deserve the same opportunities as their peers, but they face far too many hurdles to accessing high-speed internet.

This knowledge prompted much discussion within our advisory committee about the changing roles of the UBC, the USBE, UDOT, UETN, URTA, regional service centers, tribal leaders, and other key stakeholders as Utah moves into the next phases of the BEAD process in both protecting unserved/underserved students and arbitration challenges between communities, special interest groups, and broadband service providers. These discussions eventually resulted in and additional recommendation to form a temporary multiagency advocacy group that could meet regularly to find solutions that meet the immediate needs of unserved/underserved students living at or below 150 percent of the federal poverty level, who are currently incarcerated, have disabilities, have a language barrier, are members of a racial or ethnic minority group, or are new Americans.

3.5.3 Lack of representation from USBE's Career & Technical Education program and Utah Department of Workforce Services

In addition to the traditional K-12 and higher education systems, Utah has a Career & Technical Education (CTE) system and Department of Workforce Services (DWS) focused on training adult students to enter the workforce or transition to emerging areas of the workforce. These adult education courses are critical services, especially to low-income individuals and immigrants.

The BEAD program Notice of Funding Opportunity (NOFO) asks applicants about specific "strategies to ensure an available and highly skilled workforce … plans to attract, retain, or transition the skilled workforce needed to achieve the plan's goals …"[41] As a result, we should be looking for ways to activate and involve participants in these programs to support all the aspects of this funding opportunity.

Two of the three main statements given on the Internet for All website[42] are**:**

> EQUITABLE BROADBAND WORKFORCE
> When quality jobs are filled by qualifying applicants, people can grow, communities are empowered, and businesses can thrive. The jobs created through investments in high-speed internet must be good jobs that offer equitable access, a safe workplace, and fair compensation. These new opportunities will have lasting positive economic, social, and health benefits for years to come.
>
> VALUABLE JOB OPPORTUNITIES AND SKILLS DEVELOPMENT
> Improved access to high-speed internet has a significant impact on the social and economic well-being of communities, making them more attractive to employers and highly skilled workers alike. By increasing access to reliable and affordable connectivity, skills development resources, and remote working technologies, communities can promote economic growth and improve quality of life for all residents.

Students in CTE and DWS programs are typically nontraditional and do not appear in some of the documentation we discussed earlier. Additional efforts might be necessary to ensure that these students are included in the full gap analysis.

3.5.4 Broadband Affordability

As mentioned in Section 3.4.3, UETN's 2021 Utah School Technology Inventory reports that 38 percent of LEAs list affordability as the primary reason why adequate internet access is not available for unserved/underserved students.

---

[41] NOFO, p. 58, "A description of how the Eligible Entity will develop and promote sector-based partnerships among employers, education and training providers, the public workforce system, unions and worker organizations, and community-based organizations that provide relevant training."
[42] https://internetforall.gov/

Collectively, the teams involved in determining reasonably affordable solutions may need to reconsider the idea of “fiber to the home” when finding solutions for homes that sit miles from any others. The nature of rural areas generally, and western states particularly, means wide-open gaps where people live many miles apart. Nevertheless, the state is legally bound to provide equal educational opportunities to all the students in the state, and as the recent pandemic illustrated, education is delivered not only in brick-and-mortar buildings. To receive a public education, students now require broadband access at school and at home.

While we have discussed the temporary nature of many of the innovative solutions used by LEAs to meet the remote learning needs of students, UBC needs to consider the very real possibility that some of these measures may become permanent, not temporary, and that some of them will of necessity rely on wireless technology. “Fiber to the home” is a great goal, and it will work well for most locations. The state may well be faced with decisions, however, where $4 million could build a fiber network that serves forty households, but that same $4 million would only connect one very remote household to a fiber network. Because of this economic reality, the most remote households will always be pushed farther down the list of priorities and thus also down the timeline, and even then, we may never have adequate funds to connect them all to fiber. In the meantime, there are students who live in those remote households, and they should not be left without access to SchoolNET when wireless or other new technologies are available.

In addition to these barriers, we need to consider the barrier of connection fees to affordable fiber. A surprising number of neighborhoods and communities have fiber running right through them or very nearby, but the connection fees involved—often more than $1,000 per household—are well out of the affordable range. This is another area where a portion of the BEAD funding should be set aside to target individual addresses where hook-up fees or line extension fees are the primary barrier to having affordable broadband to that address.

4 OBSTACLES OR BARRIERS

The ambitious goal of providing affordable broadband to every person in the state comes with equally high barriers. Some of these barriers are fixed: Utah’s geography will not change, so we must find technological solutions that overcome those literal obstacles. Other obstacles are procedural: with many public and private entities involved in this effort, we will need to overcome barriers to communication and cooperation. Many of these procedural barriers make the first step in this process—an accurate gap analysis—very challenging. In this section, we will detail the following key barriers:

- Geography that impedes high-speed internet
- Misalignment regarding key data repositories and common processes
- Incomplete FCC Fabric data
- Gaps in available and affordable service
- Lack of broadband service provider fiber information
- Inconsistencies of student user experience
- Lack of advocacy for students and their network challenges

- Student data privacy concerns
- Overloaded education IT staff and library staff

In section 5, we will discuss strategies to overcome these barriers.

4.1 GEOGRAPHY THAT IMPEDES HIGH-SPEED INTERNET

Utah's rugged geography provides a scenic backdrop that brings more than eleven million visitors to Utah's national parks each year and adds $1.3 billion to local community economies. At the same time, this topology of steep mountains, deep valleys, high mesas, rivers, streams, and desert washes creates some of the biggest challenges to providing broadband access for many of the approximately 43,000 students in unserved or underserved locations.

Utah's topology creates challenges for delivering wired internet service, such as fiber-optic-based broadband, in a manner that is profitable for many ISPs. In cases where geography, distance, and low population density present challenges to the delivery and sustainability of fiber-based broadband, wireless solutions must be leveraged. To be reasonably cost-effective, broadband access in these areas is a necessary mix of the best-fit technologies to reach students who reside in a remote farming community, tourist community, or secluded portion of a reservation. Regardless of location, the student still needs access to adequate and affordable broadband for today's educational modalities, including completing homework and interacting with their peers and teachers online.

Keep in mind, as well, that children seldom choose where they live, and as a result, whether or not they have adequate or affordable broadband to do their homework at night. Even families of students who live where broadband is available may not be able to afford it. Yet all students require access to broadband internet service to participate in public education regardless of their families' ability to afford it. This concern should be at the forefront of conversation among the adults and agencies that have custodial responsibilities for these students' education. It is at the forefront of UETN's concerns because providing access to education resources is part of our legislative mandate.

4.2 MISALIGNMENT REGARDING KEY DATA REPOSITORIES AND COMMON PROCESSES

The Utah State Board of Education (USBE), the Utah Broadband Center (UBC), the Utah Geospatial Resource Center (UGRC), and the Utah Education and Telehealth Network (UETN) have all been working separately on access for community anchor institutions (CAIs) and student for some time. These split efforts present a barrier but also an opportunity: in particular, the broadband planning grant process provides an opportunity to explore the topic as a collaborative group. Each agency has identified data sources, and a cooperative effort from these entities could deploy those data to support further discovery and planning.

For example, as these agencies look toward a common action plan based on pooling resources and data sources, a logical first step is to work together to identify student broadband needs by location, leveraging data from the student information systems (SISs) of local education

agencies (LEAs), stripped of any personally identifiable information (PII). This step would allow USBE to work directly with UBC and UETN to make sure every student in the state has equitable access to SchoolNET. (As explained in Section 3, SchoolNET is our umbrella term for services that provide students with content-filtered, education-focused internet access.) We should include K-12 schools, higher education, telehealth, libraries, workforce services, and career and technical education (CTE) programs in the conversations about student broadband needs to make sure all relevant stakeholders give input.

4.3 INCOMPLETE FCC FABRIC DATA

The FCC National Broadband Map,[43] also known as the FCC Fabric, provides essential information to every state about broadband availability and speed. For the Infrastructure Investment and Jobs Act (IIJA) and Broadband Equity, Access, and Deployment (BEAD) efforts, it's vital that this map be as accurate as possible because it will inform where, when, and how broadband funding is distributed. The baseline map information uses broadband availability data self-reported by internet service providers (ISPs) to show information for specific addresses. The nature of this data has caused various stakeholders to express concerns that incomplete map data may actually lead to inaccurate funding allocations.[44]

Across the nation, the FCC Fabric often represents a broadband service provider's optimism rather than the end user's actual experience. Several prominent leaders in the industry recognized this fact and have voiced concerns. For example, Peggy Schaffer, strategic advisor to mapping software company VETRO FiberMap, pointed out that states must "be the source of truth for challenges" when it comes to the Fabric.[45] And Chad Rupe, general manager of fiber provider Ponderosa Communications, agrees with Schaffer. He said, "Coverage maps require a party that can call out untruths and misdirection. Providers often claim to be providing 100 megabit per second (Mbps) symmetrical speeds to locations simply to prevent competition in the area."[46]

Federal funding processes often create an additional barrier for states to act as "arbiters of truth." When UBC becomes the entity that disburses funds, it must remain neutral between all parties, including providers and citizens. This change in roles for the state means that other parties need to step in and address information gaps where they exist. As the following graphic shows, the FCC defines which groups may act as "eligible challengers" and has given directions for how they should function.

[43] FCC National Broadband Map: https://broadbandmap.fcc.gov/home
[44] Broadband Equity, Access, and Deployment (BEAD) Program: Issues and Congressional Considerations: https://crsreports.congress.gov/product/pdf/IF/IF12429
[45] "States Must Be the Truth Arbiters of Broadband Coverage, Say Experts." *Broadband Breakfast*, April 14, 2023. Accessed on July 6, 2023. https://broadbandbreakfast.com/2023/04/states-must-be-the-truth-arbiters-of-broadband-coverage-say-experts/#:~:text=To%20successfully%20implement%20these%20state,of%20coverage%20claims%2C%20said%20Schaffer.
[46] Ibid.

Figure 4.1. Challenges Improve Service Long Term. *The FCC Fabric is a vital tool for gap analysis and funding projects that serve all students. Fortunately, the FCC has put a process in place to challenge the map and improve its completeness.*

Later in this section, we will discuss the roles UETN and other groups can play as advocates for Utah CAIs and students.

4.4 GAPS IN AVAILABLE AND AFFORDABLE SERVICE

Even when the broadband connectivity shown on the FCC Fabric map is complete, that does not mean the broadband is reliably **available** at every home, nor does it mean that the broadband is **affordable** for every home. As noted in the UBC Digital Connectivity Plan,[47] "Of those who reported not having an internet connection, the most commonly reported reasons were affordability, which included both expensive monthly charges (41 percent) and initial connection fees (26 percent)." In other words, of all the Utahns who did not have an internet connection, 67 percent lacked a connection because they could not afford it.

The common practice of "bundling" services illustrates the problem of expensive monthly charges. For example, the purchase of 1 Gbps internet service might be available for $59 per month, but only if the student's parent or guardian also purchases the additional $55 per month cable TV package. While this arrangement is advantageous to the consumer who can afford

[47] Utah Broadband Center Connecting Utah Digital Connectivity Plan, p. 61–64, June 7, 2023. https://www.connectingutah.com/_files/ugd/ceee1c_e7b9a37165f2441b9a8a417d50867bdf.pdf

that cable package, for a family that only needs internet service, this arrangement requires them to either pay more for a bundle or pay more for the standalone service.

In other words, of all the Utahns who did not have an internet connection, 67 percent lacked a connection because they could not afford it.

Initial connection fee examples include students who have fiber within a few hundred feet of their homes, at the end of the block, across the street, or in the air above their residences, but do not have broadband. To obtain it, the families face the challenge of paying an additional line extension fee ($1,200–$3,000), or a basic hook-up fee ($99 or more).

4.5 LACK OF BROADBAND SERVICE PROVIDER FIBER INFORMATION

The necessary gap analysis is undercut by existing Utah law. Utah Infrastructure and Broadband Law UT Code § 63N-3-501 (2019Utah Infrastructure and Broadband Law UT Code § 63N-3-501 (2019 specifically states that disclosure of "broadband availability speeds is voluntary," meaning that broadband service providers do not have to share the actual paths for their current fiber networks. Since a gap analysis looks at how to bring two disconnected things together, having one half of the equation—the fiber network—unavailable generates a problem that is difficult to overcome. Collaborative efforts to determine the most cost-effective fiber solution for a student's location are hindered because we cannot perform an accurate gap analysis without knowing the location of the nearest fiber strand. In addition, for the unserved/underserved areas, we lack information regarding auxiliary backhaul, middle-mile pathways, and routes that safeguard against accidental outages or interruptions.

4.6 INCONSISTENCIES OF STUDENT USER EXPERIENCE

Students who do have access to internet service don't always receive reliable, high-quality service. Many factors contribute to a perceived poor or degraded user experience:

- Service does not consistently meet the National Telecommunications and Information Administration (NTIA) minimum acceptable rate of 100/20 Mbps.
- Oversubscribed networks from ISPs may not be adequate to support the number of homes served or maximum usage patterns during certain times of day.
- Major events on the network, such as Super Bowl streaming, presidential elections, and major operating system updates, impact large portions of the customer base.
- Student home network experience degrades quickly between 7 and 10 p.m., when utilization by adults in the neighborhood increases due to activities like multiple video streams or gaming.

- Old or inadequate home network equipment that is unable to support network throughput requirements is often cited by ISPs as the cause for end user speed test performance issues, even when that equipment is provided or owned by the ISPs themselves.[48]

If the service provider does not have the ability to measure student experience for specific applications (e.g., Canvas, Adobe, Lucid, Google Docs, etc.), the factors listed above often combine to create an end user experience that leaves the student feeling frustrated and discouraged about trying to complete their homework.

4.7 LACK OF ADVOCACY FOR STUDENTS AND THEIR NETWORK CHALLENGES

As we explained in our discussion of the FCC Fabric, when UBC becomes the entity that disburses federal funds, its role changes, and advocating for unserved and underserved residents may not be possible. It can no longer pursue advocacy because UBC may need to be a neutral arbiter between parties. As planning processes turn into implementation and then operational processes, UBC's role changes. Specifically, the UBC role transitions from representing the Utah challenges to the FCC Fabric into a role that works with providers, communities, and other groups of constituents who need broadband connectivity.

In this role, UBC will be able to represent the different groups, but a question remains on how individual entities, especially students, can gain help in mitigating access issues. The needs of unserved and underserved populations remain, which means other agencies will need to fill that gap.

In Section 5, UETN discusses several different advocate roles, so to mesh this section with that one, we will discuss the same advocate roles here, focusing on the barriers that make those roles necessary.

We want to emphasize the following areas:

- **Broadband service providers with advocates.** Every broadband service provider that accepts Affordable Connectivity Program (ACP) funding must have a "lifeline" advocate who helps consumers in financial distress. Since the expansion of broadband will likely experience inconsistencies and challenges, as all large-scale efforts must, we should address this barrier by preparing lifeline advocates to do more for consumers who may not be getting the service they expect. And we should make sure consumers know that both the ACP program and these advocates exist to help them.
- **Advocates within LEAs, regional service areas, and possibly UETN.** Students in unserved and underserved areas remain a vulnerable population that will need

[48] "Router and Modem Rental Fees Still a Major Annoyance Despite New US Law," *Ars Technica*, March 10, 2022, https://arstechnica.com/tech-policy/2022/03/router-and-modem-rental-fees-still-a-major-annoyance-despite-new-us-law

outspoken advocates. A logical place to look for these advocates is within the LEA or the regional education service center. These people know the financial processes, the providers, and the students and families, making them a natural fit. However, if we are unable to find advocates in every LEA, UETN may also be able to fill this role.

- **Statewide advocacy group that encompasses relevant stakeholders.** While local advocates will provide an essential service, we will also need an advocate group at the state level. We suggest an advocate group formed by a consortium of providers, UBC, UETN, USBE, UGSC, and more. We have already formed an advisory group of these members, and we believe that as the broadband expansion effort continues through the state, this group should transition from an advisory role to an advocacy role to make sure all groups are represented at the state level. This advisory board will need to meet regularly to work through individual- and community-specific issues, identify funding mechanisms, discuss technical options, identify appropriate collaborators, streamline data sharing, and prioritize requests. In Section 5, we will explain why UETN, in combination with these other groups, is well positioned to take on this role.

In the meantime, other entities will need help to continue challenging the FCC Fabric to make sure it best reflects the reality of the consumer experience. The following graphic explains the process for becoming an "eligible entity" that can challenge the FCC Fabric.

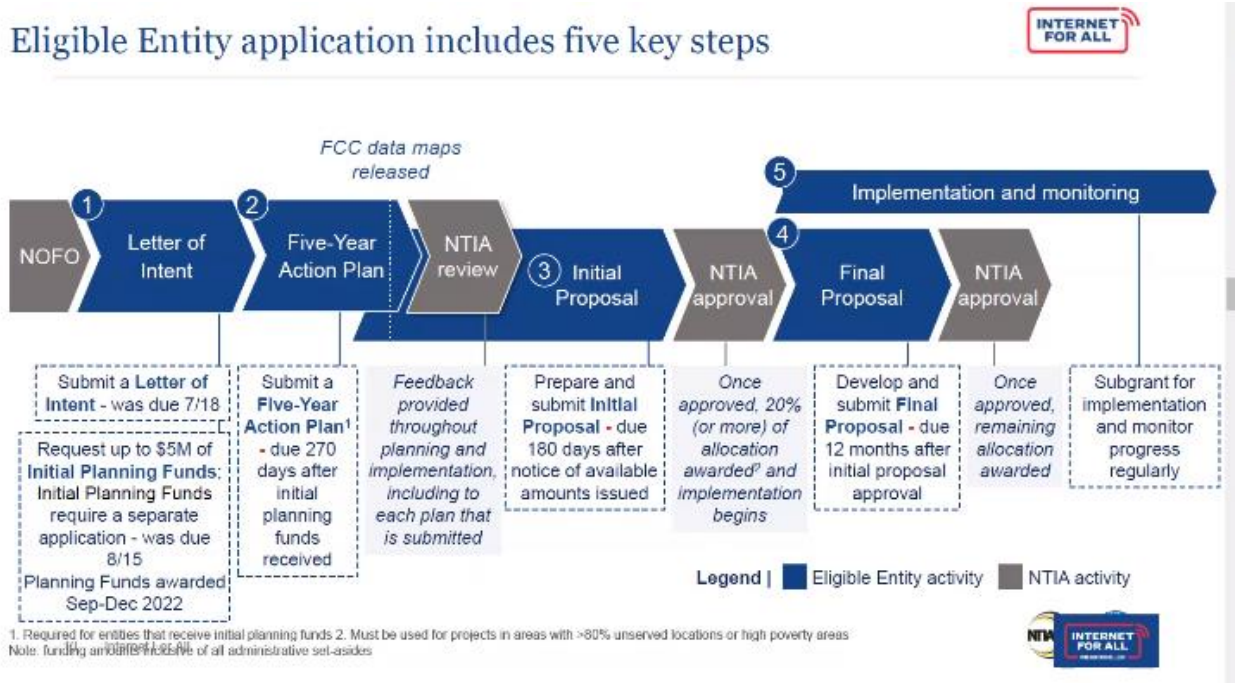


Figure 4.2. It's Not Easy to Become an Eligible Entity. *In order to become an eligible entity that can make a bulk challenge to the FCC Fabric, an agency needs to perform a series of tasks and receive NTIA approval at multiple steps.*

While a broader question exists regarding advocacy and processes for individual entities throughout the state, for the scope of this document, we focus on students, schools, and districts. These LEAs and their students will require a trusted third-party advocate and set of processes to interact with internet service providers to validate and work through claims of insufficient broadband access to individual residences. This work may be as simple as organizing speed tests and technical assistance (e.g., the Bonneville Internet Speed Week campaign we describe in Section 3). Or this work may involve working with the districts, providers, and other collaborators to verify end user data speeds and look at various technical options and funding mechanisms to resolve them. Since this advocacy does not exist today, either BEAD or another funding mechanism will need to support this effort.

4.8 STUDENT DATA PRIVACY CONCERNS

Utah law Title 53E-9-309: Third-party Contractors requires schools to include student data privacy provisions in all third-party agreements that receive student personally identifiable information (PII).[49] The goal of this law is to protect private student information, including address and location information.

During this proof-of-concept pilot, UETN has developed techniques to protect student privacy while obtaining general location information for gap analysis. (Please see Section 3 for further details.) As the backbone broadband provider for 1,900 CAIs in Utah, UETN is uniquely qualified to work with broadband service providers and LEAs to establish best practices for extending SchoolNET to students in a secure way that protects the students' PII.

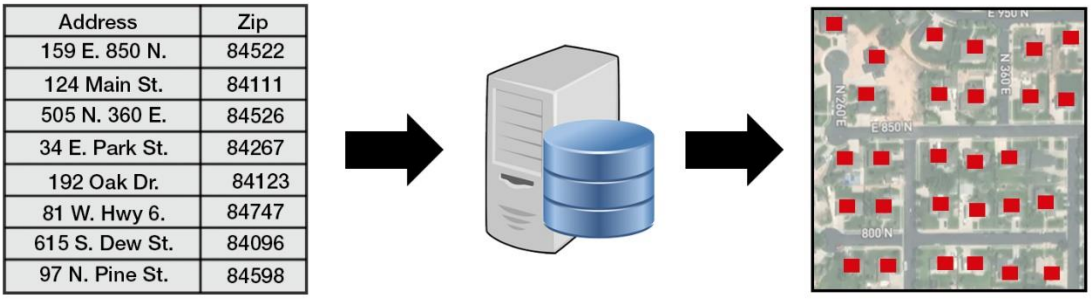


Figure 4.3. Careful Process Protects Student Data. *UETN has developed techniques to scrub and decontextualize student location data to protect student privacy.*

[49] Student Data Privacy Agreements, USBE, https://www.schools.utah.gov/studentdataprivacy/agreements

4.9 OVERLOADED EDUCATION IT STAFF AND LIBRARY STAFF

The COVID-19 shutdowns in March 2020 created major hurdles that LEA IT professionals throughout the state had to overcome. Many LEAs worked with UETN to expand SchoolNET services to facilitate students learning at home. LEA IT professionals put in hours of Herculean efforts to support 100 percent online learning, often sacrificing family time and personal relationships for the greater good of their communities. When the COVID-19 shutdowns officially ended, teachers and students went back to class, but the public expectation for remote school access remained. This expectation has grown to demand continued service to traditionally unserved and underserved neighborhoods.

To be clear, none of the LEAs we consulted while conducting stakeholder interviews and gathering data for this plan wanted to provide at-home SchoolNET access for their students. They all prefer to have a commercial broadband service provider provide that service in their areas. They are only taking action because no options—or no affordable options—exist for their students. LEAs are responsible for providing an equal and accessible education to every student, and they recognize that online schooling today requires affordable broadband to each student's home. Therefore, until and unless a private broadband service provider can provide access at a price families can afford, LEAs have been under a moral imperative to support their students by any means necessary.

As IT staff for LEAs have resumed their school or district operational and special project duties, the additional burden of remote access connectivity has spread the existing workforce even thinner. As a result, LEAs with large populations of unserved and underserved students will require additional financial and staffing resources or external resources to overcome this barrier in the long term.

Many LEAs are anxious that the state will place a requirement on them without providing the necessary funding, as this scenario has happened in the past. However, the availability of state and federal funds for broadband internet access provides the necessary opportunity to support these LEAs and their increased staffing needs.

This concern regarding IT professionals also extends to librarians. During the pandemic, Utah state libraries provided hotspots to patrons that could be checked out like library books and taken home. While these provided a much-needed lifeline to homes in communities where broadband was unavailable or limited, UETN would strongly suggest that libraries use alternative technologies to meet this need in a more sustainable manner. BEAD funding would allow UETN to help libraries to use a modified version of SchoolNET.

As noted in several other Digital Connectivity Plans, the success of this initiative, and the obvious benefit to the patrons, has recently been impacted by the loss of COVID-related funding. Many of these libraries have either cut back or been forced to eliminate these hotspots entirely because of lack of ongoing funding. Lack of ongoing funding for

libraries to continue offering this type of service to their low-income or transient populations is an obstacle moving forward.

5 IMPLEMENTATION PLAN

5.1 PRIORITIES

Cooperation, collaboration, and coordination will be the watchwords for a successful broadband expansion effort in Utah. This effort will not be a turnkey operation where we can hand over a check and receive an expected outcome. If we want this effort to succeed, we will all need to work together—public and private, state and local, individual and community.

The Utah Education and Telehealth Network (UETN) has blazed trails by embracing collaboration and nurturing coordination between disparate groups and interests to help students throughout the state. We will carry that approach through all phases of implementation, including the priorities described in the following table.

Table 5.1. Priorities for Broadband Deployment and Digital Access

PRIORITY	RANKING	DESCRIPTION
Obtain accurate anonymized data on unserved and underserved students	High	The first part of a full gap analysis requires us to obtain accurate anonymized student data. We further recommend obtaining this data at a regular cadence to make sure various maps stay up to date.
Obtain accurate network endpoint information	High	The second part of a full gap analysis requires us to obtain accurate network endpoint information—in other words, where is the fiber? How far away is the fiber from the students who need it? If fiber isn't the right solution for an area, what other technologies are currently in place?
Perform full map gap analysis	High	At least annually, the Utah State Board of Education (USBE) should allow the Utah Geospatial Resource Center (UGRC) to geo-code students for Utah Broadband Center (UBC) planning.
Conduct regular endpoint validation	High	At least annually, have student devices run UETN speed tests and provide the results to UGRC for use by UBC.
Perform stakeholder updates	High	At least annually, stakeholders UBC, USBE, UETN, and broadband service providers should meet to decide and update master plan priorities.

PRIORITY	RANKING	DESCRIPTION
Engage in advocacy to match solutions to student access needs	High	Create one or more advocate roles to work with broadband service providers, students, and local education agencies (LEAs) to inform and match students to appropriate technical solutions and financial aid.
Make legislative recommendations	Medium	When appropriate, advocates will make recommendations to local, state, and federal governments that will support private and public entities' ability to perform broadband expansion and provision.

Our goals and objectives as outlined in Section 1.2 map to our priorities in the table above. We describe the rest of our implementation plan in Section 5. Section 5.2 briefly describes activities. In Section 5.3 we go into more detail regarding how we plan to achieve our priorities. Section 5.4 explains how we will engage our stakeholders and presents how we might set up advocacy groups to interact with LEAs and students in order to help match solutions to student broadband access needs. Section 5.5 explains our predicted timeline, and Section 5.6 begins to break down the costs we expect to face. Section 5.7 looks at how we aim to align our priorities with those of other communities seeking funding for this effort. Finally, Section 5.8 discusses the roles we think the UBC may need to play during the next five years.

5.2 PLANNED ACTIVITIES

This document describes many of UETN's planned activities in Sections 1–4, and we include specifics in Section 5.3, Key Execution Strategies. To avoid repetition, we won't put details of all activities and strategies here. We will, however, highlight an important upcoming activity that will help with the necessary gap analysis of student needs: Bonneville Internet Speed Week.

5.2.1 Bonneville Internet Speed Week—A Speed Testing Push

To get needed data about internet speed on student devices, UETN has leveraged the talented IT professionals at the NUES/SEDC regional service centers, along with UETN engineers, to develop an automated speed test to run on existing LEA-owned Chromebooks and iPads. We rolled this out during a pilot project in the last month of the 2022–23 school year. The speed-testing work allows them and the LEAs to gather valuable data from the schools that allow their students to take home school-owned devices. This pilot project led to a ten percent increase in speed-test data for UBC.

Due to the success of our pilot project, the team proposes to continue testing during "Bonneville Internet Speed Week" in September 2023. UETN and our partners will fund this activity through shared development costs, small license fees (depending on final implementation), storage costs, and minor marketing costs, allowing us to gather critical data from a minimal expenditure.

5.3 KEY EXECUTION STRATEGIES

To fully realize the goals and objectives defined in Section 1.2, we need innovative, collaborative strategies. This section explains our key strategies, such as creating an accurate gap analysis for students in the state as well as developing long-term funding models. These strategies are not absolute and unchanging—we recognize that they will require refinement based on feedback from collaborating partners and, importantly, the students.

5.3.1 Obtain or produce an accurate and anonymized list of unserved and underserved student locations.

Objective: Create an anonymized list of unserved/underserved locations based on the best data available from school districts and the Utah state education system.

Strategy:

The first half of the gap analysis for student broadband access is locating the students. In order to know "by student, by standard … by address," the UBC must have geospatial data for individual houses where students live. However, this data contains directory Information[50] that the public might interpret as personally identifiable information (PII) regarding the students or families.

While we emphasize that PII would **never** be made public, we want to avoid even the perception of that happening. Therefore, the team proposes the additional step of stripping the data of all PII and presenting only a generic list of unserved and underserved house locations. The team will work with USBE, UGRC, and the LEAs to accomplish this task.

Ideally, the team will collaborate with USBE and UGRC to create a secure set of processes for communicating anonymized forms of this data from the existing USBE state data sources directly and securely to UGRC for mapping on a geospatial layer. UGRC provides geographic information system (GIS) services to Utah's state and county governments. Should statewide data not be available, or where it might be lacking, the team will work directly with the 168 LEAs[51] that wish to participate, using their respective LEA student information systems (SIS), their respective transportation departments, and local LEA personnel to collect, correct, and anonymize this data.

If we work directly with the LEAs, this effort will require funding additional staffing, and we will need to establish an annual review in order to adapt to the changing student populace.

---

[50] "Directory Information", 5(a) - https://www.govinfo.gov/content/pkg/USCODE-2021-title20/pdf/USCODE-2021-title20-chap31-subchapIII-part4-sec1232g.pdf & https://www.ecfr.gov/current/title-34/subtitle-A/part-99

[51] Utah has 41 school districts, the Utah School for the Deaf and Blind (USDB), and 127 state-chartered schools. https://ucap.schools.utah.gov/Home/AboutCharters

However, this data collection approach is critical in meeting the overarching goal of “internet for all” when it comes to Utah students. Without it, the task is impossible.

Please note that for a certain subset of Utah’s student population, we should take care to provide SchoolNET solutions that extend “to the child” and not to the address on file with the LEA. These students live in situations where they are often unsure where they will sleep each night due to economic or family dynamic factors beyond their control. For these students, we need to target broadband solutions for their personal devices and make sure the internet “just works” when they find a safe place to do their homework.

In summary, the objective of this first strategy is to find all the unserved and underserved students in Utah so that we can figure out how to get broadband access to them.

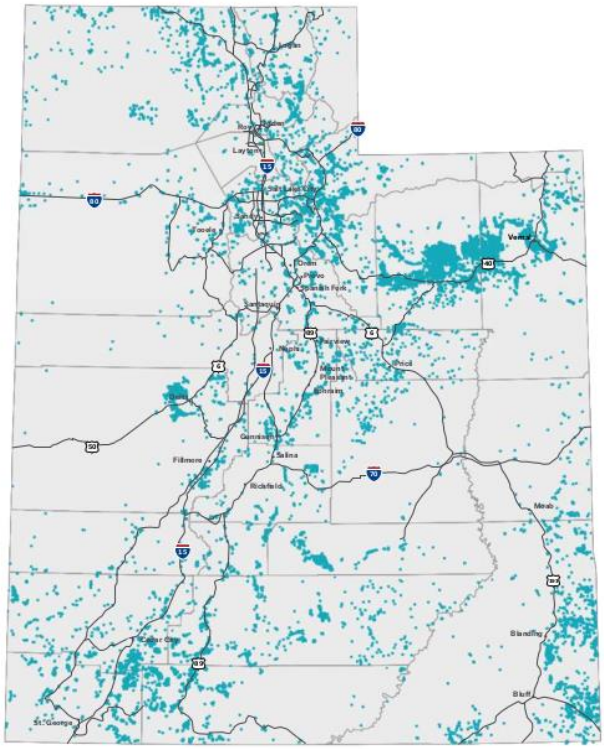


Figure 5.1. Unserved and Underserved Areas of Utah. *The state is peppered with locations where unserved and underserved students cannot access broadband internet. UETN is working with providers and LEAs to identify them all.*

5.3.2 Obtain or produce a map of the closest network endpoints in areas identified as unserved/underserved.

Objective: Create a geospatial data layer map that shows UDOT, UETN, and broadband service provider network endpoints in relation to anonymized student housing data.

Strategy:

The second half of the gap analysis for broadband student access is determining the locations of fiber and other broadband hardware. Once UETN has a reasonably anonymized student location dataset assembled and mapped to a GIS data layer, the team will work parallelly in parallel and serially together with LEAs and UGRC to superimpose the UBC unserved/underserved layer on the statewide map. The team will also work with collaborating broadband service providers, the UBC/Horrocks engagement team, and other collaborators such as UDOT to create a layer that shows all relevant fiber endpoints.

With these layers, the team will analyze the results in the context of community and state plans such as UDOT's five-year Statewide Transportation Implementation Program (STIP). The STIP identifies upcoming road projects and areas where UDOT and providers can collaborate in a "dig once" approach to install fiber trunks and additional empty conduit for future growth, especially in hard-to-reach areas. This approach helps realize a statewide vision of "deep fiber nodes" where public-private partnerships make reasonable financial sense.

For areas where the cost for fiber is currently unreasonable with present installation methods or will require large amounts of sustained multiyear funding to reach the desired final fiber endpoint, we may need a different approach. The UDOT infrastructure already contains deep fiber nodes that provide a middle-mile connection point for alternative technologies to extend from that point to current unserved/underserved areas.

In short, once we know student locations, we need to map them next to existing fiber locations so that we can complete a gap analysis that helps us connect the two.

5.3.3 Complete gap analysis with partners and identify potential technological solutions.

Objective: Create an anonymized ArcGIS layer for a UBC complete gap analysis through partnerships with USBE and UGRC.

Strategy:

Once we have created the layer of unserved/underserved locations and the layer of network endpoints and major trunks, UETN will then need to work with collaborators to form an anonymized result layer for analysis. We will also form a working group from UBC, USBE, UETN, the Utah Rural Telecom Association (URTA), LEAs, and other pertinent community members. This working group will use these map layers to perform a gap analysis that considers the context of the NTIA definition of low-cost broadband service: "low-cost broadband service option should address, at a minimum… (2) the plan's basic service characteristics

(download and upload speeds, latency, any limits on usage or availability, and any material network management practices)."[52]

As the gap analysis takes shape, UBC—with help from this team—can begin to create a prioritized list of unserved and underserved areas and communities. This approach allows UBC and its partners to prioritize community deployment and fiber projects and pool financial resources when possible.

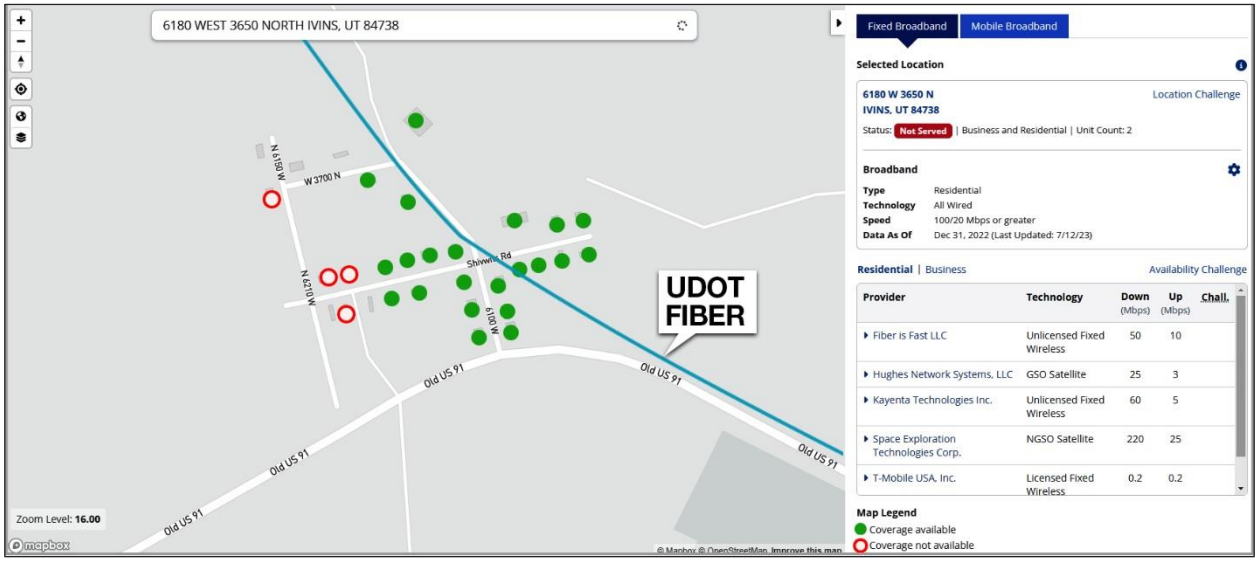


Figure 5.2. Sample Overlay of an Unserved Area and the Fiber Location*. Ivins, Utah, provides an example of how pockets of unserved students exist even where fiber is very close. A vendor installed aerial fiber years ago as part of a network, but residents have not yet been connected to the fiber, leaving students without access to the broadband internet they need for schooling. This map combines information from the FCC Fabric with information from UDOT about fiber location. When UETN completes its gap analysis, we will have maps like these for the entire state. (Note: This map shows eligible location data from the FCC Fabric, not specific student homes.)*

In addition to the physical logistics, this approach will allow UBC, UETN, the communities, districts, broadband service providers, and other partners to engage in more in-depth and transparent dialogue. This dialogue should produce better community partnerships as the residents discuss the legal/tariff challenges that Utah's rural telco providers face and the challenges that the LEAs and community members face.

As noted in Section 5.4, Ongoing Stakeholder Engagement, successful and sustainable implementation will require this working group to meet with other groups across the state regularly and establish a long-term horizon for the shifting student landscape. In other words,

[52] https://broadbandusa.ntia.doc.gov/sites/default/files/2022-05/BEAD%20NOFO.pdf , pg. 67

the gap analysis work by UETN and our partners will repeat at least annually as part of a multiyear, multiphase set of network rollouts throughout the state.

One of the key initiatives of the group will be to standardize the process and protocols for gathering anonymized data, submitting it for inclusion in the map layers, and identifying unserved/underserved areas. This process is very time-intensive, and streamlining and standardizing the process will help make it less burdensome, particularly on LEAs.

To summarize, this strategy will take the two ends of the gap analysis—students and broadband hardware endpoints—and bring them together to create a map that lets us build a prioritized list of projects.

5.3.4 Work with partners to identify potential financial models that leverage multiple state and federal programs for providing services.

Objective: UBC, USBE, UETN, and URTA have a mutual vested interest in connecting affordable broadband to Utah students as both a moral imperative and an economic incentive. Our agencies must work from a single master plan to find multiple revenue streams to provide affordable broadband access for all students.

Strategy:

Broadband is of no use to rural residents if it isn't affordable. Poverty is much higher in rural Utah than in urban areas of the state: 10.3 percent compared with 7.0 percent, according to the USDA Economic Research Institute.[53] What's more, broadband access is a necessary component of the modern public education to which each student in Utah has a right.

How do we define affordable, though? The BEAD Notice of Funding Opportunity (NOFO) states:

> A definition of low-cost broadband service option should address, at a minimum*:*
>
> (1) all recurring charges to the subscriber, as well as any nonrecurring costs or fees to the subscriber (e.g., service initiation costs) ...
>
> (3) whether a subscriber may use any Affordable Connectivity Benefit subsidy toward the plan's rate; and
>
> (4) any provisions regarding the subscriber's ability to upgrade to any new low-cost service plans offering more advantageous technical specifications.*[54]*

The UBC, USBE, UETN, URTA, LEAs, and broadband service providers have a common interest to find financial models that leverage the state, federal, and private programs which enable connectivity to all students. To achieve this common interest, the approach must be

[53] Rural Health Information Hub, https://www.ruralhealthinfo.org/states/utah
[54] https://broadbandusa.ntia.doc.gov/sites/default/files/2022-05/BEAD%20NOFO.pdf, pg. 67

collaborative, not mandated. Flexibility—with technologies and with the application of funding (within guidelines)—will be important to achieve the goals efficiently.

As already noted by our advisory board for this planning grant, having candid conversations about hard issues from all perspectives is a key element to successful collaboration, especially where money is involved. Open dialogue regarding the legal and tariff issues that Utah rural telco providers face is as important as identifying unserved and underserved locations. Current legal and tariff issues often create economic constraints for local broadband service providers that either interfere with network rollouts and upgrades or prevent them from offering broadband service at competitive rates. Additionally, we need to continue to discuss balancing the importance of consumers having a minimal amount of "skin in the game" with the needs of students who have no skin to give due to factors beyond their control. The state can encourage a strong work ethic, but it must offset that value by acknowledging the realities of poverty and the needs of students who have no control over their life circumstances.

Our team will need to create a robust list of available state, federal, and private funding programs and communicate about them to residents living in unserved and underserved areas. Advocates need to be aware of funding options and work with LEAs to communicate these resources to students in need.

We propose that a working group composed of the UBC, USBE, UETN, URTA, LEAs, and broadband service providers collaborate to discuss and develop broadband solutions that benefit students throughout the state. We will discuss this group and its responsibilities in greater detail in Section 5.3.5.

The working group also needs a thorough understanding of these programs so they can effectively connect the funding to necessary network rollouts. The working group and advocates must understand the guidelines of these funding programs, how the monies apply, and their respective timelines (if any).[55]

Financial models for this work will need to leverage existing partnerships and seek new partnerships with state, private, and nonprofit groups. As the working group identifies concrete objectives for unserved and underserved areas, they should look for projects that combine goals. For example, as mentioned in 5.3.2, the leadership of UDOT and its five-year Statewide Transportation Improvement Program (STIP) have been able to work with broadband service providers to create collaborative projects.[56] These projects install conduit, fiber, and other communication services while UDOT is in the process of upgrading roadways. This type of public-private partnership and identification of common goals will effectively leverage limited

[55] ACP funding is scheduled to run out, taking away an important source of funding. Maine Connectivity Authority newsletter, Jul 6, 2023, explains: "ACP is currently funded with a one-time allocation from the IIJA. The funds will be exhausted by June 2024 at the current estimated rate of expenditure. Deploying hundreds of millions of dollars to infrastructure to connect Maine households [or households in any state, including Utah] is only part of the equation; those households must also be able to afford that service. The ACP requires an estimated $7–8 billion in annual funding to continue connecting families who struggle to afford the internet."

[56] https://www.udot.utah.gov/connect/about-us/commission/stip/

BEAD funding as well as other state and federal financial broadband investments. It will also provide a model for other partnerships to follow.

The working group, which includes broadband service providers, will also investigate the feasibility costs and efficiency costs of different network technologies. Emerging network technologies such as 5G wireless can deliver the requisite speeds and lower latencies to unserved/underserved areas where "fiber to the home" is not currently an option. Together these collaborators will be able to explore, test, plan, and provide cost estimates through discussions at collaborative workshops such as the UETN Future of Wireless Retreat, the UETN Tech Summit,[57] and Utah Transportation Conference.

Collaboration with these additional stakeholder groups will allow the creation of a final priority list. This process will facilitate better conversations when UBC reaches out to private providers to let them know what areas are underserved so providers can decide whether they will undertake the challenge of serving those locations.

5.3.5 Identify available last-mile technologies for different student use cases.

Objective: Create a limited array of potential "best practices" endpoint technology solutions with providers which allow UETN and LEAs to deliver SchoolNET services reliably.

Strategy:

The working group we described in Section 5.3.3 needs to provide leadership, national and global vision, and practical technical assistance to LEAs. To do so, the team will leverage knowledge and experience from Utah broadband service providers, UDOT, the University of Utah (U of U) Platform for Open Wireless Data-driven Experimental Research (POWDER[58]) project, Research and Education networks in Quilt[59], Internet2[60], relationships with the Department of Energy—Energy Sciences Network[61], and other relevant technical groups and consultants. These partnerships allow UETN to explore emerging technologies which we can then disseminate to Utah LEAs and partner broadband service providers to create an array of choices to reach the unserved and underserved.

By leveraging resources such as the POWDER test bed and broadband service provider lab environments, the team will be able to develop new approaches, best practices, and alternative solutions. For example, wireless broadband starts to fail when different users try to use the

[57] UETN Tech Summit: https://uetn.org/summit/

[58] POWDER (the Platform for Open Wireless Data-driven Experimental Research) is a facility for experimenting with future wireless networking on a city-scale "living laboratory." It provides radios that are programmable down to the waveform, attached to a network that can be configured by the user. Researchers use this platform to build and test new protocols and technologies.

[59] The Quilt: https://www.thequilt.net/

[60] Internet2: https://internet2.edu/

[61] Department of Energy ESnet: https://www.es.net

same spectrum at the same time. The POWDER test bed has developed spectrum monitoring capabilities with simple packaging for easy deployment. This spectrum monitoring package will be able to deploy at specific sites around the state to monitor the utilization and availability of wireless frequencies, as funding becomes available. This technology will provide feedback to UETN, LEAs, providers, and the communities to help mitigate this issue. The POWDER test bed also provides a repeatable test environment which UETN and providers can leverage to validate new wireless technologies, software stacks, and the interactions between them. This test-bed environment is critical to validating broadband service provider claims and knowing how services truly work in an outdoor deployment.

Another example of resources combining to help Utah students is the way UETN, CentraCom, LICT, and a consultant group are collaborating to explore novel ways of handing off SchoolNET broadband service securely between private and public backbones. If successful, this exploration will demonstrate that a student on a broadband service provider network can show up behind the appropriate LEA firewall with respective security, filtering, and privacy policies, anywhere in the state. A third example of an emerging exploration with the regional service centers is the creation of a simple wireless-to-go solution using virtual or preconfigured SIMS/eSIMS[62] for easy LEA SchoolNET access/deployment.

Each of these examples is in early-phase exploration or thought design, but they should have significant impact on the deployment of last-mile broadband access. Each technology will also require the developers to explore and document the best practices before final deployment. For a new technology to be of merit, the working group, including broadband service providers, must show how these technologies fit within their business and support models, meet UETN's network and security requirements, and can replicate to multiple LEA locations in a cost-efficient manner.

One of the biggest benefits of UETN working with small pilot groups of LEAs to test out these technologies is the opportunity to make mistakes in a safe environment. When these groups try out a technology and it fails, we document that one failure and share that knowledge with other LEAs, leading to better solutions in the future. choices we can share with LEAs. If an LEA tries the same experiment, it doesn't prevent other LEAs from trying and failing, wasting their time and resources. Oftentimes finding out what doesn't work is as valuable as finding out what does work, as long as we help others avoid a costly mistake.

Among these groups, the question of whether to use fiber or other technologies has received a great deal of discussion, for good reason. Fiber is secure, high speed, and reliable, so as UBC recognizes, it is the best choice for most areas. But it also requires a physical connection from the fiber node to the household, and some households will cost more to connect than UBC and its private partners will be willing to pay. With its partners, UETN agrees to prioritize fiber, but not at the expense of students who need service now.

[62] Subscriber Identity Module: https://www.gsmarena.com/glossary.php3?term=sim

UETN intends, pending available funding, to work with LEAs to extend their local school networks to students who are unserved and underserved while continuing to work with broadband service providers toward a permanent “fiber to the home” solution for every student in Utah. In addition, we will find last-mile solutions that fill in the gaps necessary to serve both urban and rural students.

5.4 ONGOING STAKEHOLDER ENGAGEMENT

UETN maintains ongoing meetings and collaborations with its stakeholders and partner providers throughout the state. We have leveraged these meetings as part of the gap analysis discussions. Some examples of these ongoing meetings are described in the following table.

Table 5.2. Leadership/Stakeholder Engagement Activities

PRIORITY	CADENCE	DESCRIPTION
PLTE User Group	Monthly	Statewide leadership discussion forum for LEAs piloting some kind of CBRS/LTE project—how-to guides, statewide purchasing contract, etc.
Utah Technology Coordinators Council (TCC)	Once each Semester	Members of the TCC include technology representatives from LEAs, USBE, and regional education service agencies (RESAs); TCC advocates for district technology needs that support improved student learning
Southwest Regional PLTE pilot sites	Quarterly	LEAs: Millard, Iron, Beaver, Kane, Garfield, and Washington School Districts
Northern Regional PLTE pilot sites	Quarterly	LEAs: Cache, Daggett, South Summit, Logan City, and Wasatch School Districts
Wasatch Front Districts & Library PLTE pilot sites	Quarterly	LEAs: Tooele, Granite, Salt Lake City, and Murray School Districts
Weber Schools PLTE pilot sites	Quarterly	Weber State University and Ogden School Districts
Central Regional PLTE Pilot sites	Quarterly	LEAs: Piute and Sevier School Districts
Southeast Regional PLTE pilot sites	Quarterly	LEAs: San Juan and Grand School Districts
Library PLTE pilot sites	Quarterly	CAIs: Tooele County Library and Weber County Library
PLTE/5G UETN Planning Meeting	Every other week	Includes key stakeholders across the state to discuss and plan for campus and SchoolNET access
ISPs	Individual site visits	UETN representative makes visits to each ISP

This table lists only a portion of the many dozens of meetings UETN facilitates throughout the state to coordinate the efforts of various groups. These engagements allow UETN to anticipate and help resolve technical deployment issues before most LEAs face them in the field, which is part of our proactive approach to finding solutions.

In addition to these existing groups, UETN formed an advisory committee specifically for this planning grant that includes members from URTA, UDOT, the U of U research community, K-12, and others. This advisory committee has brought together various perspectives that are typically not in the room at the same time, which has helped us uncover issues and find solutions together. These transparent discussions have uncovered a number of the challenges that rural broadband service providers, LEAs, and students face, as well as more opportunities to collaborate long term.

The participation and collaboration have proven so successful that the team plans to host, monthly or quarterly, members of UETN, UDOT, URTA, U of U, regional service centers, and districts who are deploying last-mile solutions. We may include different internet service providers (ISPs) and wireless ISPs (WISPs) that serve discrete geographic areas in the state. We would like to include USBE and UBC on a regular cadence, as appropriate, for their statewide perspectives.

We plan to expand this group to include additional groups, such as the Department of Workforce Services, USBE, CTE teachers, reservation and tribal land representatives, and telehealth providers, because they may have data or valuable input (as noted in the BEAD NOFO[63]). The working group would also like to encourage direct student input, which would provide additional insights and engage students in leadership development within their local communities.

Candid and open discussions have been and are expected to continue to be a critical component of these ongoing meetings. Both the BEAD advisory meetings and the LEA PLTE meetings involve concerns from all perspectives, such as the basic student need for access to SchoolNET, right of way issues, and legal requirements and tariff concerns that Utah broadband service providers face. To make the most of these working group meetings, the outcomes of these meetings will need to inform the ongoing, evolving UBC broadband plans for the state.

These meetings have been so useful, in fact, that UBC may want to **empower this group to act as advocates** for consumers throughout the state. While UETN focuses on students, the other participating groups have broader goals that include all state populations. As a collective group, this advisory committee is one of the most capable and well-informed collection of people

[63] See NOFO, p. 20, 6 - Increase skilled workforce availability & American Recovery and Reinvestment Act of 2009 p. 13 - Telehealth / IVC P. 21, 6,3-4 Expand capacity for rural communities to host new businesses & Enhance opportunities for residents to have better access to education and training.

in the state when it comes to broadband access. This group can do a great deal of good for Utahns.

UETN feels strongly that advocacy is vital to this effort going forward because individual consumers—and individual students—will get lost in the bureaucracy of BEAD broadband without a guide. The aforementioned advisory committee felt strongly[64] that we must create an entity that is empowered to advocate with local ISPs on behalf of students. The committee has identified several areas where this consumer advocacy will be particularly important:

- **Oversubscription.** We want to prevent underserved areas where too many customers are competing for the same bandwidth.
- **Timelines.** If the provider has promised to install a permanent solution such as fiber, how long will residents need to use alternative technologies?
- **Bypassing communities.** If a broadband service provider has fiber passing through a community, we'd like to make the case that they should connect the community rather than bypassing it.
- **Penalties.** Will the provider face penalties if they do not follow through on promised connections and speeds?

In addition to the advocacy group we described, a key component of "ongoing stakeholder engagement" that emerged from these discussions as part of this planning grant is the need for LEAs to designate student advocates. This role will likely include multiple people who match the student to available financial programs and technical solutions. Most rural telcos already have people who fulfill this role for their customers—a "lifeline" advocate who works with people in financial distress. The local LEA advocates will need to work directly with broadband service provider advocates to identify and provide immediate solutions for students with exceptional broadband needs. UETN, LEAs, and the regional service centers will need staff trained in broadband service and broadband affordability programs. They should also be equipped with the local knowledge of students and their needs. Together, the telco advocates and the LEA/UETN/LEA/regional service center advocates can help match technical and financial services to student needs in respective service areas.

If adding the student population to the LEA advocate's caseload creates workload stress, UBC may want to consider providing funding for these positions. The biggest challenge will likely come in publicizing these advocates to students, so UBC and broadband providers will need to work with LEAs, schools, and districts to get information to the students who need it. We suggest that all providers who receive BEAD funds be required to have a student advocate (this mirrors the requirements they already face to receive ACP funds).

If no simple financial or technical solution is readily available, these advocates should work with the LEAs and local technical experts to find immediate solutions for unserved and underserved

[64] Local broadband providers gave specific examples where they were underbid by national carriers, that intended from the start to only finish the best/premium locations and simply pay the fine at the end of the project/contract, leaving the unprofitable/undesirable locations unserved.

students, and quickly. Students in upper grades can be impacted greatly by missing a single week of online assignments. These advocates should have the ability to provide feedback about common challenges they are facing to the working group described in Section 5.3.3 that is exploring alternative technology solutions.

5.5 ESTIMATED TIMELINE FOR UNIVERSAL SERVICE

For a statewide approach to meeting the needs of unserved and underserved students, UETN and its collaborators will develop a multiphase, multiyear plan from the full gap analysis described in 5.3.3 above. Prior to the completion of a full gap analysis, the team can only develop a timeline for the gap analysis because it is a project unto itself that involves many stakeholders, development of initial data collection, development of ongoing processes, and the development of sustainable financial budgets, complete with full-time equivalency (FTE) personnel.

Assuming full collaboration with all partners and no unforeseen issues, the following table shows our estimated projected timeline.

Table 5.3. Estimated Timeline for Full Student Connectivity

TIME PERIOD	ACTIVITIES
Q3 2023	• Complete software development for Bonneville Internet Speed Week • Host Bonneville Internet Speed Week with collaborating LEAs • Submit results to UBC, USBE, and UGRC for incorporation into maps • Continue meeting with our advisory group • Expand advisory group to include tribal representatives, student representatives, workforce services, and career and technical education
Q4 2023	• Develop processes with UBC, USBE, and UGRC to create a secure data layer of anonymized locations • Overlay UBC/Horrocks broadband service provider endpoints layer with new anonymized student location layer • Begin appropriate NDA discussions with ISP partners for fleshing out network layers • Begin adding UDOT STIP information as a layer • Identify network technologies required to reach communities and areas not accessible by fiber
Q1 2024	• Continuation of work started in Q4 2023 • Work with UBC and partners to put together presentation for LEAs, USBE, and communities • Start to identify initial areas where UETN, LEAs, broadband service provider partners, UDOT, and others can make a significant impact • Develop multiyear, multiphase project for deploying initial areas • Identify potential funding sources for FTEs for advocacy, project management, and technical expertise • Identify potential funding for student workforce development at LEAs and at

TIME PERIOD	ACTIVITIES
	UETN for noted roles • Identify potential funding sources for network technologies needed • Work with UBC and partners to put together initial findings to present to legislature
Q2 2024	• Complete another iteration of Bonneville Internet Speed Week with previous and additional collaborating LEAs—expand statewide if possible • Submit results to UBC, USBE, and UGRC for incorporation into maps • Hire FTEs for advocacy, project management, and technical expertise • Hire student workforce at LEAs and UETN and train in roles of advocacy, project management, documentation, and technical support roles • Develop additional software roadmap automation, including feedback from LEAs • Streamline map layer data incorporation processes • Develop engineering for initial areas requiring network deployment
Q3 2024	• Review successes and lessons learned from a year of development of processes, data collection, map creation, advocacy, speed tests, and initial network rollouts to unserved/underserved students • Identify next steps in data collection and any gaps • Identify areas in LEAs which need bolstering in terms of engineering, operational, student, and advocacy support • Deploy network to identified initial areas • Complete another iteration of Bonneville Internet Speed Week • Update map layers • Identify new gaps • Identify next set of unserved/underserved network objectives with input from FTE advocates • Identify network technologies necessary for next set of network objectives
Q4 2024	• Continue working with ISPs on deployment of networks to identified initial areas • Develop operational processes for advocacy and technical support of networks • Identify funding requirements for next set of unserved/underserved network objectives • Continue software automation/updates • Negotiate contracts with broadband service providers for next set of network objectives
Q1 2025	• Identify funding sources for next set of unserved/underserved network objectives • Identify funding sources for additional support for LEAs for engineering, operational, student workforce, and advocacy support • Continue/complete contract negotiations with broadband service providers for next set of network objectives • Work with UBC and partners to put together update to present to legislature

TIME PERIOD	ACTIVITIES
	• Work with UBC and partners to put together presentation for LEAs0, USBE, and communities
Q2 2025	• Begin deployment of next set of network objectives • Host the springtime Bonneville Internet Speed Week • Document network rollouts and student support work
Q3 2025	• Review successes and lessons learned from two years of development of processes, data collection, map creation, advocacy, speed tests, and network rollouts to unserved/underserved students • Review documentation collected regarding network rollouts and student support work • Identify changes/adjustments to array of network technologies with collaborating partners • Review UETN Network Operations Center, network engineering, and Security Operations Center load with additional network rollouts

5.6 ESTIMATED COST FOR UNIVERSAL SERVICE

No one is really sure how much it will cost to provide broadband connections to every US resident, but the consensus remains that the $42 billion in the IIJA BEAD Program is not enough to cover everyone, everywhere. While Utah's $317 million allocation is more than many of us expected, it's not going to be enough to provide "fiber to every home." As a result, we need to take a circumspect and strategic approach to make the best use of the funds we have while creating a master plan for the state that will allow for the judicious use of future funding.

Access for K-12 students and higher education needs to be one of the state's highest priorities. To fund the majority of the planned activities UETN has outlined in this document, the team will additionally target specific grant solicitations, federal funding opportunities, legislative requests, volunteer work, existing personnel, and potential private partnership funding.

When it comes to specific expenditures, we will start with the coordinating team. We propose that UBC set aside a percentage of the existing planning funds from the Department of the Treasury and the Department of Commerce[65] to create a multi-agency advocacy group that should be specifically tasked with the following:

- Completing a full gap analysis of all students in Utah
- Determining priority areas based on areas of need, including student need

[65] *UBC Connecting Utah Digital Connectivity Plan*, Governor's Office of Economic Opportunity, June 23, 2023, p. 25, 84, www.connectingutah.com/Utah Five-Year Plan 2023_062323.pdf

- Creating solutions for providing a low-cost 100/20 Mbps proposed minimum broadband standard throughout the state[66]

We further suggest that 8–11 percent of the $317 million BEAD funds be set aside to help fund student connectivity. We propose UBC allow a multi-agency advocate group similar to the one described in Section 5.3.3 to authorize payments to broadband service providers to specifically cover initial installation or line extension costs to homes where fiber is close, but not quite "to the home," if necessary. Continued communication among these stakeholders should allow student-centered solutions to be rapid, adaptive, and dynamic in meeting the needs of students' social, emotional, and academic well-being.

Though the team does not have visibility into the full costs of the multiyear, multiphase network rollouts to reach all the unserved/underserved students throughout the state, we have compiled a list of likely costs and possible amounts related to performing the gap analysis and hiring the necessary experts in the initial year of rollouts. We have included students to help with costs, for workforce development, and for their perspectives. Please note that these rough costs do NOT include actual deployments as those costs will be project-specific but are included to give a feel for the scope of the project.

Identified and potential costs for the gap analysis (approximately $1.25 million)

- Dedicated project manager
- Software developer and software consulting costs for regional service center developers
- Software licensing costs
- Two FTE advocates
- Student workforce
    - Project management and documentation support—two students
    - Advocacy support—two students
    - Network and student documentation (LEA/region)—two students
- Possible UGRC engagement costs / consulting time
- Possible telco provider engagement / engineering time
- Possible Horrocks engagement / engineering time

The initial years of rollouts and the ongoing work to reach unserved/underserved students in hard-to-reach areas will require additional technical engineering and operational staff. These staff will have to adapt and support new technologies beyond the traditional fiber backbones as they partner with commercial broadband providers. These staff will have to create new processes and procedures for achieving the proper network results for the students in specific regions with unique challenges. The staff will also have to diligently ensure the security posture of SchoolNET and the underlying infrastructure, as well as the performance characteristics as the data traverses between both public/private networks and wired/wireless technologies. The

[66] For example, the advocacy group might need be given a portion of BEAD funds to address the need to either waive or substantially lower the one-time setup fees to homes that were skipped in the vendor's initial fiber build-out process or were constructed after the vendor's initial pass through the area.

mentoring of university and high school students along with the full-time engineers will help with costs and with developing a skilled workforce which might better enable the respective communities long term.

Identified and potential costs for initial roll-out engineering in parallel with the gap analysis (approximately $1.9 million plus the costs of the actual to-be-determined deployments). Remember that it takes 6–8 months for new employees to come up to speed with the environment and their projects.

- Network engineer
- Two wireless engineers
- Two network operations engineers
- Security engineer
- Monitoring engineer
- Student workforce
    - Network operations support (UETN)—two students
    - Network operations support (LEA/region)—two students
    - Monitoring support—two students
    - Security support—two students
- Potential UGRC engagement / consulting time
- Potential telco engagement / engineering time
- Potential Horrocks engagement / engineering time

5.7 ALIGNMENT

As discussed in Sections 5.3.2, 5.3.3, 5.3.4, and 5.3.5, by aligning projects, we are helping to pool costs, combine efforts, and use state money wisely. This alignment helps get more Utahns connected, faster. And it helps prevent any consumer from getting overlooked. UETN has already begun discussions with UDOT about the possibility of aligning priorities with UDOT's STIP highway infrastructure and broadband network endpoint planning and project timelines. For details, see UDOT's Digital Equity plan.

In addition, the team has begun to review other Digital Connectivity plans and noted synergies in the Estimated Costs for Universal Service for many communities listed in these plans:

- Six County AOG Local Broadband Plan (Kanosh, Medow, Oasis, Mills, Fairview, etc.)
- San Juan County Local Broadband Plan (Aneth, Mexican Hat, Montezuma Creek, etc.)
- Beaver County Local Broadband Plan (Sulphurdale, Manderfield, North Creek, Frisco, etc.)
- Wallsburg Valley Local Broadband Plan

UETN adds our support for various parts of these plans because of their obvious impact on student populations identified during our own planning grant.

5.8 TECHNICAL ASSISTANCE

The Utah Broadband Center (UBC) will be a critical part of the activities described in this document. The support described is collaborative support rather than simple requests of UBC. UBC is a key partner that we foresee will have a role in specific areas such as:

- Aiding coordination of data collection and putting together appropriate map layers
- Supporting broadband service providers and understanding their current legal/tariff requirements
- Coordinating with broadband service providers to obtain clear, concise network information regarding trunks and endpoints
- Messaging UETN as a trusted state agency and not a competitor with ISPs
- Supporting at a national level with regards to future LEA spectrum requests
- Supporting at a legislative level in presenting network objectives, requirements, and success stories
- Identifying state, federal, and private/nonprofit financial options
- Helping the public understand the critical need for student broadband access and how UETN, LEAs, and broadband service provider partners are reaching out to them

As broadband solutions continue to grow and become more universal to all Utahns, UBC will also be critical in helping UETN and its partners refine the solutions to be student-centric, as much as possible, as opposed to simply address-specific. In other words, the solutions should bring SchoolNET to the student wherever they currently are. UBC has a moral imperative and financial interest in resolving all of these challenges and is a critical partner to reaching NTIA's "Internet for All" goal, and UETN's focus on students is a vital part of that goal.

UETN has a clear priority: making broadband access available, affordable, and reliable for every student in Utah. In cooperation with UBC and our statewide partners, we will continue our efforts to reach every student in the state.

6 CONCLUSION

The massive influx of federal funding for the purpose of expanding broadband access presents an extraordinary opportunity for Utah students. While $317 million is arguably inadequate to extend broadband access to *every* person in Utah, it can help us realize many of our most acute, ambitious goals for helping Utah's students.

The Utah Education and Telehealth Network's (UETN's) core priority is to provide students with reliable, equitable access to education and career development resources. Broadband internet access for every student in Utah is a keystone tenet that undergirds that priority. The state has a moral responsibility to provide an equal education for every student, and our education paradigms now require that for students to participate fully in online educational opportunities, they need broadband access at home.

Utah has been extremely successful on this mark compared to other states—most Utah students already have this access—but nearly 43,000 students remain who do not, who can't get to reliable, affordable, and accessible internet outside the school, and they are at a major social and economic disadvantage. UETN, with its partners, providers, and leadership of the state, has the plan to connect those students, and to equitably put them on the same footing for success as their peers throughout the state.

If the Utah Broadband Center (UBC) directs funding to UETN under the Infrastructure Investment and Jobs Act (IIJA) or other programs, UETN will be able to accomplish its goals:

- Identify unserved and underserved homes of students and their families.
- Prioritize initiatives to expand reliable, accessible, and affordable broadband internet opportunities to those students.
- Provide student home access opportunities that mirror the classroom SchoolNET experience.
- Where necessary, provide the technology that supports SchoolNET delivery.

UETN's tradition of engaging in collaborative, coordinated efforts with local education agencies (LEAs), state agencies like the Utah Department of Transportation (UDOT) and the Utah Geospatial Resource Center (UGRC), broadband service providers, and many others will continue because of its core mission. UETN will continue this work because it is Utah's "magic sauce": we provide stewardship for vastly important resources to a diverse and unrepresented population. Ensuring our students' success is critical to the future of the state.

Appendix A: Glossary of Terms

2022 US Census Data—The population and housing unit estimates are released on a flow basis throughout each year. Each new series of estimates (referred to as a "vintage") is revised annually beginning with the date of the most recent decennial census to incorporate the latest administrative record data, geographic boundaries, and methodology.

Affordable Connectivity Program (ACP)—The Affordable Connectivity Program is an FCC benefit program that helps ensure that households can afford the broadband they need for work, school, healthcare and more. 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.

ArcGIS—ArcGIS, the powerful GIS application, is a feature-packed software developed with enhancements and ideas from the ArcGIS user community. ArcGIS supports data visualization; advanced analysis; and authoritative data maintenance in 2D, 3D, and 4D. It supports data sharing across a suite of ArcGIS products such as ArcGIS Online and ArcGIS Enterprise and enables users to work across the ArcGIS system through Web GIS.

Bonneville Internet Speed Test—A test to measure internet speeds of students at their homes (not at school). The test has been designed with a one-click button to capture all the information that is needed to help provide information about underserved students.

Broadband—Term used interchangeably with high-speed internet and refers to high-speed internet access that is always on and faster than traditional dial-up access. Broadband includes several high-speed transmission technologies such as:

- Digital Subscriber Line (DSL)
- Cable Modem
- Fiber
- LTE or Private LTE
- Wireless
- Satellite
- Broadband over Power Lines (BPL)

To be considered served broadband, the service must provide a download speed of not less than 100 Mbps; an upload speed of not less than 20 Mbps; and a latency to support real-time, interactive applications.

Broadband, Equity, Accessibility, and Deployment (BEAD) Program—The Broadband Equity, Access, and Deployment (BEAD) Program, established by the Infrastructure Investment and Jobs Act (IIJA), appropriates $42.45 billion for states, territories, and the District of Columbia (DC) to utilize for broadband deployment, mapping, and adoption projects.

Carriers of Last Resort (COLR)—The carrier of last resort obligation was created to ensure that, when telecommunications providers were granted an exclusive service territory, they would provide service to all customers within that service territory. Under the COLR, providers are required to provide service to customers upon request. The customer retains the obligation to pay for the cost to provide them service, which can vary depending on their placement on the system.

Citizens Band Radio Service (CBRS)—is a 150 MHz wide broadcast band of the 3.5 GHz band (3550 MHz to 3700 MHz) in the United States. In 2017, the US Federal Communications Commission (FCC) completed a process which began in 2012 to establish rules for commercial use of this band while reserving parts of the band for the US Federal Government to limit interference with US Navy radar systems and aircraft communications by reserving parts of the band for military use.

Use of the CBRS band does not require a spectrum license, and it has been asserted that they will reduce the cost of data transmissions. However, since these frequencies have historically been used for government purposes, users of the CBRS band will be required to "take care not to interfere with others already using nearby airwave bands in some locations, users will be required to pay their Spectrum Access System (SAS) a 'reasonable' fee for spectrum allocation through a server."

Community Anchor Institution (CAI)—Includes schools, libraries, medical and health care providers, public safety entities, public housing authorities, institutes of higher education and other community support organizations that provide outreach, access, equipment, and support services to facilitate greater use of broadband service in an eligible service area.

Covered Household—A household, the income of which for the most recently completed year is not more than 150 percent of an amount equal to the poverty level, as determined by using criteria of poverty established by the U.S. Census Bureau.

Covered Populations—Includes the following:

- Individuals who live in covered households
- Aging individuals
- Incarcerated individuals, other than individuals who are incarcerated in a federal correctional facility
- Veterans
- Individuals with disabilities
- Individuals with a language barrier, including the following:
    - » Are English learners
    - » Have low levels of literacy

- Individuals who are members of a racial or ethnic minority group
- Individuals who primarily reside in a rural area
- New Americans (individuals who are new arrivals to the U.S. such as immigrants, refugees, or long-term visitors)

Digital Access—A term used interchangeably with the term digital equity. Digital access is the condition in which all individuals and communities have the information technology capacity needed for full participation in our society, democracy, and economy. Digital access is necessary for civic and cultural participation, employment, lifelong learning, and access to essential services.

Digital Divide—The digital divide is the gap between those who have affordable access, skills, and support to effectively engage online and those who do not. As technology constantly evolves, the digital divide prevents equal participation and opportunity in all parts of life, disproportionately affecting people of color, Indigenous peoples, households with low incomes, people with disabilities, people in rural areas, and older adults.

Educational Broadband Service (EBS)—The 2.5 GHz band, which is divided into the Broadband Radio Service (BRS) and the Educational Broadband Service (EBS), is available for commercial service. The band is currently used to provide high-speed, high-capacity broadband service, including two-way Internet service via cellularized communication systems. Such services provide consumers integrated access to voice, high-speed data, video-on-demand, and interactive delivery services from a wireless device.

eduroam—eduroam (education roaming) is the secure, world-wide roaming access service developed for the international research and education community. eduroam allows students, researchers, and staff from participating institutions to obtain Internet connectivity across campus and when visiting other participating institutions by simply opening their laptop.

Endpoints—An endpoint is any physical device that can be connected to a network, including computers, laptops, mobile phones, tablets, and servers. Most commonly, it refers to the last point fiber reaches and/or wireless access points.

E-Rate—The Schools and Libraries (E-Rate) program provides funding towards eligible services for schools and libraries. Public or private schools (K-12), libraries, and groups of schools and libraries (e.g., consortia, districts, systems) can apply for discounts on eligible services. Internet access, telecommunications services, and related equipment are eligible for discounts. E-Rate is a subset of the Universal Services Fund.

FCC Broadband Serviceable Location Fabric (Fabric) Map—A dataset of all locations in the United States and its territories where fixed broadband internet access service is or could be installed. The Fabric allows broadband availability data filers, the FCC, and other stakeholders to work from a single, standardized list of locations for the Broadband Data Collection (BDC).

Federal Communications Commission (FCC)—Regulates interstate and international communications by radio, television, wire, satellite, and cable in all 50 states, the District of Columbia and U.S. territories. An independent U.S. government agency overseen by Congress, the FCC is the federal agency responsible for implementing and enforcing the United States' communications law and regulations.

Fixed Wireless—Permanent wireless facilities which include tower and radio equipment to send a dedicated internet connection to another location, such as a business or residence, that is not able to have a direct fiber or Ethernet broadband internet connection.

Gap Analysis—Compares where you are to where you want to be and investigates why a gap exists so that you can develop reasonable goals to fill it.

Gigabits Per Second (GPS)—Unit for measuring broadband speeds; equivalent to one billion bits per second.

High-Cost Area—An unserved area in which the cost of building out broadband service is higher, as compared to the average cost of building out broadband service in unserved areas. Factors that may influence a high-cost area are:

- Remote location
- Lack of population density
- Unique topography
- High rate of poverty

Indefeasible Right of Use (IRU)—The Indefeasible Right of Use (IRU) is a contractual agreement (temporary ownership) of a portion of the capacity of a cable or fiber. As the name suggests, the contract provides an indefeasible right to use a cable and cannot be annulled or voided.

Infrastructure Investment and Jobs Act (IIJA)—The $1.2 trillion Infrastructure Investment and Jobs Act, adopted by the U.S. Congress in November 2021, provided $550 billion for new initiatives to rebuild roads and bridges, improve public transit, replace lead pipes, and address drinking water contamination, expand access to high-speed internet, and more. BEAD is a subset of this funding, with $46.2 billion set aside for fiber-to-the-home projects in states.

Internet Service Provider (ISP)—An organization that provides services for accessing the internet. ISPs can be organized in various forms, such as commercial, community-owned, nonprofit, or otherwise privately owned.

Last Mile Infrastructure—The "last mile" describes the short geographical segment of delivery of communication and media services or the delivery of products to customers located in dense or rural areas. Last mile logistics tend to be complex and costly to providers of goods and services who deliver to these areas. For the purposes of BEAD funding, "last mile" refers to the segment of a network that actually reaches a home.

LEA—Local educational agency or LEA means a public board of education or other public authority legally constituted within a state for either administrative control or direction of, or to perform a service function for, public elementary schools or secondary schools in a city, county, township, school district, or other political subdivision of a state, or for a combination of school districts or counties as are recognized in a state as an administrative agency for its public elementary schools or secondary schools.

Megabits Per Second (Mbps)—Unit for measuring broadband speeds equivalent to one million bits per second. For the purposes of BEAD funding, 25/3 Mbps is the speed set in the original NTIA NOFO, while 100/20 Mbps is the minimum standard for "broadband" in the "Challenge Process" addendum.

Middle Mile Infrastructure—"Middle-mile" networks are the connections from national and major regional internet backbones to local networks.

Multi-Unit Dwellings (MUD)—A classification of housing where multiple housing units are contained within one building or multiple buildings within a complex or community. Common types of MUDs include duplexes, townhomes, apartments, mobile homes, and manufactured-home parks. For the purposes of BEAD funding, some MUDs bill internet access as part of the total rent. This practice prevents families who dwell there from applying for Affordable Connectivity Program (ACP) funds.

National Telecommunications and Information Association (NTIA)—NTIA is the Executive Branch agency that is principally responsible for advising the President on telecommunications and information policy issues. NTIA's programs and policymaking focus largely on expanding broadband Internet access and adoption in America, expanding the use of spectrum by all users, and ensuring that the Internet remains an engine for continued innovation and economic growth.

Notice of Funding Opportunity (NOFO)—Formal announcement inviting grant applications to be submitted for consideration of award. Announcement details include a description of the project/grant and which entities are eligible to apply.

Open Access Network—A broadband network that permits any internet service provider (ISP) to connect to the network on nondiscriminatory terms and conditions.

Platform for Open Wireless Data-driven Experimental Research (POWDER)—A facility for experimenting with future wireless networking on a city-scale "living laboratory." It provides radios that are programmable down to the waveform, attached to a network that can be configured by the user. Researchers use this platform to build and test new protocols and technologies.

Private Long-Term Evolution (PLTE)—Private LTE is a network that is run specifically for the benefit of an organization, such as a utility, factory, or school. Only authorized users of that organization have access to the network. The organization decides where there will be coverage, how the network will perform, and who has access and priority. This contrasts with a

public LTE network, which is run for the benefit of anyone willing to pay the monthly fee, like Verizon, AT&T, and Sprint.

Satellite Telecommunications Technology—Primarily a middle-mile wireless solution that involves satellites that orbit the earth transmitting long range signals.

SchoolNET—SchoolNET is an essential digital equity service and our umbrella term for the educational content that an LEA extends to a student via remote learning. SchoolNET mirrors the educational experience students receive in the classroom by providing the same content-filtered access to material students have when using computers on their school campuses. SchoolNET deployments by LEAs should provide all the software available to them at school while their browser activity is restricted to prevent access to inappropriate material. SchoolNET does not provide full, unrestricted internet access to the adults in the households it serves, nor does it allow parents or guardians to stream movies or "surf the net."

Spectrum Access System (SAS)—The primary function of Spectrum Access System (SAS) is to control spectrum access for a CBSD. A CBSD transmits only after it has received authorization from SAS. This control ensures the protection of higher-priority CBRS users by controlling the operating parameters such as channels or transmission power of lower-priority CBRS devices.

State Digital Access Planning Grant Program (SDAPG)—Digital Access, sometimes called Digital Equity, is access to and the ability to participate fully in a digital society where computers and the internet are essential to an individual's social, economic, and physical wellbeing. Digital Access refers an individual's ability or having the necessary connections to live, learn, and work in a society where communication and access to information that is on digital platforms such as email, the internet, mobile devices, and social media and do so safely is important. Digital Access includes all the activities and efforts necessary to ensure that all individuals and communities, including the most disadvantaged, can access the opportunities of the internet. The State Digital Access Planning Grant Program is part of the larger State Digital Equity Capacity Grant Program.

STIP Plan—UDOT's Statewide Transportation Improvement Program (STIP) is a five-year plan of highway and transit projects for the State of Utah. The STIP is maintained daily and includes transportation projects on the state, city, and county highway systems as well as projects in the national parks, national forests, and Indian reservations. These projects use various federal and state funding programs.

Terrestrial Network—A network of fiber and copper facilities that are installed either underground or aerially on new and/or existing utility poles and feed directly to consumers, or to wireless facilities and then consumers. Terrestrial network means any network that does not utilize satellite telecommunications technology in their end-to-end delivery method.

Underserved Location—Locations without broadband service offering speeds of 100 Mbps downstream/20 Mbps upstream with a latency of 100 milliseconds or less.

Unserved Location—Locations without any broadband service at all or with broadband service offering speeds below 25 megabits per second (Mbps) download/3 Mbps upload at a latency of 100 milliseconds or less. Locations served by satellite or using a hybrid of licensed and unlicensed spectrum are considered unserved.

Utah Education and Telehealth Network (UETN)—The Utah Education and Telehealth Network (UETN) provides critical broadband infrastructure and services to education, healthcare, and broadcast sites throughout Utah to improve education and healthcare. The organization provides a robust, reliable network connecting more than 1,900 locations, including schools, district offices, hospitals, community health centers, and local health departments. UETN values open, honest, and respectful interactions as well as documented policies and action.

Utah Geospatial Resource Center (UGRC)—The Utah Geospatial Resource Center (UGRC) is the State of Utah's map technology coordination office. UGRC staff have knowledge of and experience with geographic information system (GIS) desktop software, hosted map- and web-services, mapping data resources, and GIS professionals and their activities around the state.

Universal Services Fund (USF)—The Universal Service Fund (USF) is a system of subsidies, fees, and funding designed to increase access to telecommunications for everyone who lives in the United States. It is based on the idea of universal service contained in the Communications Act of 1934, that "all people in the United States shall have access to rapid, efficient, nationwide communications service with adequate facilities at reasonable charges." The fund was created in 1997 as part of the implementation of the Telecommunications Act of 1996, and it is overseen by the Federal Communications Commission (FCC).

Utah Universal Service Fund (UUSF)—The Utah Universal Public Telecommunications Service Support Fund (UUSF) is a funding mechanism for a qualifying carrier of last resort to obtain specific, predictable, and sufficient funds to deploy and manage, for the purpose of providing service to end-users, networks capable of providing access lines, connections, or wholesale broadband Internet access service.

U.S. Department of Agriculture (USDA)—Made up of 29 agencies and offices who serve the American people by providing leadership on food, agriculture, natural resources, rural development, nutrition, and related issues based on public policy, the best available science, and effective management.

Utah Broadband Center (UBC)—Works with broadband providers, local, state, and federal policymakers, consumers, community institutions and other stakeholders to support broadband deployment throughout the state, improve efficiencies, and expand statewide access and usage.

USF Lifeline Program—Since 1985, the Lifeline program has provided a discount on phone service for qualifying low-income consumers to ensure that all Americans have the opportunities and security that phone service brings, including being able to connect to jobs, family, and emergency services. Lifeline is part of the Universal Service Fund. The Lifeline program is

available to eligible low-income consumers in every state, territory, commonwealth, and on tribal lands.

On March 31, 2016, the Commission adopted a comprehensive reform and modernization of the Lifeline program. In the 2016 Lifeline Modernization Order, the Commission included broadband as a support service in the Lifeline program. The Commission also set out minimum service standards for Lifeline-supported services to ensure maximum value for the universal service dollar and established a National Eligibility Verifier to make independent subscriber eligibility determinations.

Vulnerable Populations—Vulnerable populations include, but are not limited to, low-income individuals, unemployed individuals, children, the incarcerated, New Americans, and aged individuals.

Appendix B: Infographics

We have included two infographics as PDF files on the following two pages.

UTAH 2021 SCHOOL TECHNOLOGY INVENTORY

uen Utah Education and Telehealth Network | CONNECTED NATION

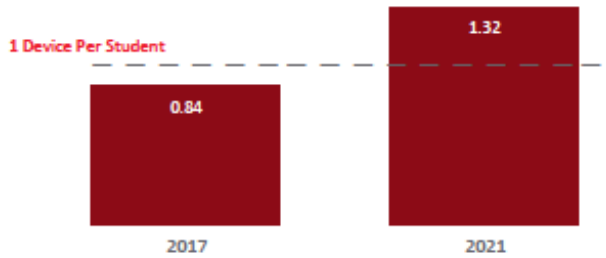
UTAH DISTRICT AND CHARTER SCHOOLS

STATE FACTS

ENROLLMENT	675,589
NUMBER OF SCHOOLS	1,037
ESTIMATED % OF STUDENTS WITH INADEQUATE HOME INTERNET SERVICE	8%
% OF STUDENTS RECEIVING REMOTE INTERNET ACCESS SOLUTIONS OR SERVICE*	11%

*Among schools providing remote internet access solutions or service

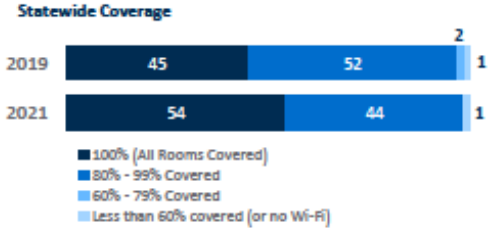
COMPUTING DEVICES PER STUDENT



WI-FI NETWORKS

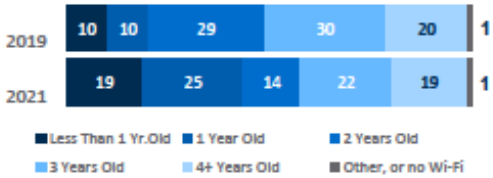
Wi-Fi Coverage Reported by Schools (%)

Statewide Coverage



Age of Wi-Fi Access Points Reported by Schools (%)

Statewide Coverage

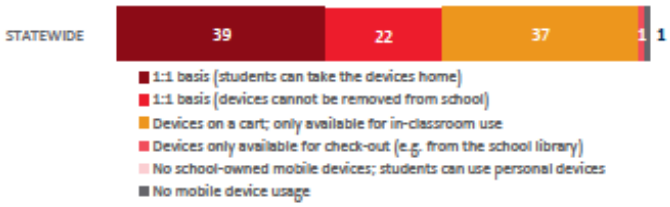


COMPUTING DEVICES USED IN SCHOOLS

	Student Use	Teacher/ Admin Use	Change in the # of Devices Since 2017	% Change Among LEAs Operating in 2017 and 2021
DESKTOPS | WINDOWS OS	61,303	28,549	-41,527	-30%
LAPTOPS | WINDOWS OS	99,196	16,712	+59,982	112%
DESKTOPS | MAC	14,751	3,230	-6,187	-25%
LAPTOPS | MAC	19,991	17,754	+1,197	3%
CHROMEBOOKS | GOOGLE	577,690	22,052	+329,200	126%
TABLETS | WINDOWS	12,727	4,472	+7,592	86%
TABLETS | ANDROID	1,363	224	-333	-23%
TABLETS | IOS	100,710	23,569	+20,091	21%
OTHER DEVICES	1,073	99	-7,580	-88%
ALL COMPUTING DEVICES	**888,804**	**116,661**	**+362,435**	**59%**

MOBILE DEPLOYMENT

Wireless Device Policies at Schools (%)



FULL-TIME EQUIVALENT (FTE) TECHNICAL SUPPORT STAFF IN UTAH SCHOOLS

For more information, visit www.uen.org/digital-learning

UETN's Private LTE and 5G Pilot 2021 Exploration

What the pilot is

Several emerging use case pilots in Private LTE and 5G wireless have begun to spring up statewide across the Utah Education and Telehealth Network (UETN) network footprint. In order to get ahead of these emerging use case pilots, UETN has started its own early exploration of Private LTE and 5G wireless Technologies. UETN is exploring a wide variety use cases with our partners in:

EDUCATION

Most of the original use case pilots have emerged from the K-20 education and library environments searching for ways to improve the student experience and to fill the connectivity gaps that exist within every one of the school districts.

TELEHEALTH

Telehealth covers the gamut of interaction / connectivity with rural hospitals and clinics to the health interactions with students at schools and patrons at community anchor institutions throughout Utah.

RESEARCH

UETN's connectivity and tight collaboration with research enables the research community at a statewide level, both in geographic location access and in scale.

How UETN is looking forward

Before and beyond the rollout of the infrastructure, UETN has been working with the respective pilots to explore different use cases. These use cases range from simple to more complex demonstrations, as well as to prototype potential solutions. Representatives from Murray school district, Ogden school district, University of Utah, Weber State University, various vendors and other organizations have teamed with UETN to prototype small deployments at conferences such as:

UCET - Utah Coalition for Educational Technology | Rural Schools Conference | UETN Tech Summit

SAINTCon - Utah's Premiere Cyber Security Conference

SC19, SC21 - The International Conference for High Performance Computing, Networking, Storage and Analysis

What the pilot is not

- General home access
- Commodity apps other than schoolwork
- Commercial acess (except in collaborative research/pilot)
- Open, unfiltered access for K-12 students
- Access to non-managed devices