School District Internet Costs and Access in Alaska

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Introduction

This policy brief looks at what school districts in Alaska pay annually for internet access as well as the internet bandwidth and speed available in schools across the state. It includes a discussion of the factors influencing the costs of internet in Alaska as well as the availability of high-speed internet, or broadband, currently defined by the Federal Communications Commission (FCC) as 25 Mbps download speed/3 Mbps upload speed.[1]

Before delving deeper into the story, we want to highlight the major takeaways here:

- Alaska school districts pay a great deal for internet access. However, two subsidy programs—E-rate and School BAG (Broadband Assistance Grant)—provide support that reduces the contribution from district budgets substantially.
    - There are many factors contributing to these costs. Some of them have to do with the overall cost of delivering internet to rural and remote places in Alaska. Others have to do with decisions districts make in terms of how much bandwidth to purchase and the ways in which access is provided.
    - Without the subsidy programs, some districts would have to significantly reduce their levels of internet access.

- While access to broadband internet is improving, Alaska schools still lag behind their counterparts in the lower 48 in terms of bandwidth.
    - The FCC has set a goal that districts have broadband at the minimum recommended bandwidth of 1 Mbps per user. As in the lower 48, school districts in Alaska are struggling to achieve this, and at least 5 districts do not even have access to internet that meets the FCC's minimum standard of 100 Kbps (0.1 Mbps) per user.

- Progress is being made across the state, with new undersea cable and microwave networks recently completed and new low-earth satellite being launched this year, all of which will result in faster speeds and, in some cases, lower costs for users across the state, including school districts.

Internet costs in Alaska School Districts

The cost of internet access in Alaska—both for private homes and public spaces, like schools—can be very high at present when compared with the lower 48 and is also quite variable depending on whether the school district is in a remote or more populated and connected part of the state. Indeed, the primary reasons for expensive internet in Alaska are our remoteness and how we connect to the internet. In broad swaths of the state there has not been any terrestrial network infrastructure to communities and the only internet access

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[1] https://www.fcc.gov/reports-research/reports/broadband-progress-reports/2015-broadband-progress-report.

has been via satellite; that can be an expensive proposition. It is also expensive to transport and install infrastructure in rural and remote places. The landscape in terms of internet access and infrastructure is changing – rapidly in some places – but we cannot yet determine the full impact on costs.

Progress has been made in the lower 48, as reported[2] by Education Superhighway, an organization focused on bandwidth issues across the nation. They contend that the "classroom connectivity gap is closed" as internet costs have decreased thanks, in part, to "price transparency and technological improvements that have enabled service providers to bring school districts significantly more bandwidth at the same monthly cost." They noted that 42 states have fallen below the critical $3 per Mbps threshold "enabling school districts to purchase the internet access needed to support the growing demand for digital learning in every classroom, every day" (pg. 8).[3] Alaska is making progress in reducing costs as well. The cost per Mbps has dropped 39% between 2017 and 2020.[4] But Alaska remains more expensive, and some districts continue to face bandwidth access challenges, though again, the situation is dynamic and ever changing.

Internet Subsidies in Alaska: E-rate and Alaska BAG

In Alaska, most school districts do not pay the full cost of internet access thanks to two subsidies: the federal E-rate program and the state-run School BAG (Broadband Assistance Grant). The E-rate program, also known as the Schools and Libraries program, is a federal program run by the Federal Communications Commission (FCC) to help schools and libraries obtain affordable broadband. The funding supports telecommunications services and internet access as well as maintenance of internal connections in schools and libraries. Funding comes from the Universal Service Fund, which is a monthly surcharge paid by phone customers. The fund had about $4.2 billion in 2020. Alaska school districts requested $145.9 million in 2020, or about 0.03% of the total nationwide funding. E-rate covers 20% to 90% of district costs for eligible services. The amount or percent of funding districts receive is based on poverty levels in schools as measured by free and reduced lunch eligibility, and priority is given to the highest poverty schools and libraries.

The School BAG was created in 2014 by the Alaska State legislature to help school districts cover the costs for schools to reach internet download speeds of 10 Mbps; this was raised to 25 Mbps for the most recent awards, and now follows the FCC's broadband benchmark speeds of 25 megabits per second (Mbps) for downloads and 3 Mbps for uploads, set in 2015[5] The program is targeted at rural school districts. Twenty-five (25) districts received assistance from this program in the 2020-2021 school year (See Appendix A). Chart 1 below shows the annual internet cost per pupil for each district with E-rate and School BAG subsidies.

The E-rate and Alaska School BAG subsidies make a considerable difference in many school district budgets. Appendix B shows the annual cost of the internet as a percentage of school district AY2021 budgets before and after E-rate and School BAG subsidies are applied. In some cases, it appears that school districts would not be able to afford internet access without this support. For example, in the Aleutian Region School District the subsidies drop the proportion of the district's budget spent on internet from 81.76% to 6.27%, and for the Kuspuk School District the drop is from 75.33% to 3.18%.

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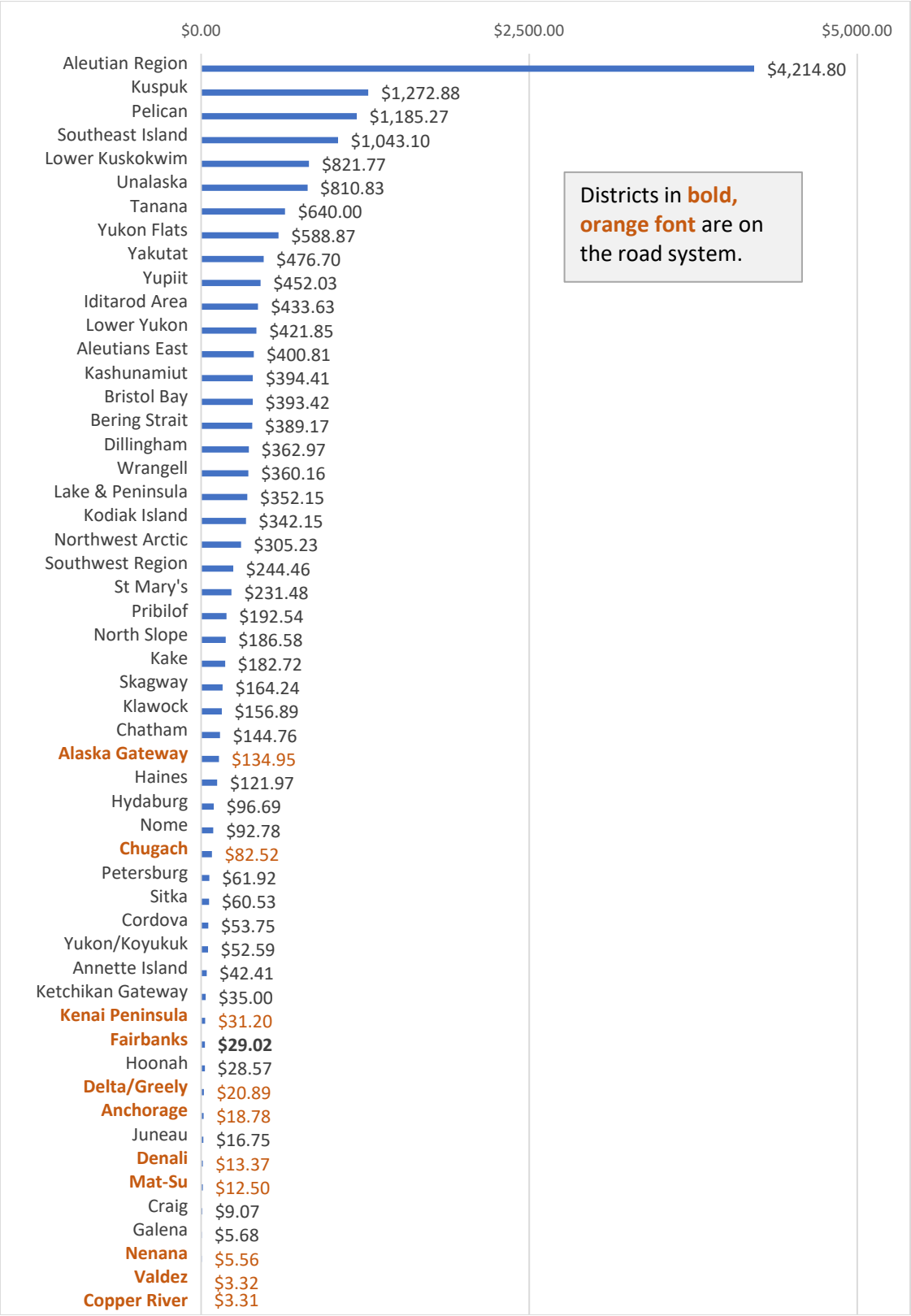
[2] Education Superhighway. (2019). 2019 State of the States: The classroom connectivity gap is closed. https://s3-us-west-1.amazonaws.com/esh-sots-pdfs/2019%20State%20of%20the%20States.pdf

[3] The organization had planned to sunset in fall 2020 due to this general success, but with the Covid-19 pandemic challenges they formed a new initiative in partnership with regional and national internet service providers to launch programs that enable states and school districts to identify students without broadband and purchase service for low-income families.

[4] Per Education Superhighway, Final Alaska Snapshot.

[5] https://www.fcc.gov/reports-research/reports/broadband-progress-reports/2015-broadband-progress-report.

Chart 1: Annual *per Pupil* Internet cost *WITH* E-Rate and School BAG



Appendixes C and D show the annual expenditures for internet in AY2019 and AY2021 for on-the-road and off-the-road school districts. It is important to note again that we cannot determine whether costs shifted because districts were able to buy the same bandwidth for less, their expenses increased because they decided to purchase more bandwidth, or if they added a wide-area network (WAN) that increased costs.

What do we mean by, and why do we care about bandwidth?

In this brief, we talk about internet bandwidth in schools, but sometimes it's hard to know how much is really needed. Many factors affect whether there is enough bandwidth, as well as the actual speed of the internet when it is in use. *Bandwidth* has to do with the volume of information that can be sent over a connection in a specific period of time. It is described in Kbps – kilobits per second, or Mbps, megabits per second; 1 Mbps is equal to 1000 Kbps. *Speed* is how fast the data traveling. It is a function of bandwidth plus the number of users and how much data they are trying to send or access at the same time. In addition, it is impacted by the decisions the users make when they set up internet access. Bandwidth is also measured in dedicated or best efforts. Some districts choose to purchase a dedicated pipe (non-shared) and others choose to purchase a best-efforts (shared) pipe. There is a difference in the price for these services, as there are different Service Level Agreements (SLAs). The transportation analogy is useful: 100 cars traveling in the same direction can go faster on a five-lane highway than on a one lane country road, even though each individual car could achieve 75 mph in traffic-free conditions. Districts that purchase dedicated transport have the lane to themselves.

Another factor affecting the Internet access in schools is the quality of the internal connections within the building. If the Wi-Fi system is outdated, the routers can't support all of the users, or if there are other equipment issues, available internet bandwidth may not get to the end users, aka, the students and teachers.

Different internet uses require different bandwidth. Email takes relatively little bandwidth, whereas streaming high-definition video takes a lot. One person streaming high-definition video needs at least 5 Mbps and 10 is generally recommended. This means, functionally, that a single person streaming a high-definition video can use up all the bandwidth available in some of Alaska's schools. And schools by definition have many people who need internet access at the same time, from the school administrative assistant to the district's testing coordinator and, of course, educators and students using online resources.

Two other concepts that are important to note are upload and download speeds. Upload speed refers to how fast information can travel from your device to another device or location on the internet, such as posting to a discussion board, or searching for something using Google. A "good" upload speed is at least 5 Mbps. [6] Download speed refers to how fast information (e.g., a website, YouTube video) can travel from the internet server to your device accessing the internet. Download speed is generally considered the most important factor and a "good" download speed is at least 10 Mbps. Both of these functions are important in schools. A good upload speed is necessary for teachers to upload lectures so students can watch them online. Good download speeds are needed for students to watch the recorded lectures or access other online resources from a library.

Table 1 below shows the breakdown of common interest speeds and what they allow:

[6] https://www.highspeedinternet.com/resources/what-is-a-good-download-upload-speed

Table 1. Internet Speeds and Uses[7]

0–5 Mbps
Works for: Simple internet access for one user
● Checking email
● Streaming music on one device
● Searching on Google
5–40 Mbps
Works for: A couple of users enjoying basic internet
● Streaming video on one (5 Mbps) to a few (40 Mbps) devices
● Video calling with Skype or FaceTime
● Online gaming for one player
40–100 Mbps
Works for: A household engaging successfully online
● Streaming HD video on a few devices
● Multiplayer online gaming
● Downloading large files
100–500 Mbps
Works for: Multiple productive users across a large organization
● Streaming video in UHD on multiple screens
● Downloading files quickly
● Gaming online for multiple players
500–1,000+ Mbps
Works for:
● Doing a lot of almost anything

Internet access in Alaska

Bandwidth in Alaska's schools varies enormously, due again to Alaska's geography as well as the way in which schools and communities receive internet access. In some places, there are insufficient satellite resources and few to no other options for internet. Bandwidth in some of those places therefore is limited as well as expensive. As noted earlier, this situation is changing rapidly – even as we complete this report new satellites are being launched, and we expect LEO service from both OneWeb and Starlink providers within the next 12-24 months – so it is important to keep in mind that the data presented here will be outdated before too long.

Per the FCC, 100 Kbps per user is the minimum, or 0.1 Mbps per user, though their "gold standard" is considered to be 1 Mbps per user. As far as we can tell, given data limitations, there are a handful of school districts in Alaska that fall below this minimum, or have speeds that are barely above. Those districts are rural districts that serve small populations of students. In their 2019 Alaska Snapshot[8], the Education Superhighway estimated that 99% of Alaska students were in schools meeting the 100 kbps standard. On the other hand, 0% of students were in schools meeting the 1 Mbps per user standard, in contrast with 24% of students in the lower 48.

While our analyses focus mostly on school districts, there is considerable variation within some districts in bandwidth. Appendix F shows the type of internet available in districts, the bandwidth, and upload and

[7] https://www.highspeedinternet.com/how-much-internet-speed-do-i-need

[8] Education Superhighway. (2019). Alaska 2019 Connectivity Snapshot. https://s3-us-west-1.amazonaws.com/esh-sots-pdfs/Alaska_Snapshot_2019.pdf.

download speeds. We have shown where there are multiple forms of internet as well as the high and low upload and download speeds in districts where there is variation. It is worth noting that in some districts, like Lower Yukon, the speeds in different schools can vary from 10 Mbps to 1000 Mbps, which means in some cases, students are having very different experiences with technology in different communities and schools within the same district.

The good news is internet access and speeds are increasing around the state, and this is accompanied by lower costs in many places. More improvements in access are on their way:

- Over 50,000 locations have received new or upgraded broadband connectivity since 2017.[9]
- KPU Telecom completed a new undersea fiber connection to Canada, connecting their fiber to the premise network with expanded capacity.
- Matanuska Telephone Association (MTA) constructed the first terrestrial fiber connection to Canada, expanding capacity of Alaska's middle mile connections to the Lower '48.
- Nushagak Cooperative completed a major expansion of their microwave network, increasing both broadband speeds and capacity for their members.
- Cordova Telecom expanded their microwave network in Prince William Sound.
- Alaska Power & Telephone has been awarded a $21.5M grants to construct an undersea fiber cable between Juneau and Prince of Wales Island and upgrade broadband service in Coffman Cove and Kasaan. This fiber will also allow other communities on the Island to access increased broadband capacity due to the extensive fiber network AP&T has already constructed.
- Arctic Slope Telephone Association Cooperative (ASTAC) has been awarded a $5.3M grant to build a microwave network to Kaktovik and increase broadband speeds in Kaktovik.
- TelAlaska was awarded a $4.1M grant to build fiber connections to Teller and Brevig Mission.
- Matanuska Telephone Association was awarded a $1.9M grant to built fiber to the home connections to 203 locations in the Kashwitna area.
- The Quintillion fiber optics cable, formerly known as Arctic Fiber, has reached the northern and northwest parts of the state[10], enabling providers such as Alaska Communications, TelAlaska, ASTAC, and GCI to provide high speed service to Nome, Kotzebue, and the North Slope. Indeed, when Nome first connected to the new fiber connection, it saw a 25% increase in speed for about 20% of the cost it had been paying.[11] New fiber cable connections in Southcentral Alaska are already in place and increasing speeds in parts of the state. That said, costs are still very high in many places.
- Microcom has plans[12] for new satellite broadband to serve rural Alaska and grow the capacity from 2.5 gigabytes per second up to 40 across multiple providers. As part of this effort, Pacific DataPort is planning to launch satellites this year and in three years. Pacific DataPort is also currently building a "Gateway," a satellite downlink facility in Talkeetna[13]. Microcom is also working with OneWeb on additional satellite development.

[9] See Connect America Fund Broadband Map, https://data.usac.org/publicreports/caf-map/.
[10] https://www.alaskasnewssource.com/content/news/Arctic-Broadband-Point-of-Presence-Launches-in-Utqiavik-559779101.html
https://www.akbizmag.com/industry/telecom-tech/quintillion-and-gci-partner-to-bring-improved-internet-services-to-nome-and-kotzebue/
[11] https://hechingerreport.org/alaska-schools-pay-a-price-for-the-nations-slowest-internet-but-change-is-coming/
[12] Brehmer, E. (2019, January 16). Microcom founder launches new satellite broadband project. *Alaska Journal of Commerce.* https://www.alaskajournal.com/2019-01-16/microcom-founder-launches-new-satellite-broadband-project#:~:text=Microcom.
[13] Bradner, T. (2020, October 13). New telecom satellite for Alaska on schedule for launch next summer; will provide broadband, high-speed internet across state. *Anchorage Press.*
https://www.anchoragepress.com/news/new-telecom-satellite-for-alaska-on-schedule-for-launch-next-summer-will-provide-broadband-high/article_3c355424-0dad-11eb-8f93-0feaade192f0.html.

- GCI was awarded a $25 million grant[14] from the U.S. Department of Agriculture's ReConnect program to provide terrestrial broadband service for the first time to Unalaska/Dutch Harbor and five other Aleutians communities – King Cove, Sand Point, Akutan, Chignik Bay, and Larsen Bay – giving them internet speeds comparable to Anchorage.
- OneWeb, Starlink, Project Kuiper, and Telesat all plan to offer low earth orbit service throughout Alaska within 1-3 years.

While Alaska still has a long way to go to begin reaching speeds and costs available elsewhere in the US, if all of these current plans are successful, Alaskans as a whole will enjoy significantly higher speeds and capacity and likely lower costs, which hopefully will benefit school districts as well. However, there still is a need to build out infrastructure in schools and communities to be able to access the increased bandwidth (or, in much of rural Alaska, to have any access at all in individual homes) and that takes resources as well.

Internet reliability and stability

ISER conducted a brief survey in partnership with the Alaska Association of School Business Officials (ALASBO) to obtain school-level data from each district on internet issues including:

- How often staff and/or students experiences challenges in connecting to the internet.
- How often staff and/or students get dropped or experience slowdowns in service.
- How often there are other reliability issues (e.g., Download/Upload problems, internet calls that "freeze" and then come back, online videos keep stopping and starting, websites don't fully load, and so on).

Responses were on a 5-point frequency scale: Always (1), Most of the time (2), About half the time (3), Sometimes (4), and Never (5).

Eighteen (18) out of 53 districts (34%) responded. The survey was sent to each district's ALASBO member. We did not specify who should complete this survey nor collect information on who completed it for each district. The data is not generalizable to the state as a whole or to any district that did not respond, and it should be noted the two largest districts in the state in terms of numbers of students and schools, Anchorage and Fairbanks, did not respond. Those districts also have access to multiple and more robust internet networks than some of the smaller districts. What we have, therefore, is a snapshot of what is experienced among a specific group of districts – generally districts serving smaller numbers of students.

As shown in Table 2 below, on average among all of the responding school districts, challenges connecting to the internet, getting dropped or experiencing slowdowns in service, and having other reliability/stability issues were experienced *sometimes.* This means that in a number of schools across the state, teachers cannot consistently rely on internet access to support their teaching and learning. This can impact activities ranging from students taking online courses to standardized testing done online. As noted above, it is also important to remember that we cannot, from our data, determine whether challenges around connecting to the internet, speed, and reliability are a result of issues within a school, such as the age of networking equipment or the bandwidth purchased by a district, versus issues related to how internet is provided by the Internet Service Providers (ISPs).

[14] Handyside, H. (2020, October 14). GCI awarded $25 million federal grant to bring urban internet speeds to remote, underserved Aleutian communities. *GCI Press Release*. https://www.gci.com/about/newsreleases/gci-aleutian-fiber-project-announcement.

Table 2. Average Internet Stability and Reliability Reported by School District

School District	Challenges Connecting	Get Dropped, Slowdowns	Reliability, Stability issues
Alaska Gateway	Never (5)	Never (5)	Never (5)
Aleutian Region	Sometimes (4)	Sometimes (4)	Sometimes (4)
Aleutians East	Sometimes (4)	Sometimes (4)	Sometimes (4)
Bering Strait	*About half the time/Sometimes (3.5)	*About half the time/Sometimes (3.5)	*About half the time/Sometimes (3.5)
Copper River	Never (5)	Never (5)	Never (5)
Denali	Sometimes (4)	*About half the time/Sometimes (3.5)	*About half the time/Sometimes (3.8)
Dillingham	About half the time (3)	About half the time (3)	About half the time (3)
Haines	Sometimes (4)	Sometimes (4)	Sometimes (4)
Juneau	Never (5)	Sometimes (4)	Sometimes (4)
Kenai Peninsula	*Sometimes/Never (4.8)	*Sometimes/Never (4.8)	*Sometimes/Never (4.8)
Ketchikan Gateway	*Sometimes/Never (4.7)	*Sometimes/Never (4.6)	*Sometimes/Never (4.6)
Klawock City	Sometimes (4)	Sometimes (4)	Sometimes (4)
Lake and Peninsula	Sometimes (4)	Sometimes (4)	Sometimes (4)
Lower Yukon	Sometimes (4)	About half the time (3)	*About half the time (2.9)
Nenana City	Sometimes (4)	Sometimes (4)	Sometimes (4)
Saint Mary's	Sometimes (4)	Sometimes (4)	Sometimes (4)
Valdez City	Sometimes (4)	Sometimes (4)	Sometimes (4)
Responding School Districts' Average	**Sometimes (4.2)**	**Sometimes (4.0)**	**Sometimes (4.0)**

*Variability among schools within district exists.

Districts with variability among schools

Five (5) school districts reported significant variability in internet stability and reliability among their schools. These districts were Bering Strait, Denali Borough, Kenai Peninsula Borough, Ketchikan Gateway Borough, and Lower Yukon. The Lower Yukon, Bering Strait and Denali Borough School Districts reported overall the least reliable internet access of those districts who responded to the survey.

Table 3. Bering Strait Schools (n = 15) internet issues variability among schools

Bering Strait Schools (n = 15)	Challenges Connecting	Get Dropped, Slowdowns	Reliability, Stability issues
Always	0%	0%	0%
Most of the time	0%	0%	0%
About half the time	53%	53%	53%
Sometimes	47%	47%	47%
Never	0%	0%	0%

As Table 3 shows, of the 15 schools in the Bering Strait school district, 53% (n = 8) experience challenges connecting to the internet, get dropped or experience slowdowns in service, and have other reliability/stability issues (Download/Upload problems, Internet calls that "freeze" and then come back,

online videos keep stopping and starting, websites don't fully load, and so on) *about half the time*. The schools that face these challenges (n = 8) are Brevig Mission School, Diomede School, Anthony A. Andrews School, Shishmaref School, Tukurngailnguq School, Wales School, Gambell School, and Hogarth Kingeekuk Sr. Memorial School.

Table 4. Denali Borough Schools (n = 4) internet issues variability among schools

DENALI BOROUGH SCHOOLS (N = 4)	CHALLENGES CONNECTING	GET DROPPED, SLOWDOWNS	RELIABILITY, STABILITY ISSUES
ALWAYS	0%	0%	0%
MOST OF THE TIME	0%	25%	0%
ABOUT HALF THE TIME	0%	0%	25%
SOMETIMES	100%	75%	75%
NEVER	0%	0%	0%

Table 4 shows that one school (25%) in the Denali Borough school district—Denali PEAK—experiences getting dropped from the internet or slowdowns *most of the time*. Denali PEAK also experience other reliability/stability issues *about half the time*. This is surprisingly as Denali Peak is the home school program for the district and has offices in Wasilla and Anchorage.

Table 5. Kenai Peninsula Borough Schools (n = 42) internet issues variability among schools

KENAI PENINSULA BOROUGH SCHOOLS (N = 42)	CHALLENGES CONNECTING	GET DROPPED, SLOWDOWNS	RELIABILITY, STABILITY ISSUES
ALWAYS	0%	0%	0%
MOST OF THE TIME	0%	0%	0%
ABOUT HALF THE TIME	0%	0%	0%
SOMETIMES	19%	19%	19%
NEVER	81%	81%	81%

In the Kenai Peninsula Borough School District (KPBSD), the eight (8) schools that experience these issues *sometimes* are Hope School, Nanwalek School, Razdolna School, Nikolaevsk School, Port Graham School, Tebughna School, Voznesenka School, and Kachemak Selo School. These schools are located away from the population centers of the borough, and/or are located off of the Kenai Peninsula entirely, either across Cook Inlet or Katchemak Bay. Table 5 shows the variation among KPBSD schools.

Table 6. Ketchikan Gateway Borough Schools (n = 9) internet issues variability among schools

KETCHIKAN GATEWAY BOROUGH SCHOOLS (N = 9)	CHALLENGES CONNECTING	GET DROPPED, SLOWDOWNS	RELIABILITY, STABILITY ISSUES
ALWAYS	0%	0%	0%
MOST OF THE TIME	0%	0%	0%
ABOUT HALF THE TIME	0%	0%	0%
SOMETIMES	33%	44%	44%
NEVER	67%	56%	56%

Table 6 shows the variation for Ketchikan Gateway Borough School District. The three (3) schools in Ketchikan that experience these issues *sometimes* are Fast Track, Ketchikan Charter School, and Tongass School of Arts and Sciences Charter School.

Table 7. Lower Yukon Schools (n = 11) internet issues variability among schools

LOWER YUKON SCHOOLS (N = 11)	CHALLENGES CONNECTING	GET DROPPED, SLOWDOWNS	RELIABILITY, STABILITY ISSUES
ALWAYS	0%	0%	0%
MOST OF THE TIME	0%	0%	9%
ABOUT HALF THE TIME	0%	0%	91%
SOMETIMES	100%	100%	0%
NEVER	0%	0%	0%

In the Lower Yukon School District, one (1) school—Kotlik School—experiences other reliability/stability issues *most of the time*, while the remaining schools in the Lower Yukon school district (n = 10) experience these issues *about half the time*, as shown in Table 7.

Summary

Internet costs, bandwidth, and speed vary enormously around the state. Internet in Alaska is expensive relative to the lower 48, and access is limited in some parts of the state. That said, the situation is improving, and the pace of change seems to be accelerating. Even between the time we received the contract to do this research and producing this brief, new initiatives to provide broader and faster access to the internet have been announced or launched (both figuratively and, in the case of satellite-based access, literally).

As we note repeatedly in the brief, the data that we have only tells part of the story about internet speed, cost and reliability. If we really want to understand the whole story, we need both more data, gathered in a consistent and standardized fashion, and qualitative case studies that help us understand the decisions made in districts and schools about how students and teachers access the internet. This will help us better understand the variability we identified within and between districts.

It is important to note that in this document we are describing internet costs and access for school districts, and not for individual families. As we put together this analysis we did come across descriptions of cost and access issues for families and students who were learning at home during the Covid-19 pandemic. One notable example was from Wainwright, where parents are paying from $300 to $1000 per month for internet access. Because of the cost fewer than half the families in that community buy internet at all.[15] We also learned of initiatives to provide better access to students in their homes, from local intranet solutions[16] to mobile Wi-Fi sites in Anchorage School District parking lots[17]. These are critical efforts, but were not the focus of this brief. That said, fast, stable and reliable internet access in both schools and homes go hand in hand. The state needs to look at issues around the need, in much of rural Alaska, to develop the middle mile" networks - the networks that link national or regional internet backbones (e.g., Quintillion or other fiber optic

[15] Bradner, T., (2021, Mar.1) *Bradner's Alaska Legislative Digest No.*7/2021. Anchorage: Mike Bradner, Tim Bradner.

[16] https://blog.gci.com/gci-works-to-connect-students-in-need-and-close-the-homework-gap/

[17] https://www.adn.com/alaska-news/2020/05/04/alaska-communications-makes-free-wi-fi-available-from-anchorage-and-fairbanks-school-parking-lots/

providers) to the local connection sites (including schools and libraries), as well as the "last mile" connections into homes.[18]

But in terms of the focus of this brief, it is critical that Alaska continues to increase bandwidth in schools. One-to-one laptop initiatives, games-based learning, distance delivered advanced courses and other innovations require strong and reliable access. Some districts and schools need support around building infrastructure and capacity in school sites to take advantage of existing networks and, especially for communities that have been underserved, forthcoming improvements in bandwidth. It would be useful to create an inventory on existing infrastructure in schools and to identify where there is a need for upgrades.

It is heartening to see new initiatives focusing on internet access in schools and communities. We want to keep at the forefront the need to improve the data gathered so that policymakers can better identify where to focus limited state resources in order to ensure the best possible learning experiences in schools for all students.

[18] Arnold, Jordan & Sallet, John. "If We Build It, Will They Come? Lessons from Open-Access, Middle-Mile Networks" Evanston, IL: Benton Institute for Broadband & Society, December 2020. https://www.benton.org/publications/middle-mile

Appendices

Appendix A: Annual Internet Costs and Subsidies By District 2020[19]

District Name	Internet costs before subsidies	E-rate Discount	Total District Cost after E-rate	School BAG Awarded to offset cost	% BAG offset	Final internet cost to district
Alaska Gateway	$1,855,152.00	90%	$185,515.20	$131,668.68	71%	$53,846.52
Aleutian Region	$1,373,000.00	80%	$274,600.00	$169,230.00	62%	$105,370.00
Aleutians East	$825,660.00	90%	$82,566.00	-	0%	$82,566.00
Anchorage	$1,934,916.00	60%	$773,966.40	-	0%	$773,966.40
Annette Island	$131,904.00	90%	$13,190.40	-	0%	$13,190.40
Bering Strait	$8,129,505.60	90%	$812,950.56	$140,851.20	17%	$672,099.56
Bristol Bay	$1,384,944.00	90%	$138,494.40	$91,677.60	66%	$46,816.80
Chatham	$266,183.00	80%	$53,236.60	$32,390.72	61%	$20,845.88
Chugach	$1,167,792.00	90%	$116,779.20	$62,892.60	54%	$53,886.60
Copper River	$6,480.00	80%	$1,296.00	-	0%	$1,296.00
Cordova	$155,880.00	90%	$15,588.00	-	0%	$15,588.00
Craig	$79,295.76	90%	$7,929.58	-	0%	$7,929.58
Delta/Greely	$80,940.00	80%	$16,188.00	-	0%	$16,188.00
Denali	$30,795.96	50%	$15,397.98	-	0%	$15,397.98
Dillingham	$1,495,440.00	90%	$149,544.00	-	0%	$149,544.00
Fairbanks	$812,424.00	60%	$324,969.60	-	0%	$324,969.60
Galena	$1,082,424.00	80%	$216,484.80	$165,216.00	76%	$51,268.80
Haines	$112,212.00	70%	$33,663.60	-	0%	$33,663.60
Hoonah	$36,000.00	90%	$3,600.00	-	0%	$3,600.00
Hydaburg	$163,404.00	90%	$16,340.40	-	0%	$16,340.40
Iditarod Area	$1,886,271.36	90%	$188,627.14	$48,997.78	26%	$139,629.36
Juneau	$167,220.00	60%	$66,888.00	-	0%	$66,888.00
Kake	$180,890.00	90%	$18,089.00	-	0%	$18,089.00
Kashunamiut	$1,250,268.00	90%	$125,026.80	-	0%	$125,026.80
Kenai Peninsula	$871,900.80	70%	$261,570.24	$15,000.00	6%	$246,570.24
Ketchikan Gateway	$179,562.52	60%	$71,825.01	-	0%	$71,825.01
Klawock	$90,210.00	80%	$18,042.00	-	0%	$18,042.00
Kodiak Island	$4,623,912.00	80%	$924,782.40	$164,877.00	18%	$759,905.40
Kuspuk	$10,626,684.00	90%	$1,062,668.40	$614,613.72	58%	$448,054.68
Lake & Peninsula	$2,521,773.48	90%	$252,177.35	$139,842.72	55%	$112,334.63
Lower Kuskokwim	$51,842,820.0	90%	$5,184,282.00	$1,907,892.00	37%	$3,276,390.00
Lower Yukon	$8,580,492.00	90%	$858,049.20	-	0%	$858,049.20
Mat-Su	$747,153.48	70%	$224,146.05	-	0%	$224,146.05
Nenana	$102,492.00	90%	$10,249.20	-	0%	$10,249.20
Nome	$920,040.00	90%	$92,004.00	$27,984.00	30%	$64,020.00
North Slope	$6,858,000.00	90%	$685,800.00	$321,600.00	47%	$364,200.00

[19] The amount of bandwidth purchased with this funding, as well as whether the funding includes WAN along with internet costs is not available at present.

Northwest Arctic	$7,623,192.00	90%	$762,319.20	$169,266.00	22%	$593,053.20
Pelican	$130,380.00	90%	$13,038.00	-	0%	$13,038.00
Petersburg	$131,880.00	80%	$26,376.00	-	0%	$26,376.00
Pribilof	$302,400.00	80%	$60,480.00	$49,312.68	82%	$11,167.32
Sitka	$234,456.00	70%	$70,336.80	-	0%	$70,336.80
Skagway	$43,032.00	50%	$21,516.00	-	0%	$21,516.00
Southeast Island	$1,741,908.00	80%	$348,381.60	$195,045.60	56%	$153,336.00
Southwest Region	$4,162,100.04	90%	$416,210.00	$267,820.00	64%	$148,390.00
St Mary's	$1,412,616.00	90%	$141,261.60	$96,586.00	68%	$44,675.60
Tanana	$192,000.00	90%	$19,200.00	-	0%	$19,200.00
Unalaska	$1,155,874.00	60%	$462,349.60	$148,556.62	32%	$313,792.98
Valdez	$7,200.00	70%	$2,160.00	-	0%	$2,160.00
Wrangell	$327,744.00	80%	$65,548.80	-	0%	$65,548.80
Yakutat	$361,500.00	80%	$72,300.00	$28,920.00	40%	$43,380.00
Yukon Flats	$2,090,520.00	90%	$209,052.00	$90,100.00	43%	$118,952.00
Yukon/Koyukuk	$4,904,169.76	80%	$980,833.96	$762,066.00	78%	$218,767.96
Yupiit	$2,679,372.00	90%	$267,937.20	$39,208.80	15%	$228,728.40

Appendix B: Annual District Internet Cost as Percentage of Total Budget, Before and After E-rate and School BAG Subsidies, 2021

District Name	Before (total)	After (final)	% Difference
Alaska Gateway	18.68%	0.54%	-18.14%
Aleutian Region	81.76%	6.27%	-75.48%
Aleutians East	9.35%	0.93%	-8.41%
Anchorage	0.31%	0.12%	-0.18%
Annette Island	1.45%	0.15%	-1.31%
Bering Strait	14.36%	1.19%	-13.18%
Bristol Bay	35.52%	1.20%	-34.32%
Chatham	6.05%	0.47%	-5.57%
Chugach	23.73%	1.09%	-22.63%
Copper River	0.09%	0.02%	-0.07%
Cordova	2.37%	0.24%	-2.13%
Craig	1.16%	0.12%	-1.04%
Delta/Greely	0.69%	0.14%	-0.55%
Denali	0.29%	0.14%	-0.14%
Dillingham	16.00%	1.60%	-14.40%
Fairbanks	0.39%	0.15%	-0.23%
Galena	3.67%	0.17%	-3.50%
Haines	2.50%	0.75%	-1.75%
Hoonah	1.23%	0.12%	-1.11%
Hydaburg	7.06%	0.71%	-6.36%
Iditarod Area	22.39%	1.66%	-20.73%
Juneau	0.24%	0.09%	-0.14%
Kake	5.91%	0.59%	-5.31%
Kashunamiut	16.68%	1.67%	-15.01%
Kenai Peninsula	0.60%	0.17%	-0.43%
Ketchikan Gateway	0.45%	0.18%	-0.27%
Klawock	2.49%	0.50%	-2.00%
Kodiak Island	10.30%	1.69%	-8.61%
Kuspuk	75.33%	3.18%	-72.16%
Lake & Peninsula	19.23%	0.86%	-18.37%
Lower Kuskokwim	42.89%	2.71%	-40.18%
Lower Yukon	15.12%	1.51%	-13.61%
Mat-Su	0.29%	0.09%	-0.21%
Nenana	1.18%	0.12%	-1.06%
Nome	6.86%	0.48%	-6.38%
North Slope	10.31%	0.55%	-9.76%
Northwest Arctic	11.92%	0.93%	-10.99%
Pelican	20.65%	2.07%	-18.59%
Petersburg	1.51%	0.30%	-1.21%
Pribilof	16.01%	0.59%	-15.42%
Sitka	1.11%	0.33%	-0.78%
Skagway	1.70%	0.85%	-0.85%
Southeast Island	26.40%	2.32%	-24.08%

Southwest Region	21.77%	0.78%	-20.99%
St Mary's	33.02%	1.04%	-31.97%
Tanana	11.75%	1.17%	-10.57%
Unalaska	13.79%	3.74%	-10.04%
Valdez	0.05%	0.02%	-0.04%
Wrangell	5.37%	1.07%	-4.29%
Yakutat	18.29%	2.19%	-16.09%
Yukon Flats	22.69%	1.29%	-21.40%
Yukon/Koyukuk	24.72%	1.10%	-23.62%
Yupiit	25.07%	2.14%	-22.93%

Appendix C: Total Annual Costs for Internet Access after Subsidies AY19 and AY21
Off Road Districts[20]

Total Annual Internet Cost OFF road	AY2019	AY2021
Aleutian Region	$1,441,899.84	$1,373,000.00
Aleutians East	$799,200.00	$825,660.00
Annette Island	$139,628.88	$131,904.00
Bering Strait	$13,678,930.20	$8,129,505.60
Bristol Bay	$2,257,096.20	$1,384,944.00
Chatham	$1,611,537.00	$266,183.00
Cordova	$155,880.00	$155,880.00
Craig	$89,915.76	$79,295.76
Dillingham	$2,277,384.00	$1,495,440.00
Galena	$248,772.00	$1,082,424.00
Haines	$114,912.00	$112,212.00
Hoonah	$24,000.00	$36,000.00
Hydaburg	$159,804.00	$163,404.00
Iditarod Area	$2,741,796.00	$1,886,271.36
Juneau	$151,352.04	$167,220.00
Kake	$185,670.28	$180,890.00
Kashunamiut	$844,572.00	$1,250,268.00
Ketchikan Gateway	$136,082.64	$179,562.52
Klawock	$64,200.00	$90,210.00
Kodiak Island	$7,436,304.12	$4,623,912.00
Kuspuk	$13,813,849.29	$10,626,684.00
Lake & Peninsula	$3,717,493.32	$2,521,773.48
Lower Kuskokwim	$32,121,096.00	$51,842,820.00
Lower Yukon	$8,023,092.00	$8,580,492.00
Nome	$1,145,400.00	$920,040.00
North Slope	$10,677,000.00	$6,858,000.00
Northwest Arctic	$6,033,252.36	$7,623,192.00
Pelican	$265,500.00	$130,380.00
Petersburg	$131,880.00	$131,880.00
Pribilof	$443,400.00	$302,400.00
Sitka	$118,800.00	$234,456.00
Skagway	$43,140.00	$43,032.00
Southeast Island	$2,580,816.00	$1,741,908.00
Southwest Region	$5,655,039.00	$4,162,100.04
St Mary's	$1,182,267.72	$1,412,616.00
Tanana	$1,113,036.00	$192,000.00

[20] Cost increases may reflect the purchase of additional bandwidth, or costs associated with operating WANs as well as the direct cost of internet access.

Unalaska	$529,802.46	$1,155,874.00
Wrangell	$107,121.00	$327,744.00
Yakutat	$368,286.00	$361,500.00
Yukon Flats	$3,122,628.00	$2,090,520.00
Yukon/Koyukuk	$7,322,843.80	$4,904,169.76
Yupiit	$3,962,010.44	$2,679,372.00

Appendix D: Total Annual Costs for Internet Access after Subsidies AY19 and AY21 On Road Districts[21]

Total Annual Internet Cost ON road	AY2019	AY2021
Alaska Gateway	$3,083,117.83	$1,855,152.00
Anchorage	$1,576,500.00	$1,934,916.00
Chugach	$1,833,425.76	$1,167,792.00
Copper River	$130,827.24	$6,480.00
Delta/Greely	$93,756.00	$80,940.00
Denali	$30,788.40	$30,795.96
Fairbanks	$1,069,796.31	$812,424.00
Kenai Peninsula	$955,533.46	$871,900.80
Mat-Su	$1,833,232.80	$747,153.48
Nenana	$104,400.00	$102,492.00
Valdez	$178,800.00	$7,200.00

[21] Cost increases may reflect the purchase of additional bandwidth, or costs associated with operating WANs as well as the direct cost of internet access.

Appendix E: Final AY21 per Pupil per year District Internet cost *WITH* E-Rate and School BAG[22]

District Name	On Road System	AY21 Fulltime Enrollment	Final Internet Cost to District	Final per Pupil District Internet Cost and rank	
				$/pupil	Rank
Alaska Gateway	Yes	399	$53,846.52	$134.95	30
Aleutian Region	No	25	$105,370.00	$4,214.80	1
Aleutians East	No	206	$82,566.00	$400.81	13
Anchorage	Yes	41,203	$773,966.40	$18.78	45
Annette Island	No	311	$13,190.40	$42.41	39
Bering Strait	No	1,727	$672,099.56	$389.17	16
Bristol Bay	No	119	$46,816.80	$393.42	15
Chatham	No	144	$20,845.88	$144.76	29
Chugach	Yes	653	$53,886.60	$82.52	34
Copper River	Yes	392	$1,296.00	$3.31	53
Cordova	Yes	290	$15,588.00	$53.75	37
Craig	No	874	$7,929.58	$9.07	49
Delta/Greely	Yes	775	$16,188.00	$20.89	44
Denali	Yes	1,152	$15,397.98	$13.37	47
Dillingham	No	412	$149,544.00	$362.97	17
Fairbanks	Yes	11,199	$324,969.60	$29.02	42
Galena	No	9,030	$51,268.80	$5.68	50
Haines	No	276	$33,663.60	$121.97	31
Hoonah	No	126	$3,600.00	$28.57	43
Hydaburg	No	169	$16,340.40	$96.69	32
Iditarod Area	No	322	$139,629.36	$433.63	11
Juneau	No	3,993	$66,888.00	$16.75	46
Kake	No	99	$18,089.00	$182.72	26
Kashunamiut	No	317	$125,026.80	$394.41	14
Kenai Peninsula	Yes	7,902	$246,570.24	$31.20	41
Ketchikan Gateway	No	2,052	$71,825.01	$35.00	40
Klawock	No	115	$18,042.00	$156.89	28
Kodiak Island	No	2,221	$759,905.40	$342.15	20
Kuspuk	No	352	$448,054.68	$1,272.88	2
Lake & Peninsula	No	319	$112,334.63	$352.15	19
Lower Kuskokwim	No	3,987	$3,276,390.00	$821.77	5
Lower Yukon	No	2,034	$858,049.20	$421.85	12
Mat-Su	Yes	17,935	$224,146.05	$12.50	48
Nenana	Yes	1,843	$10,249.20	$5.56	51
Nome	No	690	$64,020.00	$92.78	33
North Slope	No	1,952	$364,200.00	$186.58	25
Northwest Arctic	No	1,943	$593,053.20	$305.23	21
Pelican	No	11	$13,038.00	$1,185.27	3
Petersburg	No	426	$26,376.00	$61.92	35
Pribilof	No	58	$11,167.32	$192.54	24
Sitka	No	1,162	$70,336.80	$60.53	36
Skagway	No	131	$21,516.00	$164.24	27
Southeast Island	No	147	$153,336.00	$1,043.10	4
Southwest Region	No	607	$148,390.00	$244.46	22

[22] Cost may reflect only internet access or may also include costs associated with operating WANs.

ST MARY'S	No	193	$44,675.60	$231.48	23
TANANA	No	30	$19,200.00	$640.00	7
UNALASKA	No	387	$313,792.98	$810.83	6
VALDEZ	Yes	651	$2,160.00	$3.32	52
WRANGELL	No	182	$65,548.80	$360.16	18
YAKUTAT	No	91	$43,380.00	$476.70	9
YUKON FLATS	No	202	$118,952.00	$588.87	8
YUKON/KOYUKUK	No	4,160	$218,767.96	$52.59	38
YUPIIT	No	506	$228,728.40	$452.03	10

Appendix F: Speed of Internet and Types of Internet Access by District

District Name	Internet Service Providers	Mbps	Type Of Product	Upload Speed in Mbps		Download Speed in Mbps	
				Low	High	Low	High
Alaska Gateway	GCI Communication	250	Copper Ethernet	10	100	10	100
Aleutian Region	GCI Communication	*	Copper Cable Modem	15	15	250	250
Aleutians East	TelAlaska Long Distance	125	Wireless Satellite Service	7	10	25	25
Anchorage	Alaska Communications Systems Holdings	6000	Fiber Ethernet	2	3000	2	3000
Annette Island	GCI Communication	150	Fiber Ethernet	15	15	150	150
Bering Strait	Alaska Communications Systems Holdings; GCI Communication	395	Fiber Ethernet	10	10	10	10
			Wireless Microwave	10	50	10	50
			Wireless Satellite Service	3	5	10	25
Bristol Bay	GCI Communication	50	Fiber Ethernet	25	25	25	25
Chatham	Byte Networking; GCI Communication	100	Fiber Ethernet	25	1000	25	1000
			Wireless Microwave	5	25	25	25
Chugach	GCI Communication	*	Copper Cable Modem	15	15	250	250
			Fiber Ethernet	10	100	10	100
			Wireless Satellite Service	3	10	10	25
Copper River	Copper Valley Telephone Cooperative	*	Fiber Ethernet	1000	1000	1000	1000
Cordova	Cordova Telephone Cooperative	150	Fiber	100	100	100	100
Craig	Alaska Telephone Company	*	Copper Cable Modem	3	15	20	250
Delta/Greely	GCI Communication	500	Fiber Ethernet	500	1000	500	1000
			Wireless Microwave	100	500	100	500
Denali	Alaska Communications Systems Holdings, Inc.	*	Fiber MPLS	50	200	50	1000
Dillingham	GCI Communication	50	Wireless Microwave	50	50	50	50
Fairbanks	Alaska Communications Systems Holdings; GCI Communication	4000	Fiber Ethernet	40	10000	40	10000
			Copper Ethernet	40	40	40	40
Galena	GCI Communication	50	Copper Ethernet	10	50	10	50
			Wireless Microwave	25	25	25	25
Haines	GCI Communication	100	Fiber Ethernet	100	100	100	100

HOONAH	Snowcloud Services	50	Wireless Microwave	50	50	50	50
HYDABURG	GCI Communication Corp	*	Copper Cable Modem	15	15	250	250
			Fiber Ethernet	100	100	100	100
IDITAROD AREA	DRS Global Enterprise Solutions Inc.	*	Wireless Satellite Service	4	7	10	20
JUNEAU	Alaska Communications Systems Holdings	1000	Fiber Ethernet	50	1000	50	1000
KAKE	Kwaan Wireless	50	Wireless Microwave	50	50	50	50
KASHUNAMIUT	GCI Communication	15	Copper ATM	15	35	15	35
KENAI PENINSULA	Alaska Communications Systems Holdings	1000	Fiber Ethernet	150	1000	150	1000
			Copper Ethernet	10	20	10	20
			Wireless Microwave	5	20	5	20
			Fiber MPLS	25	300	25	300
			Wireless data service	75	200	75	200
KETCHIKAN GATEWAY	City of Ketchikan	2000	Fiber Ethernet	1000	10000	1000	10000
KLAWOCK	GCI Communication	25	Fiber Ethernet	25	50	25	50
KODIAK ISLAND	GCI Communication	625	Other	10	1000	25	1000
KUSPUK	Alaska Communications Systems Holdings	240	Fiber Ethernet	100	100	100	100
LAKE & PENINSULA	DRS Global	300	Copper Digital Subscriber Line (DSL)	15	75	15	75
			Wireless Satellite Service	7	10	10	25
LOWER KUSKOKWIM	GCI Communication	300	Fiber Ethernet	100	100	100	100
			Wireless Microwave	10	265	10	265
LOWER YUKON	GCI Communication	320	Fiber Ethernet	1000	1000	1000	1000
			Copper Ethernet	100	100	100	100
			Wireless Microwave	25	50	25	50
			Wireless Satellite Service	10	10	25	25
MAT-SU	Matanuska Telephone Association	3000	Fiber Ethernet	50	3000	50	3000
NENANA	GCI Communication Corp	*	Fiber Ethernet	800	1000	800	1000
NOME	DRS Global; DRS Technical Services	325	Fiber Ethernet	75	100	75	100
NORTH SLOPE	GCI Communication	285	Fiber Ethernet	25	75	25	75
			Wireless Microwave	25	25	25	25
			Wireless Satellite Service	2.5	5	2.5	25

NORTHWEST ARCTIC	GCI Communication	300	Fiber Ethernet	5	60	5	60
			Wireless Microwave	3	25	3	25
			Wireless Satellite Service	3	24	3	25
PELICAN	Byte Networking LLC	*	Wireless Microwave	25	25	25	25
PETERSBURG	GCI Communication	150	Fiber OC-N (TDM Fiber)	150	150	150	150
PRIBILOF	TelAlaska Long Distance	25	Wireless Satellite Service	2.5	2.5	10	25
SITKA	Alaska Telephone	100	Fiber Ethernet	1000	4000	1000	4000
			Fiber OC-N (TDM Fiber)	100	300	100	300
SKAGWAY	GCI Communication	150	Fiber Ethernet	100	100	100	100
SOUTHEAST ISLAND	GCI Communication	165	Wireless Microwave	10	80	10	80
			Wireless Satellite Service	4	4	10	10
SOUTHWEST REGION	GCI Communication	50	Copper Ethernet	10	40	10	40
ST MARY'S	GCI Communication	1100	Fiber Ethernet	25	10000	25	10000
TANANA	DRS Global	10	Wireless Microwave	10	10	10	10
UNALASKA	TelAlaska Long Distance	50	Wireless Satellite Service	7	50	20	100
VALDEZ	Copper Valley Telephone Cooperative	*	Fiber Ethernet	1000	1000	1000	1000
WRANGELL	GCI Communication Corp	*	Fiber Ethernet	150	150	150	150
			Copper Ethernet	1000	1000	1000	1000
YAKUTAT	GCI Communication	25	Wireless Satellite Service	3	5	15	25
YUKON FLATS	DRS Technical Services	150	Fiber MPLS	4	1000	10	1000
YUKON/KOYUKUK	DRS Global Enterprise Solutions Inc.; GCI Communications Corp	*	Wireless Microwave	2	25	5	25
			Fiber MPLS	100	1000	200	1000
			Wireless Satellite Service	5	5	25	25
YUPIIT	GCI Communication	75	Wireless Microwave	20	25	20	25
*MISSING DATA							

Appendix G: Data Limitations and Sources

Data Decisions, Definitions, Limitations, and Gaps

While we present some of the data for districts as a whole, it is important to note there are significant differences within districts in terms of costs for the internet as well as bandwidth and speeds. For districts where there are multiple internet providers and/or widely varying speeds and types of connections, we have indicated both the slowest and fasted download and upload speeds, and the different forms of internet access. First, we were unable to obtain bandwidth data for 12 districts[23]. Second, due to factors discussed above, we decided not to use data for years prior to 2018. Finally, our data on reliability is limited to those districts who completed the online survey, and reflects the views of the individuals who completed the survey for their districts as we did not have the resources to individually contact every school.

2021 budget data (total non-instruction expenditures) had not yet been audited when calculations were made. School district audited expenditure data does not allow us to break out expenditures on the internet because they are rolled up into a utility category. We used data provided for E-rate and School BAG instead.

Correlating years for the data we used can be a bit tricky. E-rate names its year for the start date, so 2018 refers to the 2018-2019 academic year (AY19), or fiscal year 2019 (FY19). State budgets refer to the end date, so FY21 refers to 2020-2021, or E-rate year 2020. As such, we have used FY21 budget data to compare to 2020 E-rate data, and 2020-2021 enrollment data for AY21. For 2018 E-rate date, we have used FY19 budget data and AY19 (2018-2019) enrollment data.

Data Sources

2018 and 2020 e-rate and internet cost data collected by Valerie Oliver, the Alaska E-rate Coordinator for Schools and Libraries in the Alaska Department of Education and Early Development.

Total expenditure data at the district level from Alaska Department of Education and Early Development website FY21 unaudited.

Utility and energy expenditure data supplied by Heidi Teshner, Director of Finance and Support Services, Alaska Department of Education and Early Development

[23] These districts are Aleutian Region, Chugach, Copper River, Craig, Denali, Hydaburg, Iditarod Area, Nenana, Pelican, Valdez, Wrangell, and Yukon/Koyukuk.