ALASKA STATE LEGISLATURE
SENATE COMMUNITY AND REGIONAL AFFAIRS STANDING COMMITTEE
April 15, 2021
3:32 p.m.

MEMBERS PRESENT

Senator Shelley Hughes, Chair
Senator Robert Myers, Vice Chair
Senator Lyman Hoffman
Senator Elvi Gray-Jackson

MEMBERS ABSENT

Senator David Wilson

COMMITTEE CALENDAR

PRESENTATION: ASSESSING THE PRESENT AND LOOKING TO THE FUTURE, WHAT ARE THE BROADBAND GAPS IN ALASKA?

- HEARD

PREVIOUS COMMITTEE ACTION

No previous action to record

WITNESS REGISTER

JOHN BOUCHER, Interim Chief Information Technology Officer
Office of Information Technology
University of Alaska
Anchorage, Alaska
POSITION STATEMENT: Delivered a presentation titled "University of Alaska Broadband Challenges and Opportunities."

CHAD STOVALL, Director of Programs
Denali Commission
Anchorage, Alaska
POSITION STATEMENT: Co-presented an Overview of Broadband in Alaska.

ERIK O'BRIEN, Broadband Program Manager
Denali Commission
Anchorage, Alaska

POSITION STATEMENT: Co-presented an Overview of Broadband in Alaska.

CHRISTINE O'CONNOR, Executive Director
Alaska Telecom Association
Anchorage, Alaska
POSITION STATEMENT: Delivered a presentation titled "State of Broadband in Alaska."

LESIL MCGUIRE
OneWeb
Anchorage, Alaska
POSITION STATEMENT: Provided an update on OneWeb during the hearing on Broadband access in Alaska.

SHAWN WILLIAMS, Vice President of
Government Affairs and Strategy
Pacific Dataport, Inc.
Anchorage, Alaska
POSITION STATEMENT: Delivered a presentation on Pacific Dataport broadband projects in rural Alaska.

PATRICIA COOPER, Vice President of Satellite Government Affairs
Space Exploration Technology Corporation (SpaceX)
Hawthorne, California
POSITION STATEMENT: Delivered a presentation on the Starlink Program.

ACTION NARRATIVE

3:32:29 PM
CHAIR SHELLEY HUGHES called the Senate Community and Regional Affairs Standing Committee meeting to order at 3:32 p.m. Present at the call to order were Senators Gray-Jackson, Meyers, Hoffman, and Chair Hughes.

PRESENTATION: Assessing the Present and Looking to the Future, What are the Broadband Gaps in Alaska?

3:32:53 PM
CHAIR HUGHES announced the business before the committee would be presentations relating to assessing broadband gaps in Alaska now and into the future. She said broadband access is an important topic because it affects almost every aspect of life in Alaska from the economy to health care to education to where people can live and work in the state. Access is very good in some areas and not so good in others and it is important for the

legislature to understand that. She listed the order of the presentations.

3:35:40 PM
JOHN BOUCHER, Interim Chief Information Technology Officer, Office of Information Technology, University of Alaska, Anchorage, Alaska, presented a PowerPoint titled "University of Alaska Broadband Challenges and Opportunities."

MR. BOUCHER reviewed the agenda on slide 2 that read as follows:

- Overview of the Office of Information Technology (OIT) role at the University of Alaska in regards to broadband
- UA's service footprint, how it can differ by location, and how that may influence the student experience
- Opportunities for the improvement of UA's current delivery of bandwidth

MR. BOUCHER displayed the map on slide 3 that delineates the locations throughout Alaska where OIT provides bandwidth for UA. He explained that OIT purchases connectivity from available venders for the university campuses in Anchorage (UAA), Fairbanks (UAF), and Juneau (UAS) and additionally provides access for the 13 community campuses and colleges throughout the state. OIT also helps support connectivity in some remote research stations and mobile work stations such as the floating research vessel Sikuliaq.

He highlighted that the UA perspective of broadband is primarily as a consumer in a variety of settings from urban campuses to regional hubs to rural and remote research settings. He said this important tool enables the university to deliver high quality education and research to Alaskans and the world at the lowest possible effective cost.

3:38:55 PM
MR. BOUCHER provided some background. He related that in 2015, the FCC defined "broadband" as a minimum of 25 megabits per second (Mbps) download and a minimum of 3 Mbps upload, sometimes called 25/3. He pointed out that the definition was on a per household basis, not a facility basis that may have far more individuals using the service than the average household. He noted that the 25 Mbps download speed matches the target goal for the Alaska School Broadband Assistance Grant (BAG) program.

MR. BOUCHER mentioned that resource constraints make it difficult to purchase significant connectivity speeds in rural locations and said it affects the students' experiences.

3:41:08 PM
CHAIR HUGHES asked him to pick up the pace so as to not shortchange subsequent presenters.

3:41:19 PM
MR. BOUCHER paraphrased the broadband limitations on UA campuses listed on slide 5 that read as follows:

- Current bandwidth provisioning at low bandwidth locations can translate into limitations for the delivery of digital content
- For example, it's challenging to deliver rich learning content that relies upon a substantial Internet connection
- Some services are difficult to deliver due to limited bandwidth (live streaming, interactive content)
- Limits UA ability to fully leverage a recent federal grant (750K) to its fullest extent

He summarized that low bandwidth capacity limits the university's available tools, particularly at its rural campuses.

3:42:16 PM
MR. BOUCHER paraphrased the list on slide 6 of challenges and costs associated with insufficient bandwidth. It read as follow:

- Due to cost structures in rural areas, meaningful capacity is cost prohibitive
- High cost creates capacity imbalance between rural and urban campuses
- Unlike K-12, institutions of higher education are not eligible for federal E-rate funding at a subsidized rate of 50-90%
- UA would like to explore the possibility of a 25 megabits per second minimum - similar to what K-12 has standardized on but resources are a challenge

3:43:16 PM

MR. BOUCHER stated that UA is working to reduce the high cost of connectivity in rural locations. He noted that the opportunity for federal funding in low bandwidth areas is growing. He noted that the university recently agreed to chair the Connecting Minority Communities Pilot Program to ensure that UA's rural campus needs are considered. UA has also been monitoring and enquiring about new services including satellite delivery that are expected to be available very soon in low bandwidth areas. He said these new technologies offer the potential for game-changing opportunities and UA is willing to participate in pilot programs as they unfold.

3:45:02 PM
CHAIR HUGHES suggested that members hold their questions until after the last presentation. She thanked Mr. Boucher and recognized Mr. Stovall and Mr. O'BRIEN with the Denali Commission.

3:45:55 PM
CHAD STOVALL, Director of Programs, Denali Commission, Anchorage, Alaska, stated that the Denali Commission currently manages a $1 billion portfolio and operates on a $15 million annual appropriation. Providing some history, he explained that the Denali Commission was established by Congress in 1998. It is one of four regional commissions; it was modeled after the Appalachian Regional Commission that was established in 1965. The Denali Commission is overseen by a board of commissioners each of whom have a vested interest in Alaska's growth and development. It was designed to share parity with the State of Alaska regarding its development goals.

The Commission is unique among the regional commissions because it has just one service area and it encompasses the entire state. This allows the commission to focus exclusively on Alaska's interests as opposed to having to handle multiple states. Second, in addition to the federal co-chair, the commission has a state co-chair who represents the governor. The relationship between the co-chairs allows the commission to work strategically with the state government in Alaska's critical development.

MR. STOVALL said that after 23 years the Denali Commission still adheres to the founding mission to oversee the most efficient and effective delivery of resources to rural Alaska. The commission has undergone changes in size, staff, and funding and as it continues to adapt to changes, the board continually evaluates and ensures that the agency is appropriately

celebrated. This is done based on changing needs, conditions, and data. Recent efforts have been based on the 2018 strategic plan which emphasized coordination and the ability to complement partners across the state. The strategic plan helped lay the groundwork to broaden opportunities and make significant program changes to the FY2020 program budget. This was done through the introduction of new funding categories to the working plan for the agency.

3:48:37 PM
MR. STOVALL related that the categories were economic development, workforce development, housing, medical facilities, and broadband. The commission has had broadband as a high priority on its agenda since 2019. Through close coordination with multiple partners, the commission was able to host a series of meetings regarding rural electric internet connectivity in August 2019. Attending those meetings from Washington, D.C. was USDA rural utility service administrator Chad Rupe. He was able to engage with Alaska stakeholders over several days and left with an appreciation of the unique challenges the state faces with respect to broadband.

He said coordinating and opening up these discussions with local partners assisted in removing barriers to Alaska's funding request that competed in the 2020 USDA rural development reconnect competition. From a high level, the federal government has been making efforts to deliver better broadband service and connectivity to rural areas for the last several years. NTIA has accelerated that to almost a warp speed. Unprecedented levels of federal broadband funds are making their way through the federal process and many federal stakeholders are stepping up and assisting in directing as much of this funding to rural Alaska as possible. Since the start of COVID, a core group of federal partners has come together in an all-hands-on-deck effort, likewise with the state. They have been a tremendous resource in assisting the commission in broadband wins across the state for the last year. The commission has been fortunate to have strong partners to help it work on strategic broadband development around the state.

Last, he said the tip of the spear for the Denali Commission is the program managers. Shortly after the rural connectivity meetings in 2019, the commission decided to commit further time and resources to the broadband enhancement efforts around the state by adding an additional staff member to manage the broadband portfolio. That program manager was Eric O'Brien who joined the commission from the Southwest Alaska Municipal

Conference. The commission feels fortunate to have him and he has produced a number of results that he will talk about as part of the strategic coordinated effort the commission has had ongoing for the last year.

3:50:50 PM
ERIK O'BRIEN, Broadband Program Manager, Denali Commission, Anchorage, Alaska, stated that he would provide an overview of broadband or internet in Alaska. He displayed the map of the state on slide 2 to highlight that the internet connects the state. It is Alaska's critical infrastructure, which the university refers to as the "middle mile." He explained that the green lines represent the fiber corridors that have the highest capacity. The blue lines identify the microwave corridors that have less capacity. The communities that are not connected by either green or blue lines have the least capacity. He clarified that the illustration is not comprehensive. It is a snapshot and a place to start the discussion, he said.

3:52:06 PM
MR. O'BRIEN discussed some of the ways the Denali Commission has engaged with Broadband.

In 2010, a group of service providers, nonprofits, elected and public officials formed the Alaska Broadband Taskforce with support of the quasi-governmental body to connect Alaska. The National Telecommunications and Information Administration (NTIA) provided the funding and had the stated goal of providing 100 megabytes (MB) of service to every household in Alaska by 2020. While this ambitious goal was not achieved, the effort was successful in shining an important light on broadband.

The 2014 Alaska Broadband Plan provided recommendations, infrastructure needs, cost estimates, and case studies.

In 2019, the Denali Commission funded an update to the Alaska Broadband Plan with the narrow focus of ensuring that Alaska applicants were eligible for all possible points in the USDA reconnect program. After successfully commissioning and completing the update and working with the governor's office and service providers in time for the December 2019 Reconnect II grant announcement for $600 million, the commission can look back on the success of that endeavor with eight submitted applications, six successful projects, a seventh pending review, and total federal investment of more than $80 million in Alaska.

MR. O'BRIEN said the commission's updated broadband plan showed the value of the public private partnerships to meet these critical infrastructure needs.

3:53:40 PM
MR. O'BRIEN pointed to the infrastructure map to highlight the challenges of serving Alaska's vast geography with its small population. He pointed out that the service providers are companies that have made substantial investments in Alaska. He commended them and said the value of the public private partnership is well understood. The central programs are from the FCC, the USDA Reconnect, USDA Community Connect, Distance Learning & Telemedicine, the NTIA Tribal Broadband grants, and other Stimulus and Infrastructure projects. He said the point he was highlighting was to identify the roles and partnerships required to meet the challenges around broadband in Alaska. HE SAID YOU KNOW THAT BETTER THAN MOST BUT HE WANTED TO LAY THE GROUNDWORK.

3:54:31 PM
MR. O'BRIEN reported that the NTIA currently is preparing a $1.6 billion grant to fund tribal broadband projects in Alaska under three programs. These are 1) serving minority communities for workforce development and training ($285mm); 2) tribal broadband to connect tribal communities ($1B); and 3) state broadband infrastructure ($300mm). He noted that the tribal focus of these programs may be especially valuable to Alaska with it 229 tribes. This is about 40 percent of the tribes nationwide but a lessor percentage of the population nationwide. Nevertheless, he said that Alaska tribes represent a substantial underserved population given the challenges outlined here. He said $1.6 billion is a large number but not compared to the national need for tribal broadband funding. Alaska has some of the greatest need for broadband in the country and it is imperative that Alaska tribes beginning planning now to maximize their eligible allocation.

MR. O'BRIEN said the NTIA grants have not been announced but he believes that the Denali Commission's accomplishments over the last 18 months demonstrate how it could provide critical support in helping Alaska's tribes.

3:55:46 PM
MR. O'BRIEN recounted the following Denali Commission accomplishments: First, through close coordination with the USDA, the commission identified the potential problem of not having a broadband plan and the negative implications that had

for the Reconnect Funding. With prompt action, the revised plan was released within three months and a partnership with service providers and the governor's office. He reminded the committee that this resulted in over $80 million in federal investments across eight application for important infrastructure projects across Alaska.

Second, through close coordination with the FCC, the Denali Commission identified important opportunity for Alaska tribes to receive a dedicated license to access valuable wireless spectrum capable of providing cellular, fixed wireless, emergency response, and other services that have yet to be identified. The commission started strong with this program with workshops scheduled throughout the state, the first of which was with tribes in the Tlingit/Haida region of Southeast Alaska. All 17 tribes, private companies, and leadership from the FCC attended. The onset of the coronavirus stopped additional workshops but the commission continued to reach out and stayed in contact with the FCC.

3:56:55 PM
MR. O'BRIEN related that with the July deadline looming, only 12 tribes had applied for their license. With an 11th hour award, the commission funded a dedicated outreach program that helped 10 tribes receive their license in the last week of July. That is almost as much as all the tribes that had been signed up in the first six months of the program. The day before the deadline, the FCC bureau chief extended the national deadline one month and Alaska took advantage signing up 180 tribes of the 229 and 95 percent of the eligible land. Essentially everything outside of the urban centers.

3:57:35 PM
Third, through close coordination with federal partners at USDA, the commission worked with Alaska communities to provide technical assistance for the Community Connect Program, which doubled the previous record of Alaska applications for this particular grant.

MR. O'BRIEN concluded the presentation stating that the Denali Commission would maintain its commitment and mission to facilitate services of the federal government to deliver infrastructure and economic opportunity for all of rural Alaska.

CHAIR HUGHES thanked the presenters and recognized Christine O'Connor with the Alaska Telecom Association.

3:58:53 PM
CHRISTINE O'CONNOR, Executive Director, Alaska Telecom Association, Anchorage, Alaska, stated her overview of the state of broadband in Alaska would look at statewide networks with a focus on the middle mile - how various technologies fit in that landscape, and the opportunities to expand and accelerate the expansion of broadband.

She directed attention to the names and logos on slide 2 of the Alaska-based companies that provide landline and wireless broadband service throughout Alaska. She related that ATA has been supporting its member companies in connecting Alaskans since it was formed in 1949.

MS. O'CONNOR advised that she looks at broadband infrastructure as last mile and middle mile. Last mile is the connection from the internet service provider to a home or business. Over the last several years, nearly 50,000 locations have been upgraded or have newly deployed broadband. A small sample of recent last mile projects include:

- Alaska Communications brought high speed internet to 16,000 rural Alaska residents with plans to double that in the next couple of years.
- Alaska Power and Telephone completed high speed deployment in Tok and Southeast.
- Copper Valley Telecom completed a 25/3 broadband Fiber to the Home Project in the Native village of Tatitlek.
- GCI has increased wireless speeds in Dillingham and nearby communities the last several years, including construction of towers.

3:59:28 PM
MS. O'CONNOR explained that the middle mile is what connects the last mile to the internet service provider. Alaska's middle mile is a combination of technologies. There are thousands of miles of fiber middle mile. It is the gold standard. It allows huge capacity and very fast speeds. Fiber is the best option when it is available. Alaska also has microwave networks that extend hundreds of miles and allow delivery of high speed broadband. This has been transformational in huge parts of Alaska. The middle mile also includes satellite connection. Today there are multiple geosynchronous satellite providers serving Alaska. She noted that more satellite capacity is expected over Alaska in the coming year.

4:02:09 PM

MS. O'CONNER emphasized that the middle mile in Alaska is unique compared to the Lower 48. She said counterparts outside rarely need to consider how they will get a middle mile connection or how much it will cost. Access to fiber backbone connection is nearly ubiquitous. It is a non-issue in most places down south, but in Alaska there are large gaps where the only middle mile connection is satellite, which are more limited in capacity, often have latency issues, and can suffer from interference. She directed attention to the middle mile infrastructure map of Alaska in 2010 with undersea cables connected to the Lower 48 and a limited amount of microwave capacity. By comparison, the broadband and satellite middle mile infrastructure in 2020 reflects the massive investment in middle mile over the last decade. There is new connectivity along the northern coast, expanded microwave networks in the southwest northwest and southeast, new fiber running up the Dalton Highway, and the first terrestrial subsea links into Canada.

MS. O'CONNOR described the following new middle mile projects:

- Alaska Power and Telephone laid an undersea cable between Juneau, Haines, and Skagway and they doubled the capacity of the microwave network between Juneau and Ketchikan.
- Cordova Telecom expanded its microwave network in Prince William Sound.
- GCI completed a multiyear equipment upgrade and added capacity at 24 microwave sites in Western Alaska.
- KPU Telecom completed the first undersea cable to Canada connecting to their fiber to the home network.
- Matanuska Telephone Association constructed the AlCan ONE project, which was the first terrestrial fiber connection from Alaska in to Canada.
- Nushagak Cooperative completed a major expansion of their microwave network.

She highlighted that both the MTA and the KPU projects are providing new routes from Alaska to the Lower 48. This expands the capacity of networks in Alaska and provides geographic diversity in the event of disaster or accident.

4:04:38 PM
MS. O'CONNOR gave a shout out to the USDA for the ReConnect Program that makes major infrastructure projects viable. She directed attention to the list of communities that will all receive broadband service over the next couple of construction

seasons. The communities listed were Akutan, Brevig Mission, Caswell, Chignik, Coffman Cove, Kaktovik, Kasaan, King Cove, Larsen Bay, Prince of Wales Island, Sand Point, Teller, Unalaska, and Yakutat. She noted that nearby communities will also be connected thanks to the ReConnect Program. She said these grants require significant investment from the applicants and significant community support so being awarded these grants is really a testament to both the support from these communities and the company's commitment to invest in the application without knowing they would get the award.

4:06:15 PM
MS. O'CONNOR said that despite tremendous progress in building broadband networks, the work is not finished. The question is how to accomplish ubiquitous and sustainable broadband networks for all Alaska. They not only have to be built but also maintained. The question is how to put the pieces together for the investment to serve the most remote communities, including those with the smallest populations. It is a complex puzzle but the pieces are working together now with investment from Alaska's telecom community. In just the last four years, 18 member companies have invested over $1.2 billion in CapEx alone. It is the investment in the last mile and middle mile infrastructure that allows about 85 percent of Alaskans to receive the FCC standard of 25/3 service and 80 percent are able access 100 megabit service or faster. Second, it is critical to have stable, predictable federal programs. Without this support, broadband expansion does not happen. When federal programs adopt stable rules paired with the requirements to deploy broadband that is what participants in those programs do. The state has a role too. Administrative order 310 directed the Department of Transportation and Public Facilities and the Department of Natural Resources to streamline their respective permitting for broadband facilities deployment projects. This is important because fee structures can either accelerate or impede broadband deployment. Congress also has a large role. President Biden's infrastructure proposal allocates $100 billion for broadband to build future-proof networks, which means fiber. It is an ambitious goal and ATA is eager for the details on this opportunity to dramatically expand broadband networks and connect all Alaskans.

4:08:52 PM
CHAIR HUGHES thanked Ms. O'Connor and recognized former Senator Lesil McGuire with OneWeb.

4:09:20 PM

LESIL MCGUIRE, OneWeb, Anchorage, Alaska, provided an update on OneWeb during the hearing on Broadband access in Alaska. She stated that we are here today because rural Alaska has been left behind. The digital revolution that has swept the earth has been slow to reach Alaska, particularly rural Alaska. She emphasized that participation in the global economy is impossible without high speed broadband. Because of rural Alaska's low population and distance from telecommunication infrastructure, high speed broad has for the most part remained out of reach for private and public sector investment.

She said exciting new technologies are bridging the digital divide. OneWeb is helping to be one part of the solution. She explained that OneWeb is the first licensed LEO spatial constellation in existence. It was licensed by the FCC in 2017 and by the ITU in 2016. OneWeb is next generation satellite technology that has launched 146 satellites to date putting in place a global network that will complete coverage of Alaska and the Arctic within the next two months.

MS. MCGUIRE highlighted that WebOne is the only LEO spatial satellite company that has committed to all of Alaska. It is a top focus. The goal is to bring connectivity to communities, businesses, and governments. They are focusing on coverage in Alaska first before moving to the rest of the globe. Service will be available to Alaska beginning in late 2021.

4:11:35 PM
MS. MCGUIRE said that the satellites that OneWeb developed are now the size of washing machines as opposed to school buses. Placing them together in a constellation with seamless handshake movement over the state provides the user a 5G like experience.

MS. MCGUIRE restated that OneWeb has launched 146 satellites and will launch again April 25 and by the end of May expects to over the entire state. Demonstration speeds have shown 40 milliseconds of latency up to 400 megabytes. There will be demonstrations in Alaska in 2021 and her hope is to bring one to Juneau next year.

MS. MCGUIRE turned to slide 5 and explained how OneWeb connectivity works. The satellites are launched into polar orbit and circumnavigate the earth in a continual handshake pattern. They connect with gateways, one of which has been built in Talkeetna in partnership with Pacific Dataport.

MS. MCGUIRE discussed OneWeb's commitment to sustainable growth across Alaska. She stated that as the least connected state, Alaska is physically and digitally separated from the contiguous U.S. states. This means that internet technologies are not equally available in Alaska. Despite being the largest state in the country, Alaska has the lowest amount of broadband infrastructure. She described OneWeb as a lifeline that can deliver broadband in rural communities, overcoming geographical barriers, helping to connect communities, government, and businesses. She said OneWeb will deliver up to 200 times more capacity to rural Alaska and the Arctic. Alaskans will enjoy the benefits of freedom from less reliable options, faster speeds enjoyed by many in the U.S., totally seamless web browsing and video conferencing, connectivity at home like people enjoy in Anchorage, a feeling like you are finally connected to the world.

4:16:15 PM
MS. MCGUIRE displayed a picture of the Talkeetna Gateway Station and restated OneWeb's commitment to Alaska first. She turned to slide 9 that depicts services for fixed and mobility markets and clarified that OneWeb is a wholesaler that works in conjunction with existing local telecommunication companies who then sell to the consumer. She recounted that OneWeb sells to enterprise, maritime, aviation, education, cellular backhaul and government.

MS. MCGUIRE concluded the presentation summarizing that the OneWeb experience offers freedom from less reliable options, faster speeds, and seamless web browsing and video conferencing.

4:18:06 PM
CHAIR HUGHES thanked Ms. McGuire and recognized Shawn Williams with Pacific Dataport.

4:18:36 PM
SHAWN WILLIAMS, Vice President of Government Affairs and Strategy, Pacific Dataport, Inc., Anchorage, Alaska, reviewed the agenda for the presentation starting with rural broadband in Alaska today, followed by Pacific Dataport's projects, and then a discussion of challenges and solutions.

MR. WILLIAMS described the three areas of funding for broadband in rural Alaska today.

- Middle mile infrastructure (CapEx) - satellite, fiber or microwave

- Last mile infrastructure (CapEx) - wireless broadband, coax cable or fiber
- Last mile (user) subsidies (OpEx)

He explained that Alaska telecoms receive about $380 million in telecom and broadband subsidies that can be used for middle mile and last mile infrastructure. In addition to that federal money are the ReConnect Grants that vary from year to year. He agreed with the ATA assessment that the problem is the missing middle mile, but noted that the other problem is that there is no funding coming to Alaska dedicated only to middle mile.

4:20:22 PM

MR. WILLIAMS turned to slide 3 that outlines the cost of broadband in rural Alaska today. He said the cost to build is very expensive and he broke it out per mile for each kind of middle mile connection. It costs about five times more than in the Lower 48 to put in terrestrial fiber and microwave. Only PDI will be able to deploy middle mile infrastructure that is economical and results in affordable broadband statewide. Telecoms and tribal entities can also use PDI's middle mile sources (both the rural project and the OneWeb project) to deliver affordable broadband anywhere in Alaska. He directed attention to the chart of the projected cost per household for the different networks. It shows that federal funding is helping to pay for these very expensive projects. He noted that even the Yakutat network breaks out to $92,592 for each of the 270 households. The calculation for each network is total cost divided by the number of households served.

MR. WILLIAMS explained that when the middle mile buildout is expensive, both the backhaul and consumer pricing are expensive. He pointed to the charts on slide 4 that confirm this. For example, the Aurora project brings the cost down to less than $500 megabit per second (Mbps), which is considerably less than the cost of other middle mile options. Furthermore, fiber or microwave is limited to the areas served by those options.

MR. WILLIAMS cited several facts about broadband in rural Alaska today.

- According to the 2021 FCC Broadband Report, 36.3 percent of rural Alaskans have no access to wired broadband.
- No organization of authority is following the existing 2014 and 2019 Alaska Broadband Plans or monitoring the benchmarks.

- Nobody has the silver bullet to provide reliable and cost effective broadband to rural Alaska (not Starlink, OneWeb, ATA, or PDI). To get broadband to the villages will take concerted effort from different organizations working together.

4:22:33 PM
MR. WILLIAMS turned to the maps on slide 5 that compare the Alaska middle mile infrastructure in 2010 to the Alaska middle mile infrastructure in 2021. He noted that while fiber and microwave have grown, there is a question about the capacity this has actually added. Continuing to add to an existing network does not add capacity. He drew a parallel between a pie cut in 6 pieces compared to a pie shared among 50. He also pointed out that the fiber in 2 of the 4 submarine cables running down the coast is about 22 years old which is approaching the end of its 20-30 year expected life. He noted that the Q fiber that runs along the northern coast was privately financed. No federal funds were used.

4:25:08 PM
MR. WILLIAMS described Dataport's efforts to expand the capacity for broadband in rural Alaska.

- The Aurora Project plans for two satellites the first of which will be launched in December. Fundraising for the second much larger satellite in underway and the plan is for it to launch the following year. This network will add about 100 gigabits per second of new middle mile infrastructure that is deployable anywhere. The goal of this project is to lower the retail price of 25/3 broadband in rural Alaska to $99 or less. He noted that these estimates to not include federal subsidies.
- PDI has been working to bring OneWeb technology to Alaska. He confirmed Ms. McGuire's description of the worldwide effort that will start in Alaska.
- PDI built the Talkeetna Alaska Teleport for OneWeb and any other LEO or GEO HTS middle mile providers that can be connected to the internet.
- PDI started the Alaska Broadband Association to notify rural Alaskans when broadband comes to their community.
- Pacific Dataport and Microcom are also working with tribes to deploy their last mile 2.5 GHz tribal spectrum wireless internet service provider (WISP)

systems. He agreed with Mr. O'Brien that the challenge for tribes to get broadband in communities is to fill the gap of the missing middle mile. Communities that do not have fiber or microwave are locked out without satellite. He pointed out that both OneWeb and the Aurora networks can be used in a hybrid of low and high capacity that goes into a modem.

4:27:53 PM
MR. WILLIAMS directed attention to the images and descriptions of the OneWeb and the phase 1 and phase 2 Aurora networks depicted on slide 8. He highlighted that the OneWeb network has 648 LEO satellites and the Aurora network consists of the Phase I Aurora 4A GEO HTS satellite and the Phase 2 Aurora IV GEO VHTS satellite, each of which covers all of Alaska. He noted that the second satellite is the new technology that is replacing the old C-band satellite technology. The capacity of each of the Aurora satellites has considerably larger capacity.

4:28:56 PM
MR. WILLIAMS briefly showed an image of the Talkeetna teleport where the middle mile connects to the internet and then paraphrased the highpoints of the broadband challenges bulleted on slide 11. The slide read as follows:

- No State broadband organization to help develop state and Federal policy. To date, federal policy is predominately being made by a trade association that controls the vast preponderance of federal subsidies, grants, or loans coming to state for broadband. Alaska residents are not represented in this process.
- 90% of federal funding for telecommunication/broadband comes in the form of subsidies, not infrastructure.
- Building out fiber and microwave middle mile infrastructure in Alaska is expensive and time consuming due to permitting.
- The USDA and FCC loan and grant programs specify engineering outcomes (not functional outcomes) and focus exclusively on last mile.
- The State of Alaska and its residents have no say in where Federal broadband funding goes.
- The current FCC Alaska Plan legacy funding program discourages competition, eliminates

market entry and disincentivizes expansion to new areas.

- One major telecom receives more than 50% of all telecom and broadband subsidies coming to Alaska, resulting in a government-sponsored near-monopoly.
- Alaska's two largest telecoms are now owned by Outside investing firms. Guaranteed subsidies and hundreds of millions per year in profit makes them valuable as an investment.
- Alaska must stop hoping someone from outside the state will provide a broadband "silver bullet" or expect Federal agencies to organize multiple federal funding programs.
- There is not one single idea or concept that will solve the Alaska Problem. The solution must be multi-faceted and organized at state level.

4:29:43 PM

MR. WILLIAMS paraphrased the highpoints of the broadband solutions bulleted on slides 12 and 13. The slide read as follows:

- Support the only HYBRID satellite project currently developing affordable middle mile infrastructure that will deliver reliable broadband to rural Alaska for $99 or less (Aurora Project)
- Use GEO HTS satellite middle mile to "fill the gaps" as 2014 and 2019 Alaska Broadband Plans suggest
- Require 20% of ALL Federal broadband funds coming to Alaska go to new middle mile infrastructure
- Allow up to three middle mile providers access to Federal funds to encourage competition • Require these agency heads to visit Alaska and see how remote communities
- Require 25X3 deployment to 100% of Alaska BEFORE requiring any faster broadband
- Use satellite as a redundant source (or backup) where fiber is currently deployed as the 2014 and 2019 Alaska Broadband Plans suggest
- Remove ALL barriers that may prevent market entry or favor terrestrial technology (FCC, USDA, NTIA)

- Allow broadband providers access to ALL Federal funds (regardless of ETC status)
- Require federal broadband funding given to the State to provide grants or loans to middle mile programs meet all four of these economic criteria:
    - Provides the greatest breadth of coverage of Alaska
    - Provides middle mile capacity at the lowest cost per unit
    - Can be available within 2-3 years
    - Has a long-term plan that is sustainable and plans for growth
- Use FCC, USDA, NTIA broadband funds to deploy 2.5 GHz Tribal spectrum last mile WISP systems in rural Alaska
- • Establish an official, authoritative Alaska Broadband Office:
    - Housed in the SOA Department of Commerce, DCRA or Denali Commission
    - Must be a politically neutral and independent office, without exposure to undue influence
    - Require broadband provider reporting to The Office
- Establish "build once" policy along all new roads and public right of ways: Allow providers access to lay their own fiber.
- Stop accepting a lower benchmark for the definition of broadband in Alaska. This should be 25X3 or what the FCC defines as broadband in the Lower 48.
- Utilize satellite middle mile to implement hybrid systems and lower telecom middle mile costs, therefore making middle mile much more affordable. The Aurora GEO HTS and OneWeb LEO is the perfect example of this new method.
- Change statute to give AIDEA the ability fund satellite broadband infrastructure projects.
    - Definition of "project" and project location limitations restrict AIDEA's ability to support this kind of project

SUGGESTED FCC ALASKA PLAN MODIFICATIONS (Write a declaration to the Alaska Delegation and the FCC):

- Immediately allow new members to join and access Alaska Plan funds, regardless of non-ETC or broadband-only provider status
- Provide funding for middle mile infrastructure to meet the needs of Alaskans and Alaska telecoms
- Establish middle mile pricing benchmarks as the Alaska Plan requires
- Require all members to access new sources of lower-cost middle mile, regardless of latency as the Alaska Plan requires
- Provide a comprehensive report on what the first $750M delivered: new infrastructure, pricing, speeds and number of new broadband customers as the Alaska Plan requires

4:32:08 PM
MR. WILLIAMS reviewed the Starlink System Arctic coverage on slide 14. He explained that the image is a recent shot from a website that tracks satellite deployment and location in real time. He pointed out that Starlink's investment in Alaska consists of 10 experimental satellites in polar orbit and a small trailer mounted gateway in Prudhoe Bay. He noted that it is still navigating issues such as orbital debris and 12 GHz spectrum sharing challenges.

MR. WILLIAMS directed attention to the quotes from leaders voicing concern about the limitations or lack of broadband service in rural Alaska on slide 15. They read as follows:

> "A cash economy and high-speed internet has changed the way we live, work, and socialize. While many rural Alaskans enjoy the advantages of urban living, it is easy to see in an emergency, like the one we currently and collectively face, those privileges, sometimes life-saving, do not benefit Alaskans and rural Americans equitably…. The cost of 6Mbps download residential service with a 40GB monthly data cap in Bethel is $165/month and in Kotzebue $150/month. In Dillingham the cost is $165/month for 6Mbps download and 100GB data cap. This makes it cost-prohibitive for the average family in rural Alaska to purchase high-speed Internet. That can leave 82 percent of Alaskan communities without an affordable option to provide distance education to children or the option to

telework." Robert Beans, Chair - Andrew Guy, President/CEO at Calista Corporation - March 20, 2020

"SWAMC recognizes the great value of a project like PDI's, given the strong need for broadband access is critical to enhance economic development and support ongoing educational efforts as well as other business opportunities in our region. Much of our region will not see this occur without the Aurora HTS system as they are not, nor will they be, served by the GCI undersea cable project that will connect 7 of our 55 communities to the critically needed service. There is no one size fits all solution to Alaska's broadband needs, and the PDI project is clearly the answer to much of our region and the State." Shirley Marquardt, Executive Director at SWAMC - January 10, 2021

"We're looking for solutions to deal with the needs of the customers we have today and we really feel an urgency to get to solutions, because they can't wait. And we can't wait because C-Band infrastructure is going to dissolve." Greg Chapados, President and COO at GCI Liberty (2020 AFN Annual Convention) - October 16, 2020

MR. WILLIAMS offered to send the committee copies of letters on this topic from former Governor Murkowski, Alaska Tribal Broadband, OptimERA, SWAMC, Alaska Village Initiatives Northwest Arctic Borough, and Nome Public Schools. He advised that he would also send his recommendations on SJR 13 to bring stakeholders in the state to the table to talk about what to do with broadband funding.

4:33:56 PM
CHAIR HUGHES thanked Mr. Williams and recognized Ms. Cooper with Space Exploration Technology Corporation.

4:34:26 PM
PATRICIA COOPER, Vice President, Satellite Government Affairs, Space Exploration Technology Corporation (SpaceX), delivered a presentation on the Starlink Satellite Broadband Project. She stated that SpaceX is pleased to share information on how Starlink can contribute to the effort to connect Alaskans. She related that SpaceX was founded in 2002 and is well known for designing, manufacturing, and launching advanced rockets and spacecraft. About six years ago SpaceX started working on Starlink, which is a constellation of satellites to deliver

universal broadband access around the world where access had been unreliable, too expensive, or completely unavailable. SpaceX launched the first test satellites in 2018 and 1,400 Starlink satellites since then. At the same time they have been building a network of gateway ground stations that link Starlink users to the fiber internet background. She noted that the image on slide 2 is a stack of 16 Starlink satellites that were just launched into space on one of their reusable Falcon 9 launch vehicles and just prior to the satellites' separation and deployment into low earth orbit.

MS. COOPER reported that the company is making good progress towards its network buildout goals and was able to offer beta services to consumers in the northern Continental U.S. in October 2020. In November 2020 service was extended to southern Canada and today, more than 10,000 beta users are served in six countries around the world. In summer 2021, the expectation is to have sufficient satellites on orbit to serve customers from 53 north and 53 degrees south latitude. At that time SpaceX will turn to a campaign to deploy Starlink satellites to Polar orbit in a way that will provide full coverage over Alaska and the Arctic.

4:36:53 PM
MS. COOPER reported that Starlink's top priority is to deliver high quality broadband service directly to consumers. Serving consumers directly from a satellite is a considerable challenge but we believe Starlink technology will open economic, education, and healthcare opportunities for people all around the world. It will also in support solutions for government and the enterprise customers. Starlink uses thousands of satellites to deliver broadband speeds that range between about 50 and 150 megabits per second with ongoing improvements that will allow our customers to reach 300 megabits per second over the next year and gigabit speeds in the future. Starlink beta customers currently on the network are consistently seeing speeds over 100 megabits per second down and 45 megabits per second up. Also because of our satellite are over 60 times closer to the earth than traditional satellites, Starlink delivers low latency broadband. This is the time it takes to send data from one point to the next. Lower latency is vital to the online services that are in demand today. Video calls like we are on now, or streaming video across multiple devices in the home like everyone does, or even online gaming. Because Starlink satellites fly close to the earth, our Starlink beta users are regularly seeing latencies between 20 and 40 milliseconds, which can support those kinds of service.

MS. COOPER said it is part of SpaceX's essential culture to continuously iterate and Starlink is no exception. She said SpaceX recently made several major upgrades that delivered even more reliability and significantly improved throughput to customers. Now, for most beta customers if communication with their assigned satellite is interrupted for any reason, their Starlink dish will seamlessly shift to an alternate satellite resulting in far fewer network disruptions. The ability to switch between satellites to the best signal is enabled both by cutting edge software and antennae technology in space and on the ground, and also by the constellation of their many satellites. The Starlink software team also rolled out something called the Dynamic Frame Allocation. It is a feature that dynamically allocates additional bandwidth to users based on their real time usage. That allows better balancing of load across the network and ultimately delivers higher speeds to individual users.

4:39:24 PM
MS. COOPER said Starlink is designed to be easy to use and fast to deploy. All that is needed to connect to the service is the kit depicted on slide 4 and a power source. To get started, customers sign up for service at starlink.com and pay a onetime $499 fee for the dish and Wi-Fi router. The subscription service cost is $99 per month. She said SpaceX likes to say that the Starlink user antennae has more advanced technology than most fighter jets. It is lightweight, durable, and simple to operate. Once it is powered up, the antennae automatically points in the right direction. The phased array antennas start to connect immediately to the Starlink satellites above.

She reported that SpaceX has been offsetting the cost of the kit to make it more affordable to consumers during the early stages of development. They have made a considerable focus on the design and production of the Starlink kit and are on a good trajectory to continue to drive down manufacturing costs. Just a few months ago, the original kit cost over $3,000 per unit to produce and today it costs about half that. A further iteration is expected to cut another $200 per unit. She said this is all part of the drive toward affordability.

4:40:51 PM
MS. COOPER reported that deployment in Alaska has been part of the SpaceX plan from the beginning. The plan will be implemented this coming summer with a polar orbiting launch campaign. This deployment drive will bring full polar coverage and by 2022

allow the first service for Alaska homes and businesses. In addition to consumer and enterprise services, SpaceX is actively working with the U.S. Department of Defense to provide military communication services in the Arctic and across northern latitudes. SpaceX launched its first 10 polar orbiting satellites in January 2021 with the Transporter I mission. These satellites were equipped with SpaceX designed optical satellite links or space lasers that are being tested to transfer data between Starlink satellites in space. They rely on a tracking telemetry and control ground station installed in northern Alaska to support these ongoing testing operations and are developing three additional sites in Alaska to support future polar orbiting operations and services.

MS. COOPER emphasized that the space lasers being tested are a key enabling technology for full connectivity in Alaska and the poles. They reduce or eliminate dependency on ground-based gateways to connect Starlink traffic to the internet. This is particularly important in polar areas where fiber options are limited and gateways are difficult or impossible to install. This means Starlink would be able to connect in the most remote regions on earth that are far from ground infrastructure. Beginning with satellites launched into the polar orbit, Starlink will start incorporating space lasers on all satellites going forward.

4:42:42 PM

MS. COOPER turned to slide 7 that depicts the large satellite in the Pikangikum First Nation village in Ontario, Canada. She explained that this last winter Starlink's data rollout in the northern U.S. states and southern Canadian provinces gave terrific opportunities to test operations in extreme weather conditions. From direct testing and customer feedback, Starlink demonstrated that it is reliable and hardy in snow storms and very low temperatures. The company was also pleased to form strong community partnerships that showcased how Starlink can be rapidly deployed to unserved home and also provide remote learning, government services, and high quality connectivity. She specifically mentioned the partnership with the Pikangikum First Nation reservation, an indigenous community located in a beautiful but very remote area of Ontario about 300 kilometers northeast of Winnipeg. There are about 400 households or 3,000-4,000 people. SpaceX delivered Starlink to the community in the dead of winter bringing their available speeds from single digit connectivity to reliably over 100 megabits per second. SpaceX is building similar partnerships across the U.S. and Canada and

sees similar opportunity for collaboration with Alaskan communities.

4:44:05 PM
MS. COOPER summarized that Starlink deploying rapidly and they are growing their constellation and coverage area with each additional launch. They are building about 120 satellites per month and aiming to launch monthly on the reusable Falcon 9 rockets, deploying about 60 satellites each mission. To date, the launch total is 1,445 satellites. In March they conducted four launches and deployed 240 satellites to orbit. With this cadence they expect to have continuous coverage for large parts of the world with just a few more launches. They will turn their attention and considerable efforts to polar campaigns this summer and look forward to supporting Alaskans by early 2022.

4:45:23 PM
CHAIR HUGHES thanked Ms. Cooper and asked the members if they had questions for any of the presenters.

4:45:43 PM
SENATOR GRAY-JACKSON asked how Starlink speeds compare to GCI.

MS. COOPER explained that when they do beta testing they tell customers to expect between 50 and 150 megabits per second (mps). Tests of the recent upgrades show speeds of up to 300 mps.

4:46:46 PM
CHAIR HUGHES asked Mr. Boucher how much money is available through the Connecting Minorities Pilot Program and if it is refunded annually.

4:47:10 PM
MR. BOUCHER replied the program is still in the rule making stage, but the expectation is that minority serving institutions, which UA is among, would be eligible for about $265 million.

CHAIR HUGHES asked Mr. O'Brien if the $1.6 billion from the NTIA for tribal broadband projects in Alaska had been appropriated or if it was through the infrastructure bill that Congress was considering now. She asked what the acronym stands for.

4:47:52 PM
MR. O'BRIEN answered that NTIA is the National Telecommunications and Information Administration. He said the

three programs were supposed to be released 60 days after December 27 but NTIA negotiated the timeline for later in the summer. The three programs are 1) $285 million for serving minority communities for workforce development and training; 2) $1 billion for tribal broadband to connect tribal communities; and 3) $300 million for state broadband infrastructure. State and private sector partners are required for the $300 million. These are nationwide.

CHAIR HUGHES asked Ms. McGuire where the OneWeb launches are taking place.

4:49:14 PM
MS. MCGUIRE answered that the OneWeb launches were funded and prepaid by Kazakhstan as part of the original business plan, but live launch viewings have been coordinated in schools and local businesses. She added that locations in Alaska have not been ruled out for future OneWeb launches.

CHAIR HUGHES referred to slide 6 of the OneWeb presentation and asked if the map showing broadband access in the state was current to 2021 because it only covers Southcentral and Southeast.

4:50:26 PM
MS. MCGUIRE answered yes.

CHAIR HUGHES asked Mr. Williams for a brief explanation of the difference between low earth orbit (LEO) and geosynchronous earth orbit (GEO) and GEO HTS and GEO VHTS.

4:51:50 PM
MR. WILLIAMS answered that the difference is the distance from the surface of the earth. LEOs are close to earth, MEOs are farther out, and the GEOs are the farthest from earth. He explained that once a GEO reach its "address" along the equator, it travels in a belt at the same rate as the earth's rotation. Once PDI's two satellites are launched, they will be about 18-20 degrees off the horizon. In answer to the second question, he said HTS stands for high throughput satellite and VHTS is very high throughput satellite. The VHTS has the ability to communicate with moving targets such as a plane or cruise ship. It also has onboard data processing.

4:53:10 PM
CHAIR HUGHES asked if the Alaska Broadband Association might be an entity that could help with coordination or if he was

suggesting that the state might have an entity to bring all stakeholders to the table.

4:53:52 PM
MR. WILLIAMS said the latter. It would not be the Alaska Broadband Association to hold that role. There needs to be a neutral organization to help bring all the stakeholders to the table including the providers that only provide broadband and middle mile providers. These people currently do not have a seat at the table. The organization that represents the telecoms does a great job representing them. Their time and efforts are valuable, but organizations like PDI and the Alaska residents are not represented and they should be. Especially with the money that is coming to Alaska.

CHAIR HUGHES shared that the genesis of the hearing stemmed from her concern about equal access for students who live in rural Alaska because she lived there herself. She would like to see access statewide robust enough that all students who are interested could participate in a two way live video conference class in Anchorage. The pandemic made it clear that there is a need to be able to work from home. Internet access is also important for commerce, and telemedicine. She said we are now realizing that the information highway is a very important piece of infrastructure. She noted that she recently asked Senator Lisa Murkowski about the prospects for funding this summer or fall and she said a concern is that what works for the Lower 48 may not work for Alaska. With that in mind, she asked the presenters to share any suggestions, language, or concern about SJR 13. The resolution is sending a message to Congress to ask for flexibility with the forthcoming funding to meet the unique needs and challenges of Alaska. She cited money dedicated to the middle mile as an example.

4:59:05 PM
There being no further business to come before the committee, Chair Hughes adjourned the Senate Community and Regional Affairs Standing Committee meeting at 4:59 p.m.