THE ARCTIC DIGITAL DIVIDE

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I. Introduction

For many, the Arctic's harsh environment, remoteness, and sparse population are what make it so unique and beautiful. But these same qualities also make establishing reliable and fast telecommunications infrastructure in the region extremely difficult – particularly with regard to the North American Arctic. Indeed, these conditions make the installation of any telecommunications system, much less one with modern dependability and speed, an arduous undertaking. Yet connectivity is a necessity in the modern age and demands in the High North are only increasing. For example, governments and industry are seeking to expand services and operations northward as climate change opens up the once ice-locked region. In turn, locals aspire to interact with and take advantage of the opportunities of the wider world. Regardless of whether one appreciates or opposes the pace and forces behind northern development, Arctic telecommunications infrastructure – whether supplying basic services or facilitating personal and economic ambitions – is inadequate for both current and future demand.

II. The "Digital Divide"

There exists a "digital divide" between Arctic and southern communities in terms of telecommunications capacities.[1] A general comparison between the

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[1] Rafico Ruiz, Arctic Infrastructures: Tele Field Notes, 3 COMMUNICATION +1 1, 12 (2014). See also, A Matter of Survival: Arctic Communications Infrastructure in the 21st Century, NORTHERN

infrastructure and costs of northern and southern locales illuminates this expansive gulf.

For Arctic Canada, the government commissioned 2011 Arctic Communications Infrastructure Report (ACIA) determined that there was widespread bandwidth shortage, high costs to users, reliability and quality issues, and inadequate coverage.[2]

In terms of connection speeds, data from the Canadian Radio-Television and Telecommunications Commission shows that in the northern territory of Nunavut 99 percent of households had broadband speeds of 1.5-4.9 megabits per second (Mbps) available to them.[3] But only 29 percent had speeds of 5-9.9 Mbps available and zero percent had access to anything greater.[4] While Yukon and Northwest Territories had substantially higher household availability percentages for 5-9.9 Mbps speeds and greater,[5] in terms of application to their Arctic regions this data is likely skewed due to the presence of more southern urban centers.

When determining Arctic connection speeds for Canada's territories, it is important to remember that most North American Arctic communities have their Internet supplied by a limited number of satellites that are put forth as providing nationally mandated 5 mbps speeds.[6] A 2014 government commissioned report, however, found that "Yukon and [Northwest Territories] have an average of 2.6 Mbps per household...while Nunavut has an average of 1.5 Mbps per household."[7] This is quite concerning given that the average web page size has surpassed 2.1

COMMUNICATIONS & INFORMATION SYSTEMS WORKING GROUP 10 (2011), available at http://www.aciareport.ca/resources/acia_full-v1.pdf [hereinafter ACIA] ("There is a growing gap between the level of service available in the North versus the South, causing serious challenges to both residents and visitors").

[2] *ACIA*, *supra* note 1, at 10-13.

[3] *Communications Monitoring Report: October 2014*, CANADIAN RADIO-TELEVISION AND TELECOMMUNICATIONS COMMISSION 196 (2014), *available at* http://www.crtc.gc.ca/eng/publications/reports/PolicyMonitoring/2014/cmr.pdf [hereinafter *CMR 2014*].

[4] *Id.*

[5] *Id.*

[6] *See* Amy Nordrum, *Fiber Optics for the Far North*, 52 SPECTRUM 11, 12 (2015), *available at* http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6995618. It should be noted that, "in reality, [the] connection is often plagued by long delays and poor reliability due to the distance the signal must travel." *Id.*

[7] *Northern Connectivity: Ensuring Quality Communications*, NORTHERN COMMUNICATIONS INFORMATION SYSTEMS WORKING GROUP 18 (2014), *available at* http://northernconnectivity.ca/resources/ncis_wg_report.pdf.

megabytes (mb) in size.[8] Furthermore, comparing the territories to the provinces – each one of which has household availability percentages greater than 50 percent for speeds of 10-15.9, 16-24.9, and 25-100 Mbps[9] – illuminates a stark north-south divide. The Arctic accessibility of these speeds must also be compared to Canada's national average speed of 11.6 Mbps, as determined by Akamai Technologies and presented in their quarterly State of the Internet Report for the first quarter of 2015.[10]

But, for a clearer picture of the situation, connection speeds should be placed alongside limitations on the amount of data that Arctic communities can consume. According to the ACIA, "[C]aps are imposed on users by all service providers [in] order to manage bandwidth usage."[11] These caps can range from 6 to 30 gigabytes (gb) per month,[12] with fees for overages.[13]

Overage fees bring to the fore another key impediment to Arctic telecommunications use: high cost. Numerous government commissioned studies highlight the prohibitive expense to consumers of northern connections compared to equal and superior services in more southern communities.[14] The ACIA notes that "[w]hile there may be more capacity available for purchase, very few can afford to purchase what they need."[15] The difference between north and

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[8]   *Interesting Stats*, HTTP ARCHIVE (Aug. 1, 2015), http://httparchive.org/interesting.php?a=All&l=Aug%201%202015.

[9] *CSM 2014*, *supra* note 2, at 196.

[10] *Akamai's State of the Internet: Q1 2015 Report*, AKAMAI TECHNOLOGIES 24 (2015), *available at* https://www.stateoftheinternet.com/downloads/pdfs/2015-q1-state-of-the-internet-report.pdf   [hereinafter *Akamai*].

[11] *ACIA*, *supra* note 1, at 53.

[12] *Mapping the Long-Term Options for Canada's North: Telecommunications and Broadband Connectivity*, THE CONFERENCE BOARD OF CANADA 11 (2013), *available at* http://digitalarctic.com/Files/Images/Sessions/Making%20it%20possible/Adam%20Fiser/14-061_connectivity_cfn_rpt.pdf. *See also*, *Northern Connectivity*, *supra* note 6, at 51 ("The most restrictive data caps apply to satellite served communities").

[13] *See Northern Connectivity*, *supra* note 6, at 51 (Giving examples of the overage fees charged by telecommunications providers for each extra gigabit (gb) of data); *Mapping the Long-Term Options*, *supra* note 11, at 12 (Documenting how northern Internet suppliers charge overage fees when consumers use more than their allotted amount of data).

[14] *See e.g. Mapping the Long-Term Options*, *supra* note 11, at 23 ("Canada's North is subject to the vicissitudes of high-cost serving areas. In terms of telecommunications services, this condition means high prices for residential wireline, long distance, cellular voice/data, and residential high-speed Internet").

[15] *ACIA*, *supra* note 1, at 11 ("There is a severe shortage of affordable bandwidth, both in terrestrial (microwave and fiber) and satellite served communities. While there may be more capacity available for purchase, very few can afford to purchase what they need").

south is particularly stark in the case of Nunavut, where 5 Mbps Internet access costs roughly $180 in the capital of Iqaluit and $370 in rural areas.[16] This compares unfavorably with provincial urban area costs of $25-$55 and rural area costs of $32-$130.[17]

The situation in the Canadian Arctic is mirrored in the U.S. Arctic. It has been noted in proceedings before the U.S. National Telecommunications and Information Administration that "Alaska, particularly in the rural areas and above the Arctic Circle, lacks the basic communications and other infrastructure present in the lower 48 states."[18] In rural Alaska, a 2015 report from the U.S. Federal Communications Commission (FCC) found that 81 percent of households lacked access to 25 Mbps Internet speeds.[19] While connections in northern rural hubs can achieve from 20-30 Mbps,[20] speeds across the region are actually quite a ways below this level: "[T]he average download speed in rural areas of Alaska rarely tops 3 Mbps. Plus, there are still 21,000 households and 6,000 businesses without any access to broadband at all."[21] This clearly falls a good deal short of

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[16] *CSM 2014*, *supra* note 2, at 183.

[17] *Id*.

[18] *Telecommunications Assessment of the Arctic Region: Comments of Internet2*, NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION 5 (2014), *available at* http://www.internet2.edu/media/medialibrary/2014/12/11/Internet2--NTIA-Arctic-NOI-Comments-11-3-14.pdf.

[19] Broadband Availability in America: With Rural Americans Looking for High-Speed Services, Adequate Broadband Speeds Remain Out of Reach for Many, FEDERAL COMMUNICATIONS COMMISSION 5 (2015), available at https://apps.fcc.gov/edocs_public/attachmatch/DOC-331734A1.pdf.

[20] *See* Alex DeMarban, *Alaska's North Slope May Get Blazing Fast Internet Access*, ALASKA DISPATCH NEWS (Feb. 5, 2013), http://www.adn.com/article/alaskas-north-slope-may-get-blazing-fast-internet-access ("Many rural hub communities in the Arctic see about 20 to 30 [Mbps] of bandwidth now"); *Internet Providers in Prudhoe Bay-Kaktovik Census Subarea, AK*, MULTITEST (last visited Aug. 10, 2015), http://www.multitest.co/internet-provider/prudhoe-bay-m-kaktovik-census-subarea-city-north-slope-county/ (Stating that the average download speed in the Prudhoe Bay-Kaktovik census subarea in northern Alaska is 27 Mbps).

[21] Nordrum, *supra* note 5, at 12. *See also*, *A Blueprint for Alaska's Broadband Future*, STATEWIDE BROADBAND TASK FORCE 5 (2013), *available at* http://www.alaska.edu/files/oit/bbtaskforce/2013-08-AK-Broadband-Task-Force-Report%7CA-Blueprint-for-Alaska's-Broadband-Future.pdf ("Some 21,000 households in Alaska currently are not served by broadband, and more than half the nation's anchor institutions (hospitals, schools, libraries, municipal or borough governments, etc.) with insufficient broadband capabilities are in Alaska"); *Broadband and Business: Leveraging Technology in Alaska to Stimulate Economic Growth*, CONNECT ALASKA 2 (2011), *available at* http://www.connectak.org/_documents/AK_BizWhitePaper_FINAL.pdf ("6,000 Alaska businesses (est.) do not use broadband"); *Telecommunications Assessment*, *supra* note 17, at 6 ("[T]here simply is not enough satellite capacity to provide even adequate backhaul to support basic needs of 4 Mbps download and 1 Mbps upload").

the United States' average connection speed of 11.9 Mbps[22] and Alaska's average of 8.2 Mbps.[23]

In terms of data limits and costs, northern Alaskans face the same caps, overage fees, and elevated service charges as northern Canadians.[24]

But perhaps more so than numbers and technical information, a common practice across the Arctic best illuminates the significant telecommunications limitations of the region. Due to slow connections and high costs, it is common to mail Universal Serial Bus (USB) digital data storage devices rather than send such information through the Internet. Individuals and companies save substantial sums of money by using the mail rather than telecommunications, or by simply bringing data storage devices with them when they travel.[25] This practice reached ironic proportions when the president and CEO of Arctic Fibre – a large company installing a massive fiber optic submarine telecommunications cable across the Arctic and through the Northwest Passage – was recently forced to use a courier to deliver his environmental report on the high speed cable to a governmental review board.[26] In the digital age, residents of the High North are still forced to workaround their lack of digital means.

III. Reasons for the Digital Divide

Telecommunications capacity is so limited and costly in the Arctic because of the economics behind bringing such services to the region. Currently, nearly

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[22] *Akamai*, *supra* note 9, at 24.

[23] *Id.* at 18.

[24] *See* Jillian D'Onfro, *Why People in Alaska Can't Watch Netflix Without Fearing a $100 Surcharge*, BUSINESS INSIDER (Feb. 13, 2014, 9:31 PM), http://www.businessinsider.com/rural-alaska-data-caps-2014-2 (Reporting on the cap and overage fee charging practices of Alaskan broadband providers); Phillip Dampier, *GCI: Alaska's Outrageous Internet Overcharger; Customers Paying Up to $1,200 in Overlimit Fees*, STOP THE CAP (July 21, 2014), http://stopthecap.com/2014/07/21/gci-alaskas-outrageous-internet-overcharger-customers-paying-up-to-1200-in-overlimit-fees/ (Describing the cap and overage fee practices of Alaskan Internet suppliers as well as individual examples).

[25] Ruiz, *supra* note 1, at 1 ("Over the past number of years, USB keys have been circulating around the Arctic at an increasing rate, both via airmail and on the bodies of corporate and government personnel"); Jordan Pearson, *The Arctic's Internet is so Expensive that People Mail the Web on USB Drives*, MOTHERBOARD (June 1, 2015, 1:08 PM), http://motherboard.vice.com/read/the-arctics-internet-is-so-expensive-that-people-mail-the-web-on-usb-drives (Describing the practice of mailing USB data storage devices as an alternative to sending digital data via the Internet and using incredibly expensive bandwidth).

[26] Nordrum, *supra* note 5, at 12.

all telecommunications are provided by satellite systems, and the data transmission and infrastructure necessary for such activity are incredibly costly. Very generally, the steps required to bring about these services involve: building a satellite, launching it, constructing ground infrastructure such as Earth stations and transmission towers, transmitting data up to the satellite and then back down to the serviced region, and maintaining the entire system.[27] The expenditures required for these undertakings can quickly add up to hundreds of millions of dollars. And this is before the unique aspects of Arctic environments are factored in.

The natural and demographic characteristics of the Arctic have large causal roles in the region's dearth and high costs of telecommunications infrastructure and services.[28] The harsh winters and drastic differences in temperature between seasons have numerous negative effects on telecommunications: they hamper construction and the transport of people and materials; exact significant stress on and damage to installed systems; and generally increase construction and maintenance costs.[29] The installation and upkeep of modern telecommunications infrastructure is not cheap to begin with. But add on Arctic-specific expenses and risks and it becomes even more of an undertaking for companies.

In addition, the Arctic's relatively sparse population offers firms a very small consumer base from which to recoup installation and maintenance outlays and turn a profit.[30] This is the core reason for the high prices of Arctic

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[27] *See generally*, *A Practical Introductory Guide to Using Satellite Technology for Communications*, INTELSAT (2010), *available at* http://www.intelsat.com/wp-content/uploads/2013/01/5941-SatellitePrimer-2010.pdf.

[28] *See Reply Comments of General Communication, Inc.*, FEDERAL COMMUNICATIONS COMMISSION 2-3 (2010), *available at* http://www.hwglaw.com/siteFiles/News/58F78628A0B02E8F0127BA7D5B43196C.pdf ("Alaska is geographically and demographically unique, presenting unparalleled challenges in deploying, maintaining, and operating modern telecommunications networks. Alaska has not only a small population spread over enormous distances, but also an extremely harsh climate and short construction season").

[29] *See ACIA*, *supra* note 1, at 153 ("A harsh environment and poor and sometimes absent community and transportation infrastructure further hinder [Arctic telecommunications] development").

[30] *Id*. at 153-54 (Noting that the small size of Arctic communities helps make "the North an unprofitable marketplace for communications service providers").

telecommunications services.[31] It is essentially a matter of economies of scale: southern locales are charged less for services because costs can be spread out across larger populations while Arctic communities are charged more because costs are spread out over much smaller populations. The numbers simply do not add up to directly address Arctic telecommunications needs.[32]

All together, the high cost of telecommunications infrastructure and services and the Arctic's natural and demographic qualities create a mixture that depresses northern development.

IV. Why the Digital Divide Matters

In the summer of 2009, the Canadian military undertook the annual training exercise "Operation Nanook" around Iqaluit: the Arctic capital of the northern territory of Nunavut.[33] While underway, the area's telecommunications network gave out, impacting both the local community and those involved with the exercise.

Following the incident, the Canadian Government commissioned the ACIA.[34] The report, published in 2011, concluded that "[t]he influx of out-of-territory personnel arriving in one community overloaded the local cell phone and Internet network, and severely hampered the communication capabilities of the emergency responders conducting the operation."[35] Had it been an actual emergency situation, the jamming of the network would likely have had serious

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[31] *See* Lorna Roth, *Digital Self-Development and Canadian Fist Peoples of the North*, 63 MEDIA DEVELOPMENT 5, 8 (2014) ("The outstanding issue with digital technologies in remote Northern communities is their lack of broadband/bandwidth infrastructure. Internet service providers, who do not have the same legal obligations as they do with telephone's universality requirement, are not particularly interested in establishing infrastructure in communities in which they won't be able to make much profit. Cost is high, profit is low; access time in the current framework is of great value as a scarce commodity").

[32] *See A Blueprint*, *supra* note 21, at 32 ("[B]ecause of Alaska's remote landscape and diffused population, a profitable return has been and will continue to be challenging").

[33] *Operation Nanook 09*, GOVERNMENT OF CANADA (last visited Aug. 9, 2015), http://news.gc.ca/web/article-en.do?nid=472469; *PM Visits with Canadian Forces Participating in Operation Nanook 09*, PRIME MINISTER OF CANADA, STEPHEN HARPER (Aug. 19, 2009), http://www.pm.gc.ca/eng/news/2009/08/19/pm-visits-canadian-forces-participating-operation-nanook-09.

[34] *ACIA*, *supra* note 1.

[35] *Id*. at 15.

repercussions for the health and safety of residents and the personnel engaged in military operations.

Reliable and effective telecommunications capabilities are integral for emergency and safety services to carry out their mandates. A participant in the interviews leading up to the ACIA said, "Reliable communications is our Achilles heel when responding to a disaster in the Arctic."[36] But this is not just a problem for responding to large-scale disasters. It hamstrings smaller-scale services as well. A memorandum submitted by the State of Alaska to the U.S. Department of Commerce in 2014 on the condition of U.S. Arctic telecommunications infrastructure highlighted this fact. Looking broadly on the basic telecommunications capabilities of emergency, safety, and other government services, it found them all lacking, some severely.[37]

Linked to the aforementioned issue is that Arctic connectivity issues force northern regions to rely on very limited sources of bandwidth – i.e. a small number of telecommunications satellites. If something goes wrong, there is little bandwidth redundancy upon which to fall back on.

An example of this problem occurred roughly five months after the ACIA was published. Due to a "technical anomaly" with their satellite service, residents of Nunavut "and off-road communities in the Northwest Territories and Yukon" lost almost all telecommunications.[38] The anomaly came about when control over one of the three satellites serving northern Canadian communities was lost and it turned in the wrong direction, thus losing its line-of-sight communications with the ground.[39] As a result,

> [l]ong distance and local phone services, the internet [sic], cellular connections,
> and automated banking services were all unavailable. Many banks closed for the

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[36] *Id.*

[37] Kip Knudson, *Re: Notice of Inquiry Docket No. 140925800-4800-01*, STATE OF ALASKA, OFFICE OF THE GOVERNOR 1-7 (2014), *available at* http://www.ntia.doc.gov/files/ntia/state_of_alaska.pdf.

[38] *Northern Telcom Service Restored After 16-Hour Telesat Canada Satellite Glitch*, NUNATSIAQ ONLINE (Oct. 6, 2011, 9.29 PM), http://www.nunatsiaqonline.ca/stories/article/65674telesat_canada_screw_up_knocks_out_northern_telcoms/.

[39] *Id.*

day as the sole connection between northern branch locations and southerly headquarters had been rendered inoperative. Retail debit and credit transactions could not be processed. Airlines decided to ground flights departing from Nunavut due to the loss of radar and weather services.[40]

The territorial government was forced to institute emergency communications measures for the roughly fifteen and a half hours during which service was down.[41]

Beyond handicapping emergency and other services, inadequate telecommunications infrastructure constrains communities in myriad additional everyday ways. The modern economy and services run through telecommunications. The FCC has stated that "[a]ccess to robust broadband service is a necessity in today's world for jobs, education, civic engagement and economic competitiveness."[42] As put by Jason Evans of The Arctic Sounder: "We are essentially left out...[T]he world in which we live is increasingly operating on the assumption that everyone in it has access to high internet [sic] speeds."[43] Therefore, "accessible, reliable and affordable communications services are seen as a foundation for Northerners to meet many of the socio-economic challenges they face."[44]

On the business front, it is estimated that "[b]roadband-connected businesses in Alaska bring in $100,000 more in median annual revenues" than those without such connections.[45] Slow and expensive broadband connections inhibit operations and growth and dig into company finances.[46] Overall,

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[40] Ruiz, *supra* note 1, at 2.

[41] Northern Telcom Service, supra note 38.

[42] *Broadband Availability*, *supra* note 19, at 3. *See also* Tim Ellis, *Fiber-Optic Cable Project Could Bring Broadband to Northern Alaska*, KUAC (July 10, 2015), http://fm.kuac.org/post/fiber-optic-cable-project-could-bring-broadband-northern-alaska (Quoting U.S. Special Representative for the Arctic Robert Papp as saying, "The economy and prosperity depends upon good, rapid telecommunications nowadays. And I know, at least within the American Arctic, we're lacking in many ways").

[43] Jason Evans, *From the Publishers: Fast Internet Essential to Rural Alaska*, THE ARCTIC SOUNDER (Dec. 16, 2011), http://www.thearcticsounder.com/article/1150from_the_publisher_fast_internet_essential_to.

[44] Northern Connectivity, supra note 7, at 16.

[45] Broadband and Business, supra note 21, at 2.

[46] *Id*. at 3.

"[e]nhanced connectivity would mean more competitive [northern] businesses"[47] and "small and medium sized business creation and growth."[48] Improved telecommunications capacity would also lessen the logistical challenges of operating in the Arctic and increase the region's attractiveness to outside businesses – including, for better or worse, to natural resource developers.[49]

Superior information infrastructure would also allow the more widespread use of tele-services in the High North, particularly telehealth and tele-education resources.[50] Telehealth involves "the use of electronic information and telecommunications technologies to support long-distance health care."[51] Arctic residents face both increased health risks due to northern weather and climate as well as limited healthcare services.[52] Some Arctic regions are also confronting relatively severe and widespread mental health problems that they have had trouble addressing.[53] Due to their remoteness and health, northern communities end up underserved and spending significant amounts on medical transportation to bring individuals to where they can receive care.[54] Going forward, "[i]n order for arctic communities to provide adequate healthcare to [their] people, there must be a sustainable means of delivering this care at a distance."[55]

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[47] Northern Connectivity, supra note 7, at 153

[48] *Id*. at 26.

[49] *Id*. at 25.

[50] *See* Mia Bennett, *Northwest Territories' Fur and Fiber Optics Make Asian Inroads*, CRYOPOLITICS (July 13, 2015), http://cryopolitics.com/2015/07/13/northwest-territories-fur-and-fiber-optics-make-asian-inroads/ ("faster broadband internet would be able to open more doors for activities such as tele-medicine and online education. Both of these sectors could deliver a lot to the region, too, considering the long distances and expensive travel required to get to hospitals and universities at present").

[51] Heather Exner-Pirot, *Telehealth in the Arctic: Unfulfilled Potential*, ALASKA DISPATCH NEWS (June 23, 2015), http://www.adn.com/article/20150623/telehealth-arctic-unfulfilled-potential.

[52] *Arctic Telemedicine Project: Final Report*, INSTITUTE FOR CIRCUMPOLAR HEALTH STUDIES i (2000), *available at* https://oaarchive.arctic-council.org/bitstream/handle/11374/27/Arctic%20Telemedicine%20Project%20Final%20Report.pdf?sequence=1&isAllowed=y.

[53] *See* Nikki Wiart, *Nunavut's Suicide Epidemic*, WORLD POLICY (July 22, 2015, 8:58 AM), http://www.worldpolicy.org/blog/2015/07/22/nunavut%E2%80%99s-suicide-epidemic ("Inuit youth are dying by suicide at an alarming rate in northern Canada — over the past 20 years, Inuit suicide rates have been about 10 times 110 deaths per 100,000 people the Canadian average, or 110 deaths per 100,000 people").

[54] *See* Exner-Pirot, *supra* note 46 ("In Canada, Health Canada's First Nations and Inuit Health Branch spends over Canadian $350 million (US $285 million) a year on medical transportation costs alone").

[55] Arctic Telemedicine, supra note 47, at i.

Telecommunications limitations therefore materially impact the health of Arctic populations.

Many of the same issues with Arctic healthcare that result from remoteness also afflict education. Compared to southern regions, educational opportunities and materials in the High North are rather sparse.[56] But increased telecommunications speeds and distribution would spread regional educational capacities and open up a bevy of global resources to Arctic classrooms and individuals. Teachers and professors could utilize tools such as videoconferencing, educational videos, and online course and classroom supplements to expand their lesson plans and expose their students to more sources of information.[57] Students, researchers, professionals, and other individuals could take online courses, access scholarly journals, and interact more with peers.[58] But for infrastructural shortcomings, the Internet could provide a world of educational opportunity to northerners.

Finally, beyond the limitations outlined above, telecommunications deficits significantly constrain the personal lives of Arctic residents. Their abilities to access news sources, conduct e-commerce, utilize social networking sites, and generally communicate with one another fall far below those of individuals in more southern communities. They are less able to use modern technology and networks to find fulfillment and engage with one another.

In so many ways – likely more than have been mentioned in this section – the relative lack of regional telecommunications capacity inhibits the lives and opportunities of those in the High North. It is therefore of paramount importance that this situation be actively and effectively addressed.

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[56] *See* George W. Brown, *Alaskans Want and Need Public Investment in Education and Health*, ALASKA DISPATCH NEWS (June 1, 2015), http://www.adn.com/article/20150601/alaskans-want-and-need-public-investment-education-and-health; Heather Exner-Pirot, *Does Northern Canada Need a University?*, ALASKA DISPATCH NEWS (July 14, 2015), http://www.adn.com/article/20150714/does-northern-canada-need-university.

[57] John Christopher & Eleanor Fast, *The Arctic: Transportation, Infrastructure and Communications*, PARLIAMENTARY INFORMATION AND RESEARCH SERVICE 3 (2008), *available at* http://www.parl.gc.ca/Content/LOP/ResearchPublications/prb0808-e.pdf.

[58] *Id.*