Northern and Arctic Air Connectivity in Canada
Discussion Paper

179
Roundtable

Mike Tretheway
Robert Andriulaitis
Jody Kositsky
Geneva Tretheway

InterVISTAS, Vancouver

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Acknowledgements

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Purpose of this paper

Governments with remote northern and Arctic communities generally recognise the unique challenges regarding transport connectivity in these communities and generally have northern and Arctic connectivity as an explicit, or at least implicit, social policy goal. This paper examines explicit northern and Arctic connectivity policies in Canada and comments on existing legislation, regulations, policies and programmes of the federal government as well as of Canada's three northern territories. It also comments on recommendations from various past transport policy reviews as they are indicative of the prevailing attitudes of stakeholders and industry experts over time, looking specifically at whether or not the policies were adopted.

Because Canada's north relies heavily on air transport for economic, social and national defence connectivity, the latter is the major focus of this review. There is, however, is a limited presence of road, rail and marine transport in Canada's north, and these too are discussed.

Current transport infrastructure and services in northern and Arctic communities

All communities in Canada's Yukon Territory, Northwest Territories (NWT) and Nunavut are northern and Arctic communities. According to the latest census data from 2016, the population of the three territories combined is just under 114 000, with only three communities over 7 000 in population and the rest with 3 000 or fewer. There are also some communities below the Arctic Circle in the northern parts of Manitoba, Ontario and Quebec and Labrador that are generally considered northern communities due to their remote location and the limited transport options residents face. The level of connectivity to and from these regions varies among the three territories. While there has been growth in connectivity for the Yukon (air connectivity), the other territories have had little to no increase in air connectivity over the past 15 years. Other than the amount of road in each territory there is limited data available on the connectivity by modes such as road and sea.

Figure 1 shows the northern and Arctic Canadian communities from a more geographically correct polar perspective. As can be seen, the communities are spread out across the vast north (Canada is as tall north to south as it is broad from east to west). There are significant land masses that are islands in the usually frozen sea, and there is limited access to many communities. Figure 2 shows the transport infrastructure that exists in this area, including roads, winter roads, major airports and port facilities. Most communities will also have an airstrip (typically gravel, which limits aircraft choice), as road access is limited and aviation provides the critical year-round link.

Figure 1. Circumpolar map of northern Canada
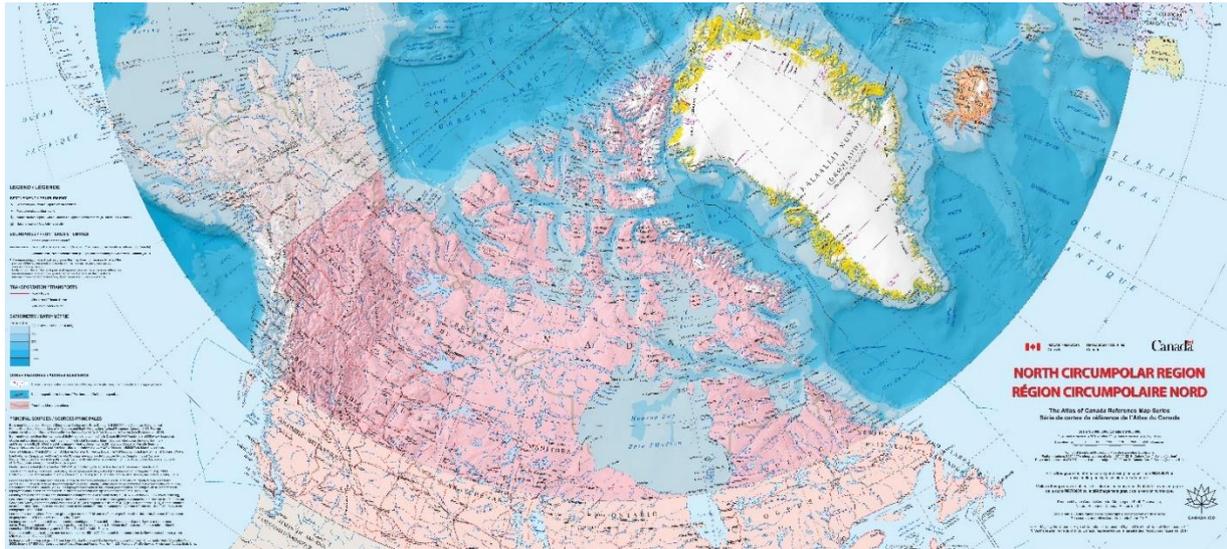
Source: Natural Resources Canada.

Figure 2. Map of key transport infrastructure in northern Canada

Source: House of Commons, Canada, INAN Committee Report.

Road network

The Yukon Territory has a significant road network. In fact, of the 15 communities only Old Crow cannot be accessed via a permanent road. The road system links the Yukon to the northwest corner of the NWT, as well as Alaska and British Columbia.

Figure 3. Map of the Yukon road network

Source: Travel Yukon, https://www.travelyukon.com/en/plan/getting-around/maps.

The NWT has road access between 14 communities in the southern portion of the territory, as well as three roads linking the NWT to both British Columbia and Alberta. Some of the permanent roads are paved, while the rest are gravel. There are also four communities in the northwest portion of the NWT mainland

that are linked to each other as well as the Yukon via permanent roads. There are ten communities that are only connected by winter ice roads.

Figure 4. Map of the road network in the Northwest Territories
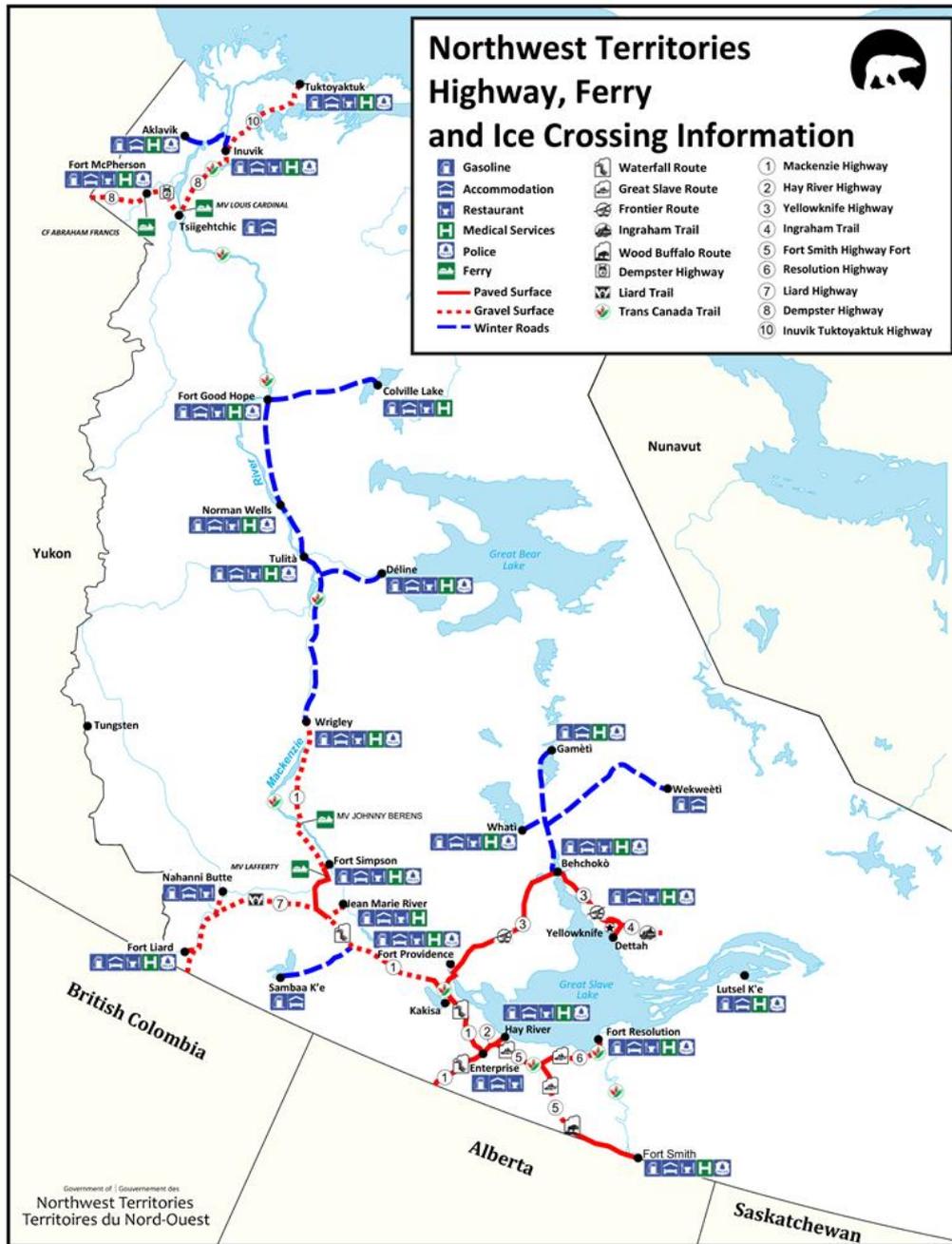
Source: Government of the Northwest Territories, https://www.inf.gov.nt.ca/en/transportation.

There is no intercity road network linking the 25 communities in Nunavut. It is also the only jurisdiction in Canada that is not connected to an adjoining jurisdiction by road. The unpaved markers in Figure 5 show unpaved roads within communities.

Figure 5. Map of road network in Nunavut
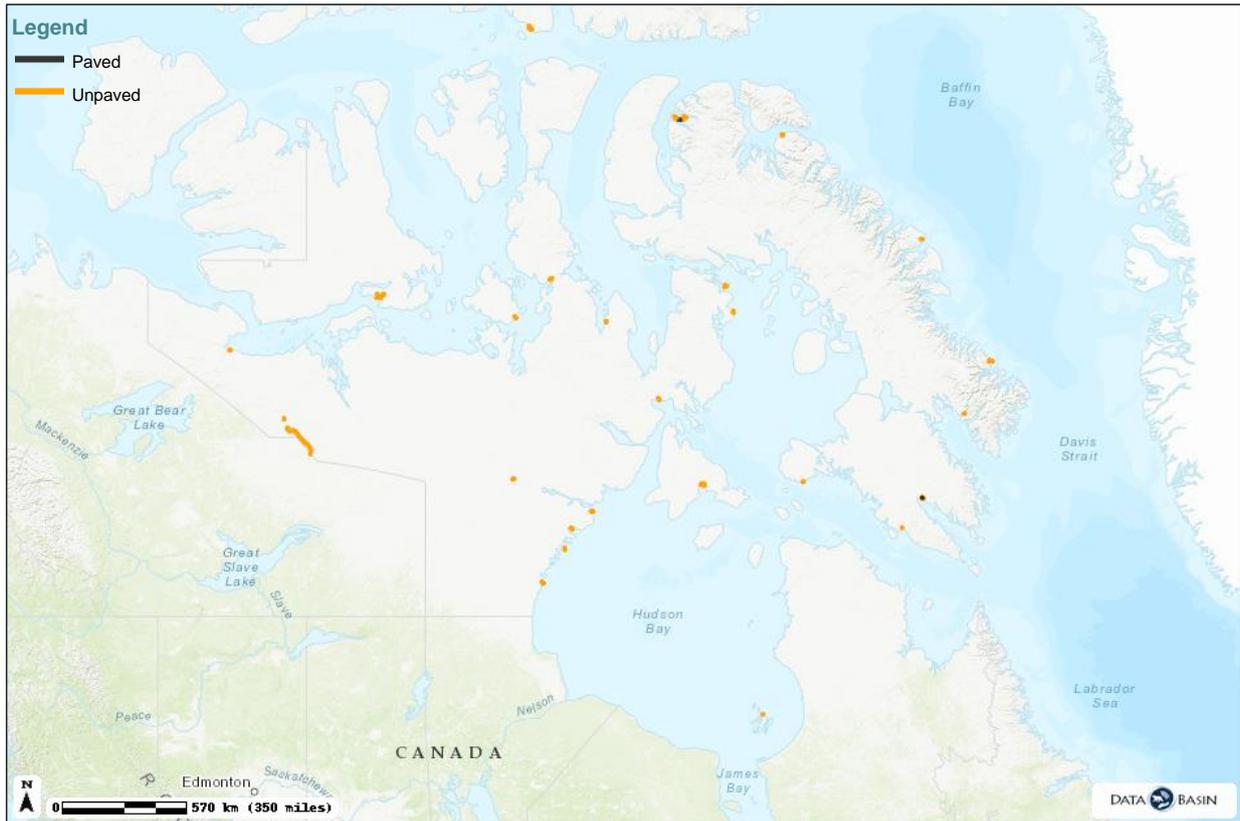
Source: Data Basin, Natural Resources Canada.

As for the provinces with remote northern communities, in Manitoba there is a limited road network north of Thompson, with no road extending to the northern port town of Churchill. The road network in northern Ontario is limited, with many communities without road access (though some are on the Ontario Northland rail line). The road network in northern Quebec is quite extensive, with only the region of Nunavik lacking a road system. The road network in Labrador extends from the Quebec border through the interior communities and connects communities along the south-eastern coast. This connected a number of communities that had relied on ferry services previously.

Rail network

There is limited rail access to northern and Arctic communities, as shown in Figure 6. This is not surprising given that rail construction and maintenance is very expensive, and there is not a large volume of traffic.

Figure 6. Map of rail lines in Canada
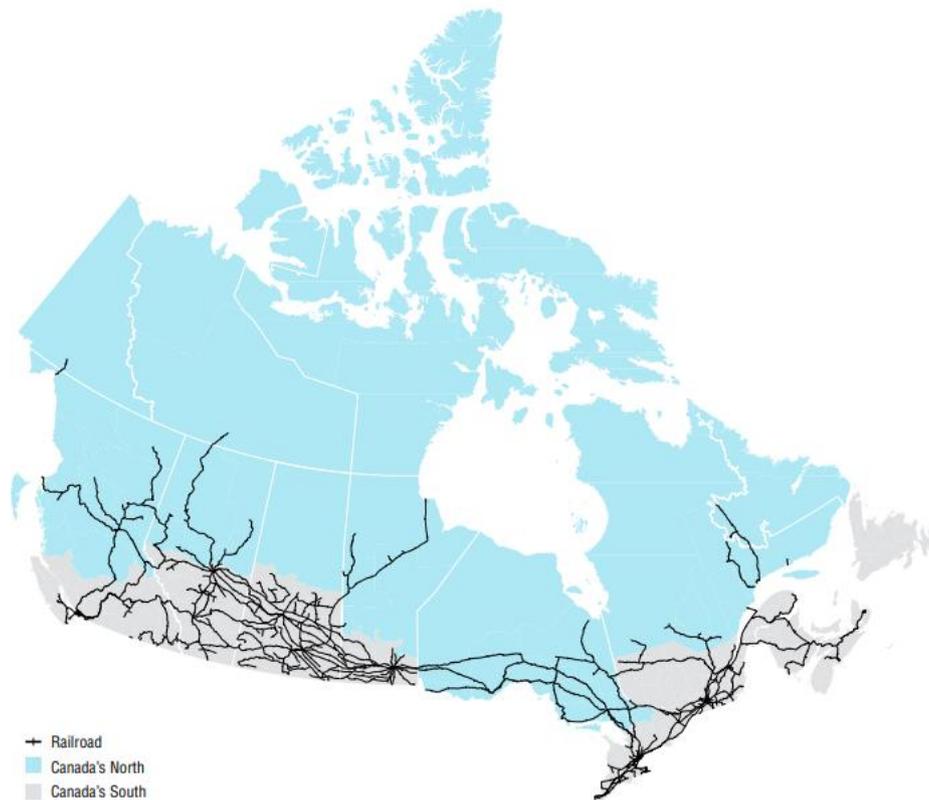
Source: Conference Board of Canada, 2011.

The White Pass and Yukon Route is a scenic tourist train that connects Carcross, Yukon, through northwest British Columbia to Skagway, Alaska. The railway is not connected to any other rail system.

Canadian National (CN) Rail has a freight-only service that extends to Hay River, NWT.

The Hudson Bay Railroad was recently bought by the Arctic Gateway Group after the previous owner, US-based OmniTRAX, refused to rebuild the line after flooding washed out sections of it. It extends from The Pas to Churchill, Manitoba, but does not connect to Nunavut. VIA Rail operates a twice-weekly passenger service. The line links northern Manitoba to the CN network at The Pas. The Hudson Bay Railway also connects to the Keewatin Railway, which has a line from Sherritt Junction to Lynn Lake, though it only operates a regular service as far as Pukatawagan. It also operates a twice-weekly passenger service from The Pas to Pukatawagan.

The Ontario Northland Railway connects North Bay to Hearst, with a line extending from Cochrane to Moosonee. This is primarily a freight service, with the only passenger service being between Cochrane and Moosonee. The railway connects with the CN system at Hearst, North Bay and Rouyn-Noranda (via the Nippissing Central Railway, which it owns).

There are no passenger rail services in northern Québec or Labrador, although there is a rail line from Schefferville, through Labrador down to Sept Îles that serves (primarily iron ore) shippers.

Marine services

Canadian Arctic seaports are only accessible for a short period during the summer. There are some ferry services remaining that serve coastal communities in Labrador.

Figure 7. Map of marine services in Northern Canada

Source: Marine Transportation Service Ltd., Nunavut Eastern Arctic Shipping, Arctic Sealift.

Marine Transportation Services Ltd. is owned by the government of the NWT and delivers critical bulk petroleum and dry cargo to western Arctic communities. Nunavut Eastern Arctic Shipping and Arctic Sealift (a group of three independent shipping corporations: Desgagnés Transarctik Inc., Nunavut Sealink & Supply Inc. and Taqramut Transport Inc.) provide similar re-supply services to northern communities located in the eastern Arctic. Re-supply services typically operate between late June and late October each year. Collectively, Arctic marine services re-supply 10 locations in the NWT and 40 locations in Nunavut.

Seasonal barge services operating during a short period when weather permits are provided on the Mackenzie River. The operator (Northern Transportation Company) went bankrupt in 2016, and its assets were acquired by the territorial government. The Yukon River is navigable from Whitehorse to the Bering Sea, but transport services have not been offered for many years.

Air Services

Every northern and Arctic community has an airfield. In many cases, air transport provides the only year-round transport option for residents.

Figure 8. Map of airports in northern Canada
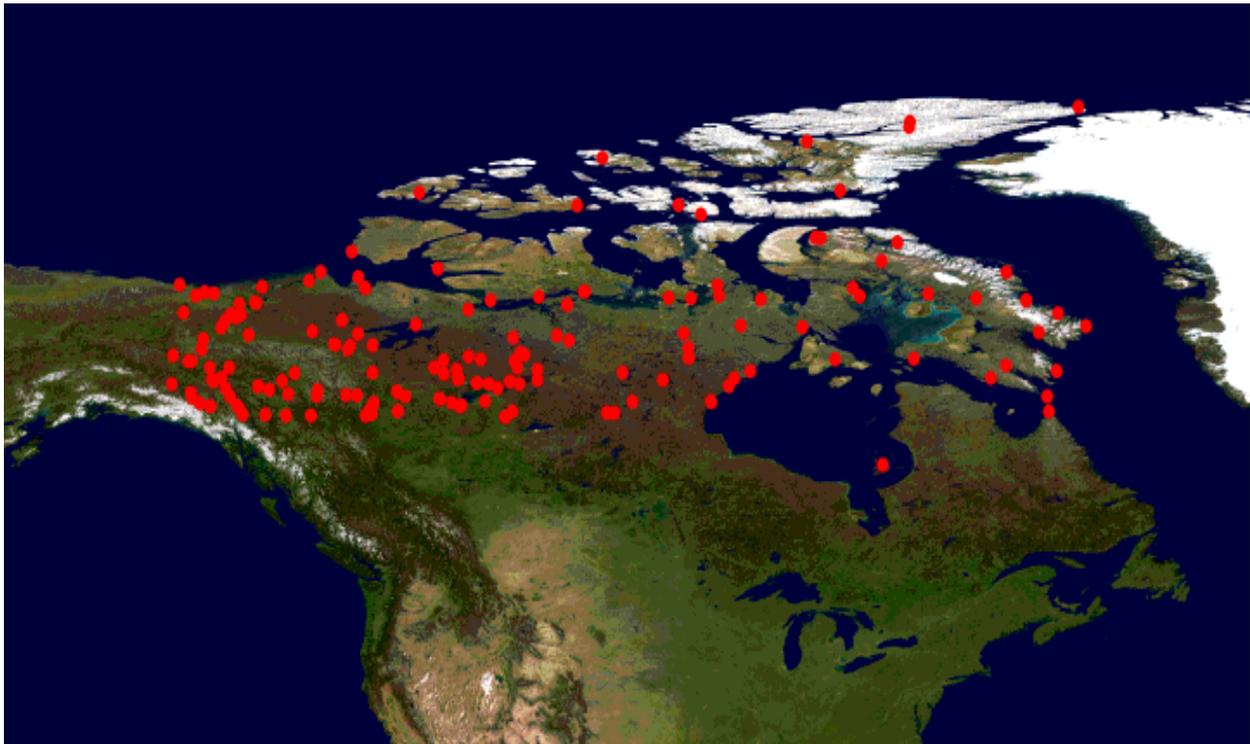
Source: Great Circle Mapper, gcmap.com.

There are 47 airports in the Yukon, ranging in size from the international airport in Whitehorse to small gravel airstrips in more remote communities. Similarly, in the NWT there are 86 airports, though most are smaller gravel airstrips. In Nunavut, there are 60 airports and all communities have access to a gravel airstrip, as air is the only connection available. Gravel airstrips pose challenges for which type of aircraft can serve a community. Many communities have been served by Boeing 737-200 gravel kitted combi aircraft, which provide both main deck cargo capacity as well as a passenger cabin. The economics of this service model have been good, as it does not require two separate flights for cargo and passengers and it keeps both rates down. These aircraft, however, are ageing and later models of the 737 have engines too low for operations on gravel runways. The Airbus A320 family is not suited to gravel operations, and turboprops, which can operate, have more limited range (distances in Canada's north can be vast) and are much slower.

Current policy regarding northern and Arctic air connectivity in Canada

Legislation, regulations and policies related to northern and Arctic air connectivity

The current Canada Transportation Act does not explicitly refer to northern or Arctic transport within the statement of national transport policy or in any of the legislative provisions other than explicitly including disputes regarding northern marine re-supply as eligible for final offer arbitrations along with air and rail. The statement of the national transport policy calls for a "competitive, economic and efficient national transport system" as essential to the needs of Canadians. (The first Canadian Transportation Act in 1967 called for an "economic, efficient and adequate transport system".)

In the past, the legislation distinguished between northern and southern air transport services. Since 1996, however, the government has held to the belief that reliance on market forces would best ensure a competitive, economic and efficient national transport system and removed the remaining regulations governing northern air transport (see Appendix A for more detail.)

The 1996 Civil Air Navigation Services Commercialisation Act has provisions related to designated northern and remote services. The privatised air traffic control operator must give notice of any proposal to reduce or eliminate any designated northern or remote services to representative organisations of users whose members will be affected by the termination or reduction of services as well as affected provincial governments. If no written notice of rejection is received from either the users or affected government within 45 days, the reductions can take place. If a proposal is rejected, there is provision for the minister of transport to overrule any rejection and allow the proposal to move forward.

The 1985 Aeronautics Act does not have specific provisions regarding the north, but there are regulations pursuant to the act that deal with airport zoning at specific airports, including northern and Arctic airports.

The 1992 Airport Transfer (Miscellaneous Matters) Act dealt with the creation of Canadian Airport Authorities and defined the National Airports System (NAS). The territorial airports, however, were handled outside the transfer process used for the other NAS airports, even though airports in the territorial capitals were deemed NAS airports. This originally included Whitehorse and Yellowknife, but now includes Iqaluit with the creation of the Nunavut Territory (from the NWT). In doing this – as well as transferring all the other territorial airports – the government recognised the unique situation pertaining to Arctic airports and realised a one-size-fits-all approach would not work. The airports were transferred to the territories, along with operating subsidies, although those specific subsidies are now subsumed within the overall federal formula for financial support for the territory.

As air transport falls under federal jurisdiction, the territories and provinces do not have legislation dealing with the provision of air transport services.

There are some operational considerations in the Canadian aviation regulations (e.g. aircraft operating in the north require a means of determining direction other than a magnetic compass).

There are no economic regulations in either the north or south in terms of fares, routes or capacity.

Federal policy had been to specifically provide funding to the three territories, which was earmarked for their airports. Currently, however, funding is provided in a more general way, with the territorial governments deciding on priorities and allocating the funding accordingly.

There are federal capital programmes that small airports can apply to. The federal Airports Capital Assistance Program (ACAP) provides capital for safety related projects. The federal government announced in 2012 funding of CAD 77.3 million towards the Iqaluit International Airport Improvement Project (new terminal, expanded aprons, upgraded runway, new lighting and a new combined services building) from the P3 Canada Fund. Airports are also eligible for funding from the CAD 2 billion National Trade Corridor Fund which is scheduled to operate from 2017 to 2028. Of the CAD 2 billion, up to $400 million in funding was dedicated for transport infrastructure in the three territories.

Transport Canada has been consistent over the past 40 or so years in providing support for northern air transport by supporting construction of airfields rather than taking a subsidy approach such as with the Essential Air Service (EAS) programme in the US. The rationale has been the federal government should assist in providing the basic infrastructure needed but market forces should determine what services are actually provided. The government has been consistent over the years in not wanting to select what carriers or communities or services should be subsidised. Support would be better provided through infrastructure funding and other programmes of general support.

To help mitigate high prices for nutritious perishable and non-perishable foods in the north, the Food Mail programme was established back in the 1960s. The Department of Indian and Northern Affairs administered it. The department identified eligible communities (135 of them across nine jurisdictions) as well as eligible goods and negotiated with Canada Post to manage the delivery of the programme. The department sets the subsidy rate; the shipper pays the subsidised rate; and the government picks up the difference between the subsidised rate and the full rate the carrier charges. The rate has stayed constant for years despite the increase in the costs of air cargo, which led to increasing financial obligations on the government. Elimination of the programme was not feasible (it was estimated the price of a 10 lb [4.5 kg] bag of potatoes in Pond Inlet would rise from CAD 18.29 to CAD 64.49 in the absence of the programme). Therefore, a review was commissioned to come up with an alternative approach (Dargo, Graeme [2008]) "Food Mail Program Review, Findings and Recommendations of the Minister's Special Representative", Dargo & Associates Ltd., Yellowknife). As a result of concerns of spiralling costs, a loss of focus, and the limitation of application to only food from the south, a replacement programme was established.

The successor to the Food Mail Program is the Nutrition North Canada Program, launched in 2011. It subsidises perishable and nutritious food items, but traditional foods that are commercially processed in the north (e.g. Arctic char and caribou) and shipped by air as eligible for subsidy are also added. Southern suppliers must be registered to be covered by the programme. Eligible communities are those that lack year-round surface transport, are defined by their territory/province as a northern community, have an airport, post office or grocery store and a permanent population. Nutrition North Canada lists all 25 Nunavut communities, Old Crow (Yukon) and 16 communities in the NWT as eligible. There is a 5% annual increase in the funding to address growing demand and cost increases.

The Northern Transportation Adaptation Initiative is a programme launched in 2011 that provides funding to help address the impacts of climate change. The funding focuses on gaining knowledge about the impacts on transport systems, developing tools and practices to deal with these impacts and providing training to help manage transport systems affected by climate change.

Policy makers started working on a new arctic and northern policy framework in late 2016. In September 2019, the minister of crown-indigenous relations and northern affairs announced the framework, which was developed in conjunction with Indigenous, territorial and provincial partners. Not surprisingly,

infrastructure to improve connectivity in transport, communications and energy was a top priority, following only health and social development as a priority goal. Transport Canada will develop an arctic transport policy framework to align with the Arctic and Northern Policy Framework. This will replace the 2009 Northern Strategy, which was announced by a previous government.

Recent investments announced/completed include highway work in NWT, replacement of 5 air terminal buildings, some marine infrastructure in Nunavut, and transit buses for Whitehorse

There are also some related legislation, regulations, programmes and policies at the territorial level.

The Yukon Public Airports Act grants management and control over all public airports to the minister but also provides them the ability to grant a lease for any part of a public airport for up to 30 years. This provides opportunities for the private sector, with a fall-back position of a government operation. The related regulations govern the establishment of the Yukon Aviation Advisory Committee to make recommendations on the development of services at public airports to capitalise on opportunities for growth and on any proposed regulatory changes related to public airports.

The Northwest Territories Public Airports Act grants the minister the power to administer and operate, as well as construct, maintain, improve and expand, public airports. It also gives the minister the power to acquire, or close, public airports. The minister can also enter into agreements with the federal government, municipal corporations or persons regarding any element of planning, construction, maintenance, administration or operation of the airport, as well as any commercial activity on airport lands.

The Nunavut Commissioner's Airport Lands Regulations empowers the deputy minister to enter into a lease to use or occupy airport lands. The airports are managed and operated by the Nunavut Airports Division, with the exception of Iqaluit. This airport is overseen by the Iqaluit International Airport Division of the Department of Economic Development and Transportation but is managed by Arctic Infrastructure LP and operated under contract by Nunavut Airport Services Ltd. (a subsidiary of the Winnipeg Airports Authority).

The territorial governments are also taking steps to review their systems and plan for the future. This includes a number of studies, including the Yukon Aviation System Review, the NWT Transportation Strategy 2015-2040 and the Nunavut Airports 20-Year Infrastructure Needs Assessment: 2014-2034.

The governments of Nunavut and Manitoba also sponsored consultants to develop the Nunavut-Manitoba Road Business Case. This could have some implications for air connectivity as Nunavut is entirely reliant on air transport and has no year-round surface alternatives.

Non-air transport policies related to northern and Arctic connectivity

VIA Rail operates a twice weekly service to Churchill, a northern Manitoba community with a port and airport but with no road connections to the rest of the province or Nunavut. This line was washed out by flooding in May 2017 and service was not restored until October 2018. Tourism was significantly impacted when the line was out and commodities became scarce and prices rose sharply as goods and people had to travel by air. There was an impasse that lasted for over a year between the owner of the rail line and the Government of Canada (as well as the community and other stakeholders) with the owner unwilling to make the investment to restore service. Despite all the statements regarding the importance of the line to Churchill, nothing happened until the line was sold to a consortium that included First Nations, northern communities, Fairfax Financial Holdings and AGT Food and Ingredients. Repair work then began.

Historically, intercity bus services were licenced to private contractors by provincial authorities. The typical approach was to limit competition on the key traffic routes to generate sufficient profits to cross-subsidise services to smaller and more remote communities. With continuing declines in bus volumes, this has become unviable, and Greyhound Canada, the main bus company in western Canada, recently ended services in Alberta, Saskatchewan and Manitoba, retaining only one service in British Columbia (Vancouver to Seattle). These services, however, have played a limited role in northern and Arctic connectivity, with Greyhound operating only one service to the Yukon (Dawson Creek, British Columbia, to Whitehorse, via Watson Lake and Teslin).

A number of jurisdictions are looking at options for all-weather roads, given concerns about the impact climate change is having on the capacity and duration of the winter roads. The amount of goods that can be transported by winter roads has become more variable than in years past.

Developments in northern and Arctic air connectivity in Canada

Current level of air connectivity

As already noted, for much of northern Canada aviation is the only major mode of access to other communities – and in many cases for resupply of goods. Figure 9 shows the current scheduled connectivity in northern Canada in both the summer and the winter for 2019. The main difference between the two seasons is a summer service from Whitehorse to Frankfurt, Germany. This figure is based on scheduled air services only, and thus there are additional charter and ad hoc connections as well. The number of flights and seats for the Yukon has grown significantly over the past 15 years, while there has been a decline for the NWT and Nunavut (Figure 10 and Figure 11). The number of scheduled flights from the Yukon has grown at an average annual rate of 5.4% over the last 15 years, compared to -0.5% and -0.3% for the NWT and Nunavut, respectively (Innovata Schedule Data via Diio, 2019).

Figure 9. Direct scheduled air services in northern Canada, January and July 2019
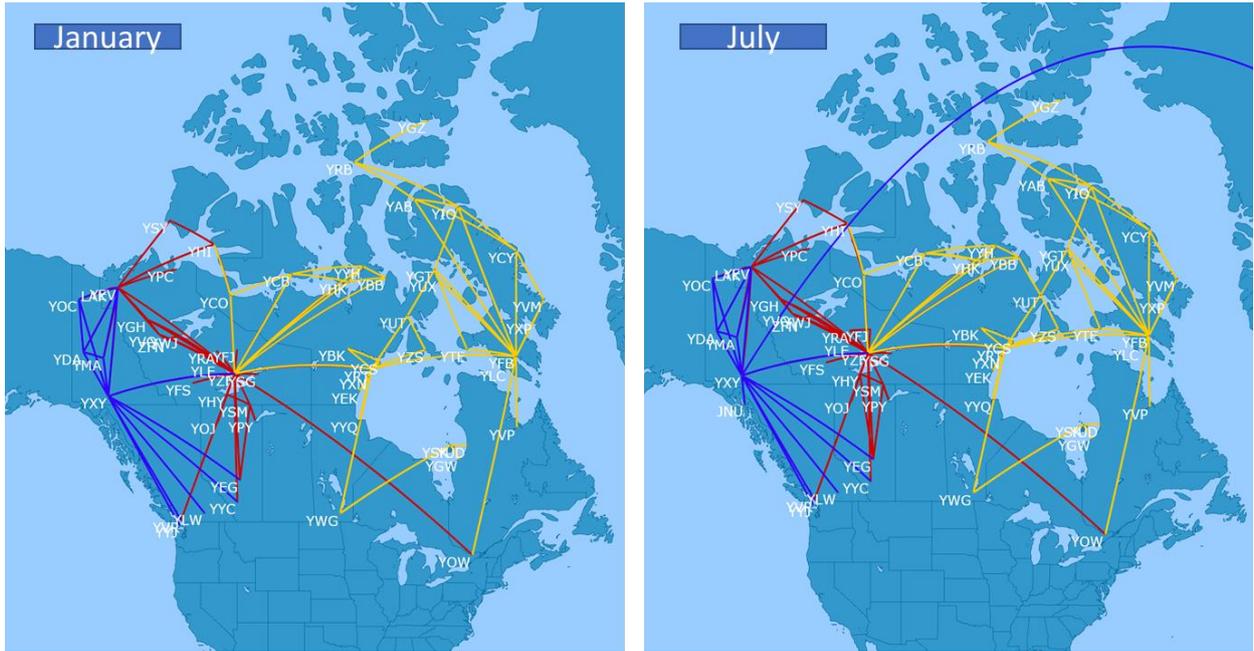
Source: Innovata Schedule Data via Diio (2019).

Figure 10. Scheduled flight departures from northern Canada's territories
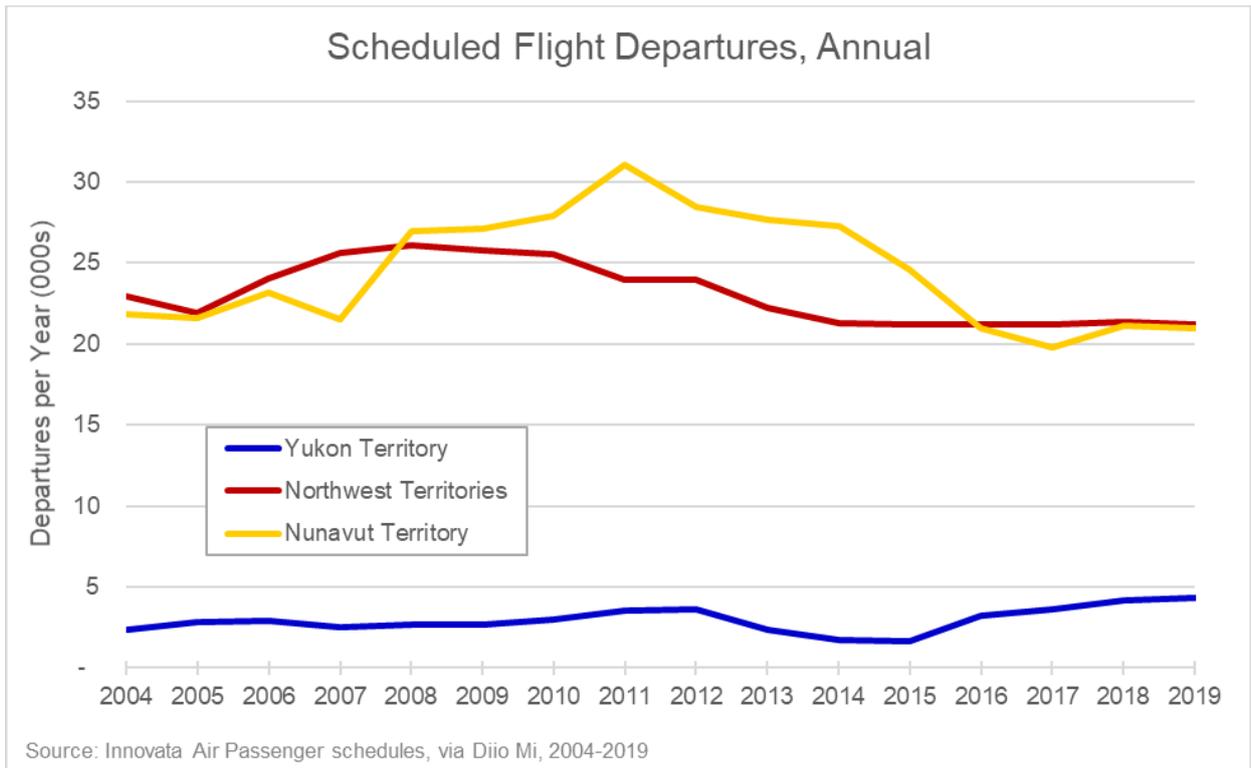
Source: Innovata Air Passenger schedules, via Diio Mi, 2004-2019

Figure 11. Scheduled seat departures from northern Canada's territories
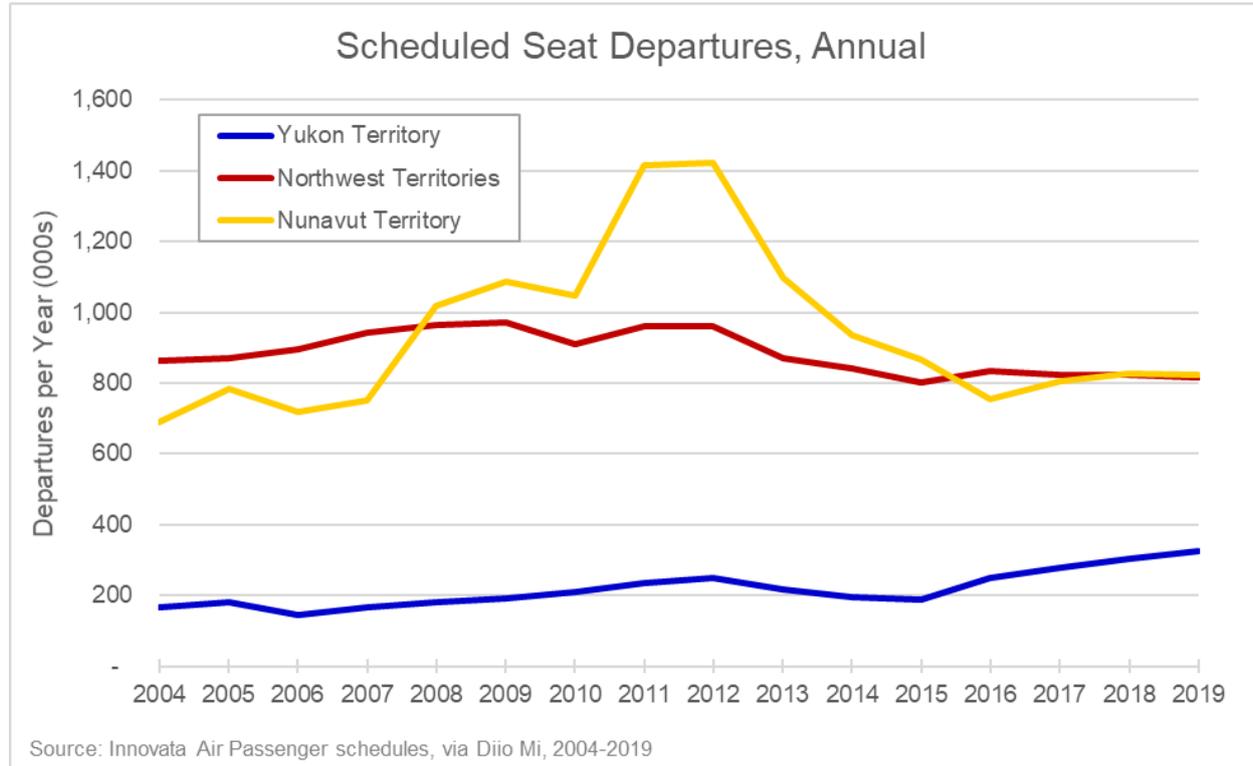
Statistics Canada provides data on passenger traffic at the three major airports in the north (Whitehorse, Yellowknife and in Nunavut [only at the territorial level]). There has been significant growth in passenger traffic, with the majority occurring over the past 17 years (Figure 12).
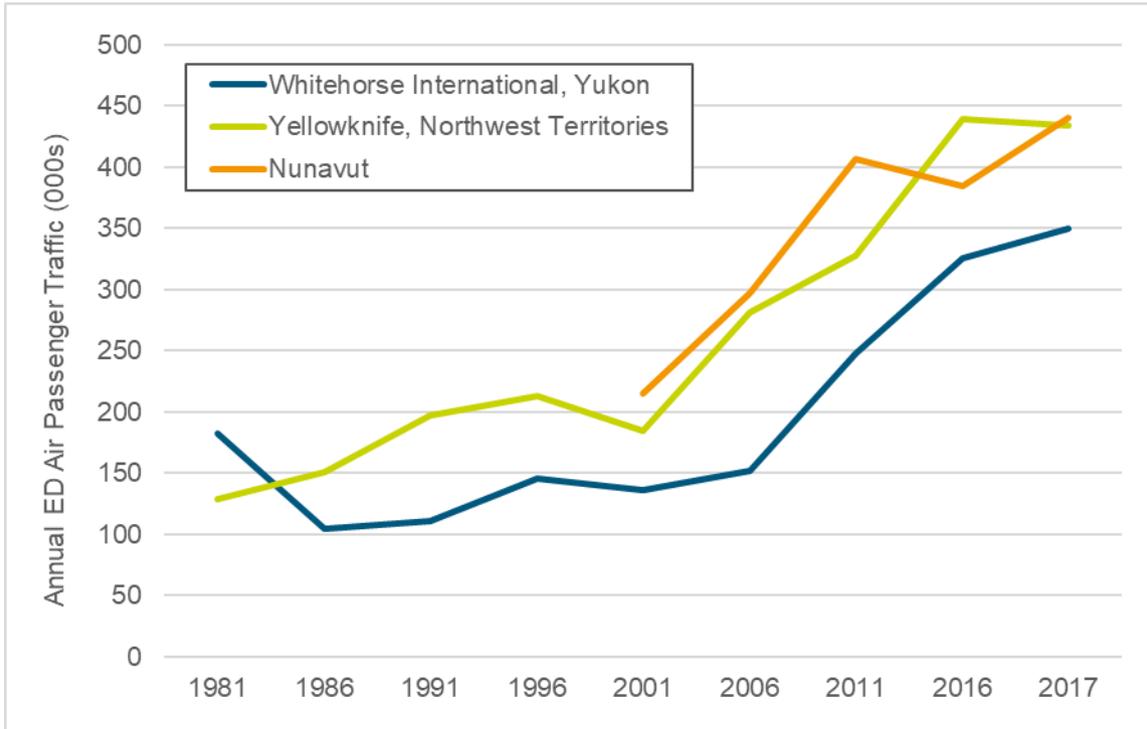
Figure 12. Air passenger traffic at airports in Canada's northern territories

Note: Statistics Canada does not provide data on Yukon Territory but does provide data for the Whitehorse airport. For the NWT, it provides data on both Yellowknife (434 282 passengers in 2017) and the territory in total (628 038). For Nunavut Territory, Statistics Canada provides territory level data but not specifically for Iqaluit Airport.

Source: Statistics Canada, Table 23-10-0253-01.

Growth has been much less stable in terms of aircraft movements. Table 1 shows the number of aircraft movements in each of the territories, as well as the population levels. On a per capita basis, in the Yukon and Nunavut, there is approximately one flight for every person, whereas this has doubled in the NWT (there are almost two flights per capita).

Table 1. Aircraft movements and population in northern Canada

Geography	Total movements (itinerant and local)			Population		
	2000	2010	2018	2000	2010	2018
Yukon	31 728	30 635	38 470	30 431	34 596	40 476
NWT	98 902	83 282	72 200	40 480	43 285	44 541
Nunavut	27 654	33 299	31 391	27 498	33 352	38 396

Source: Table 23-10-0018-01 Aircraft movements, by class of operation, airports with NAV CANADA towers, annual; Table 23-10-0025-01 Aircraft movements, by class of operation, for airports with NAV CANADA flight service stations, annual; and Table 17-10-0009-01 Population Estimates, Statistics Canada.

Alternatives to air connectivity

The following are alternatives – albeit limited – to air connectivity for goods and passengers:

- Seasonal marine services. Due to the cold climate, this alternative is limited to summer when the ice has melted. It is also essentially limited to coastal communities, given the lack of inland surface transport options. There are some inland marine services available in the NWT on the Mackenzie River, but again, these are limited in duration.

- Seasonal road access. This is again limited, but in this case to the winter months only. Ice roads are becoming increasingly unreliable and with a shorter season than has been the case historically. Air transport is increasingly used to transport goods that fail to move during the ice road season.

- Rail access. Currently this is limited to Hay River and a few other NWT points on the CN Meander subdivision. Churchill Manitoba and other points along the Hudson Bay Railway BR have rail service by the Arctic Gateway Group. The cost of constructing and maintaining rail lines, and the limited amount of traffic make rail service a challenge.

- Internet communications. This is an effective alternative for some social interaction and some medical services. It is not effective for many social interactions and is not an alternative for the movement of most goods (other than items such as electronic books, etc.).

Despite the above, there are no alternatives for many needs, such as medical trips, fresh food, year-round cargo, etc. Thus, these alternatives provided limited options for travellers, and shippers and cannot effectively substitute for air connectivity.

Potential developments impacting air connectivity

There are some current and pending aviation developments which could potentially impact connectivity.

Many of the aircraft serving northern and Arctic communities are nearing the end of their operational life. It will be a challenge to find replacements for current aircraft that are geared for operations on gravel airstrips. In many cases alternatives are more expensive separate services for passengers and cargo, possibly with lower frequency. This will be a challenge for many communities.

Drones might be an option for certain cargo services. Drones will not be able to transport heavy or bulky goods (e.g. fuel and building supplies), but they may be able to deal with the gravel runway issue. In addition to limitations on payload, the long distances and harsh climate make operation of drones problematic.

Electric aircraft are rapidly being developed. In the late 2020s, regional electric aircraft may make an appearance. This could potentially deal with increasing cost of fuel, but there will be issues of range for the long distances in the north, and another challenge is battery performance in a very cold climate. Planned investments in northern and Arctic energy corridors would provide a reliable source of electric energy at northern and Arctic airports that could service this development.

There is also a concern about the viability of northern air carriers. Services linking northern and Arctic communities to the south are likely sustainable, but the lower traffic volumes on intra-regional services make these services more vulnerable. The transport minister recently approved a merger of two northern carriers despite competition concerns raised by the Competition Bureau that this merger would result in a monopoly on overlapping routes. Concerns over the viability of the carrier appear to have been key

factors in the merger's approval by the minister, outweighing competition concerns. There will be pro-competitive conditions imposed related to fare increases, service reductions and access to facilities in order to limit the carrier's market power.

Challenges to northern and Arctic air connectivity

There are a number of current and potential future challenges to the connectivity of northern and Arctic communities.

Current challenges affecting air connectivity

- Infrastructure financing. Construction costs in the north are high. There is currently limited financial support for aviation infrastructure: the territorial governments are facing spending pressures, the federal Airports Capital Assistance Program is limited to safety-related infrastructure, and ad hoc infrastructure programmes do not provide much certainty or continuity for planning purposes. While there currently is a small number of infrastructure grant programmes available, they are not permanent funding programmes.

- High costs. Construction costs are not the only costs that are higher in northern and Arctic communities. Operating costs are high, and traffic is limited. The high cost of service for air transport in the north is exacerbated by government policy which makes air transport expensive overall in Canada (relative to some other jurisdictions), with no offsetting subsidy programmes.

- Adverse weather. The generally colder weather poses operational challenges for both people and equipment. Service reliability under adverse weather conditions is also a challenge.

- Climate change. Climate change appears to be affecting the north more than more southerly areas. There is a higher degree of weather unpredictability, which negatively affects air transport and may adversely impact connectivity of northern and Arctic communities more than their southern counterparts. For example, a number of jurisdictions are introducing carbon taxes and other forms of monetising the externality costs related to climate change to address public concerns. This would make travel in the north even more expensive than it currently is, challenging connectivity.

- Aircraft. There are limited choices of aircraft that can land on gravel runways. If suitable aircraft are not available, paving current gravel runways will be a financial challenge.

- Shortages of pilots and mechanics. There is a general North American shortage in these key areas, and this is exacerbated by living conditions in northern and Arctic communities.

- Economy. If trade declines and the general economy with it, it is likely to depress commodity prices. This would have negative impacts on mineral exploration in the north and depress traffic volumes.

Potential future challenges impacting air connectivity

Potential future challenges mirror to a large extent the current challenges facing air connectivity in northern Canada. They include the following:

- Winter roads. While ware already seeing some challenges with winter roads, this is likely to become even more problematic in the future. More limited effectiveness of winter roads due to climate change may place greater reliance on air connectivity and for longer periods. For heavy and bulky goods, this a significant challenge. This not only impacts current business and social interactions it can impact future economic activity be making the cost of exploration and resource extraction even more expensive. The less reliable winter roads could potentially be offset somewhat by longer shipping season for communities on the coasts or along the Mackenzie River.

- Environmental disaster. An environmental disaster, such as a major oil spill in Arctic waters, could have a major impact on surface transport of certain goods. Air is an expensive alternative for these types of goods.

- Climate change. If climate change increases the frequency of future major adverse weather incidents, this will negatively impact the cost and reliability of air services.

- Economy. While the north and the Arctic are resource rich, the decline in oil and gas exploration will have a negative impact, diminishing traffic demand and lowering economic activity. Due to economies of scale, reduced traffic levels may impact affordability of air transport. While population growth in Nunavut is well above the national average, and the Yukon slightly above, the latest census results showed little population growth in the NWT.

- Shortages of pilots and mechanics. There has been aggressive recruitment of pilots and mechanics in the north from southern Canada to address the shortages in the north. This is expected to become even more of an issue in the future as more baby boomers exit the workforce.

Northern and Arctic air connectivity support going forward

The new Arctic and Northern Policy Framework maintains a strong focus on infrastructure development for transport, communications and energy.

The second goal listed is related to strengthened infrastructure that closes gaps with other regions of Canada (Government of Canada, 2019) The main points of the policy are as follows:

- closing the infrastructure gap between the north and the rest of Canada by improving communications, using cleaner energy, monitoring the climate and improving transport options to communities only accessible by air on a year-round basis or seasonally by water or ice roads

- improving the infrastructure to allow for easier movement of goods and passengers, better enabling trade opportunities

- investing in cleaner energy as climate change impacts both current and future infrastructure in the north

- improving telecommunications, which is key for economic development potential.

Improved communications infrastructure will supplement the connectivity that is currently provided by air transport. To an extent it may replace some air travel, but overall improved communications connectivity could stimulate additional air travel. Improved energy infrastructure could also support air connectivity as the development of electric-powered aircraft continues. Providing reliable electric power at northern and Arctic airports will likely be a continuing focus.

The new Arctic and Policy Framework suggests airport, road, rail and marine infrastructure will be a key platform for Transport Canada's pending Arctic Transportation Policy Framework. This would also be consistent with the summary of northern transport issues in the most recent review of the Canada Transportation Act (Government of Canada, 2014):

- There are major challenges in the north (mobility, connectivity and the provision of goods and services), which the federal government needs to have a role in improving.

- Vital air transport links are threatened by unsustainable economics, deteriorating infrastructure and climate issues.

- There is a lack of rail and road infrastructure, and marine services are also limited.

- Transportation in the north is the key to development.

Current support programmes

There are four main support programmes for the north as previously discussed. These include the Nutrition North Canada Program, the Northern Transportation Adaptation Initiative Program, the recent Arctic and Northern Policy Framework, and federal transfers to territorial governments. In addition, ad hoc federal infrastructure programmes and ACAP also provide support, though these are national programmes and are not targeted to the north.

Table 2 shows the level of territorial government expenditure on transport in the Territories. Between 1991 and 2017 the government provided approximately CAD 250 million to the Yukon, CAD 710 million to the NWT and CAD 600 million to Nunavut (net of federal government transfers) for air transport. Adding in other modes (e.g. waterways and roads), these totals increase to CAD 1.9 billion, CAD 3.3 billion and CAD 670 million respectively for the Yukon, the NWT and Nunavut.

Table 2. Government expenditures on transport in the north

Territory	Net provincial/territorial government expenditure on transport by year and sector (millions of CAD)			
	90/91	00/01	10/11	16/17
Yukon	41	43	86	98
Northwest Territories	59	69	310	212
Nunavut	0	10	17	98

Source: Transport Canada, Transportation in Canada Statistical Addendum (1999, 2007, 2017).

It is anticipated these current programmes will continue for the foreseeable future.

Future federal infrastructure options

While the current ad hoc infrastructure programmes and the ACAP have been helpful, it should be noted that funding under these programmes is by no means certain. The ACAP has a fixed budget each year, and projects compete for funding. The infrastructure programmes are also competitive: Nunavut submitted six proposals to the National Trades Corridors Fund, and five were rejected. Only one proposal (CAD 22.5 million for new airport terminals in five communities) was approved. Some options are to continue with ACAP and ad hoc infrastructure funds. This provides the lowest level of certainty. One option would be to expand the eligibility of northern airport projects beyond the safety criteria that could continue to apply in the south.

A dedicated remote community connectivity fund could be created, with two main components: a technology programme that would invest in projects that enhance communications and an infrastructure programme that would fund airport, road, and marine infrastructure. Although this would still be a competitive process, a properly funded remote community connectivity fund would provide greater certainty for northern and Arctic transport infrastructure projects.

There should be a commitment to funding all reasonable infrastructure proposals for northern and Arctic transport. Each proposal would be subject to a social cost-benefit analysis rather than just a financial business case. This would provide the greatest amount of certainty, albeit at a higher cost. Nevertheless, if the social cost-benefit analysis shows aggregate benefits to Canadians exceeding aggregate costs (perhaps by a certain threshold), the investment would be justifiable and would improve Canada's economic and social well-being. It would be necessary to provide guidance regarding how the benefit of social connectivity would be valued in the social cost-benefit analysis in light of the methodological challenges of measuring these wider economic benefits.

Future air service provider options

Having consistently rejected subsidisation of specific air services over the course of several governments over the past few decades, it is highly unlikely this would be considered by the current government. It would be inconsistent with a reliance on market forces to ensure a competitive, economic and efficient transport system.

Nevertheless, there are some options for making air service more viable. One would be risk-sharing for air carrier service – such as revenue or profit guarantees – for the riskier start-up period of a new service before it gets established. Another would be committing to a certain number of seats for government travel for new services instead of continuing with the incumbent carrier. And finally, marketing support and airport fee discounts and waivers for new services for the riskier start-up period could also help make air service more viable.

Future government fees, charges and taxes

The user-pay policy has been the norm in Canada for many years now, and several reviews and commissions have consistently supported this. While this may be appropriate and viable in the south, the sparse population density, harsh operating conditions and high costs in the north, makes user-pay problematic for northern and Arctic airports (while the federal government charges rent at the major southern airports, no northern or Arctic airports pay any rent).

Continued federal funding based on non-repayable grants for infrastructure could potentially be justified on the basis of several national benefits (i.e. positive externalities) from a viable northern/Arctic transport system. These include sovereignty over Arctic territories, national defence, environmental protection of Arctic waters, lower healthcare costs via improved health of northern inhabitants from better food and hence better health, mineral exploration/extraction, energy and tourism.

This would apply to any federal fees, charges and taxes on transport, particularly air transport, which the federal government has been treating as an important revenue source (see, for example, "The Future of Canadian Air Travel: Toll Booth or Spark Plug?", prepared for the Standing Senate Committee on Transport and Communications, 2012). Implementing lower government fees, charges and taxes, or at least not having them exceed their southern equivalents, would be consistent with the current direction of the government. The latter appears to place much stock on the future of northern Canada, so it would be appropriate for any fees, charges and taxes to be enablers of northern growth rather than an impediment.

The federal government took this approach when it enshrined in the legislation creating Nav Canada a provision governing charges in the north: "25 (1) (g) charges for designated northern or remote services and for services directed to be provided under subsection 24(1) must not be higher than charges for similar services utilised to a similar extent elsewhere in Canada". It should be noted the efficacy of this provision depends on Nav Canada's interpretation of the phrase "utilised to a similar extent". This could potentially be used to justify higher charges on less heavily travelled northern routes.

Technological alternatives to air connectivity

The recently released Arctic and Northern Policy Framework has a strong focus on improving communications infrastructure as a means of improving connectivity in this region. This will enable Internet-based conferencing and remote medical treatments and thus reduce the need for air connectivity at least a little.

Potential recommendations for future policy

Potential recommendations for consideration for future Canadian northern and Arctic air connectivity include the following:

- Continue the user-pay policy, as recommended by all reviews and commissions of the past three decades. This ensures economically efficient decision making by users, since the value they derive from purchased services at least equals, if not exceeds, the cost of providing the service.

- Continue to recognise the vital importance of the social and economic connectivity provided by northern/Arctic air services, ensuing such services are not economically viable based solely on the user-pay approach. Institutionalise assessments of connectivity levels up north across modes. This addresses the issue of achieving positive externalities and wider economic benefits that accrue to the economy and society as a whole from improved connectivity, the costs of which would not be expected to be paid for by individual users.

- Instead of subsidising air services and air carriers, as is done in the US, focus subsidy programmes on the provision of infrastructure and where necessary the direct subsidisation of the transport of specific vital goods, such as with the Nutrition North Canada Program. Let the market determine how air services are to be provided rather than have government officials decide which services should receive subsidies and which should not. This could include the following:
    - creating a greater degree of permanence for infrastructure support programmes.
    - continuing with the Northern Transportation Adaptation Initiative.
    - continuing to refine the Nutrition North Canada Program to better meet health needs of indigenous and other residents of the north/Arctic
    - establishing a remote community connectivity fund
    - avoiding a route-specific operator subsidy but providing limited short-term incentives for new services
    - providing training subsidies for pilots and mechanics, focused on northern training locations and in part targeting northern residents and first nations.

- Continue to enhance road and rail infrastructure where appropriate to promote competitive options and as an alternative during bad weather. The availability of year-round surface transport should guide eligibility for certain infrastructure or nutrition programmes.

# Annex A: Evolution of northern air transport policy in Canada

Legislative changes from 1967

The National Transportation Act of 1967 was the first to deal with all modes of transport. It moved Canada towards a greater reliance on market forces – in particular intermodal competition – to promote an economic, efficient and adequate transport system. While it did make it easier for carriers to respond to evolving competitive forces by other modes of transport (primarily driven by the need to allow rail carriers to respond to road transport), it maintained economic regulation within each mode of transport. In air transport, entry and exit into markets, as well as the fares charged, were still strictly controlled by government. The criterion of Public Convenience and Necessity (PCN) governed whether a carrier could enter or exit any given market. In addition, carriers were generally limited to specific geographic locations: Air Canada and CP Air (later Canadian Airlines International) were allowed to compete on the more heavily travelled transcontinental routes, but the regional carriers were generally confined to geographic areas (Pacific Western Airlines, Nordair, Québecair and Eastern Provincial Airlines) so as to not compete with each other. International services were generally divided between Air Canada and CP Air, although charter carrier Wardair also provided international services, and there was some overlap.

The 1987 amendments to the National Transportation Act added intra-modal competition to the intermodal competition introduced in the earlier act. Air carriers were granted more rights to compete with other air carriers both domestically and internationally, but northern and southern air transport services were treated differently. Service in the more densely populated south was essentially deregulated, with Fit, Willing and Able replacing the PCN criterion. Service in the designated north, however, retained some provisions regarding entry, exit and fares. Figure A-1 below is from the 1993 NTA Review and demonstrates which routes were designated northern. The concern was that completely open entry and exit could lead to a loss of service as only certain key routes could support more than one carrier, and the existence of competition on these routes could diminish or eliminate the ability of the incumbent to use the profits of these routes to cross-subsidise other services. But the provisions that remained were much weaker than before. While a carrier or other party could object to an application for entry into an existing market, the onus was on them to show this entry would jeopardise their service. Exit was only subject to advance notice. Fares could be appealed, and the agency had the power to investigate fare increases or even base fare levels.

The 1996 Canadian Transportation Act essentially deregulated northern air services, eliminating the remaining provisions relating to economic regulation of northern air services.

Figure A1. Original delineation of northern and southern air routes in Canada
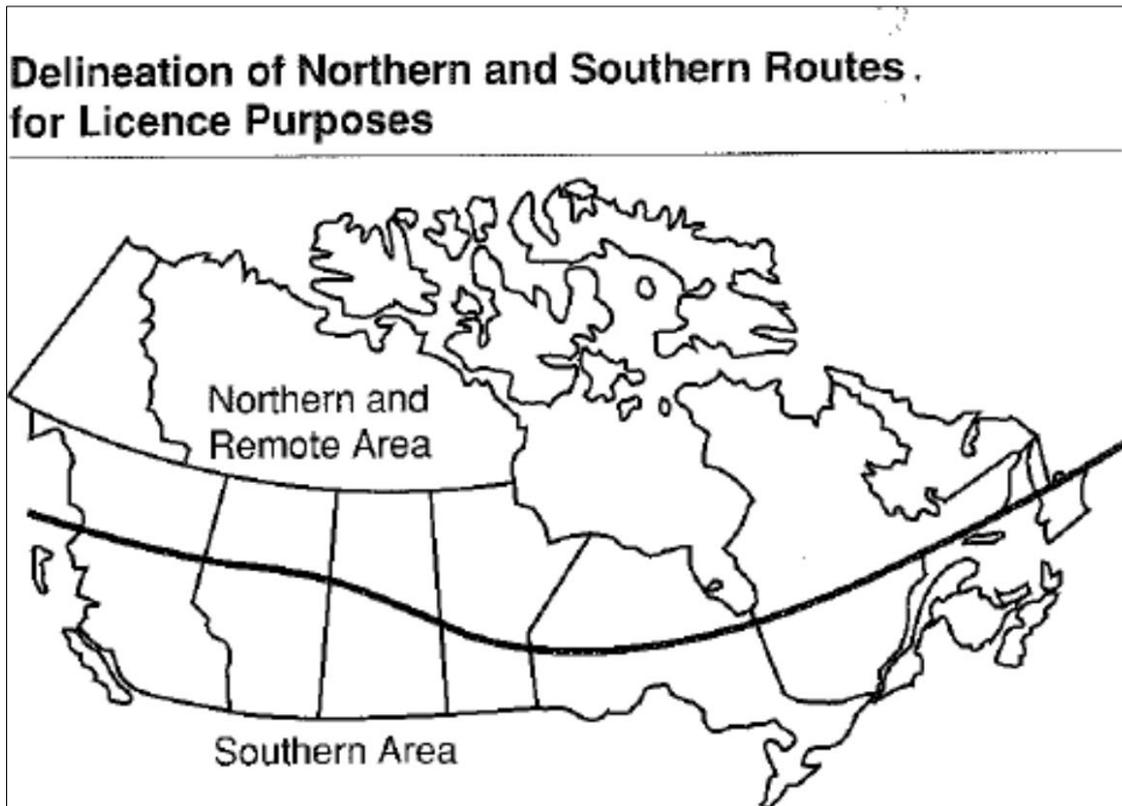
Source: National Transportation Act Review, 1993.

Key Canadian policy reviews

Royal Commission on Transportation, 1959-1961

This royal commission, commonly referred to as the MacPherson Commission, became the basis for the Government of Canada's passage of the National Transportation Act in 1967. In addition to arguing for increased reliance on intermodal competition, the commission also argued the cost of locational disadvantages should not be the responsibility of carriers but the federal government. In other words, if the government wanted carriers to provide commercially unviable services to stimulate economic or social development, the carriers should be subsidised by the public purse not be required to support such services by internal carrier cross-subsidisation from other routes. The commission also noted the importance of transport to development of the northern resource base (as well as that of Newfoundland). This would see un-remunerative, but essential, northern air services subsidised by government.

Royal Commission on National Passenger Transportation, 1989-1991

The report of this royal commission, "Directions", supported a user-pay system with no carrier or route subsidisation. The commissioners concluded that subsidies distorted decision making without improving efficiency. The commission did not support making an exception for northern air services.

National Transportation Act Review Commission, 1992-1993

The report of the commission, "Competition in Transportation," supported the regulatory reforms contained in the 1987 National Transportation Act (NTA) (National Transportation Act Review Commission, 1993). They argued worldwide competitive pressures required the Canadian transport system to be as efficient as possible – it was untenable to expect social or economic obligations to be placed on carriers. Their review of developments in northern air transport indicated the level of activity within the north and connections between the north and the south had increased. They concluded the 1987 reforms did encourage the entry of new operators.

Canada Transportation Act Review, 2000-2001

The report of the review, "vision and balance", continued support for a reliance on competitive forces to ensure the most efficient transport system. It recommended the 1996 Canada Transportation Act be amended to remove the Canadian Transportation Agency's power to review passenger and cargo fares on monopoly routes. Moreover, it ordered additional fare classes on monopoly routes and audits for carriers proactively on the grounds that monopoly impedes carriers' efforts to implement efficient yield management systems while failing to provide effective consumer protection. It also made recommendations to improve transparency.

Straight ahead: a vision for transport in Canada, 2003

This was the minister of the day's policy statement in response to "*vision and balance"*, the 2000 review of Canada's transport policy. It focused on enhancing the competitiveness of Canada's transport system in light of continued globalisation and North American integration. The government indicated it would target and leverage its limited financial resources in three areas, one of which was essential remote services where there was no alternative year-round service (the other two were strategic investments supporting economic growth that benefits all Canadians and encouraging public-private partnerships to address local infrastructure needs.) At the same time, the government indicated it "will continue to seek the best means to provide reasonable access to the national transport system for remote communities where such access is not financially self-sufficient but is essential to their survival."

Canada Transportation Act Review, 2014-2015

The report of the review, "Pathways: Connecting Canada's Transportation System to the World," (also known as the Emerson Report) addressed the issue of northern transport. Observations/findings include the following:

- It concluded northern infrastructure projects were done on an ad hoc basis with no long-term cohesive plan or links to trade and travel corridors. It found other northern jurisdictions (Greenland, Russia, the US, Finland, Norway and Sweden) had more mature transport systems to support development and security needs (Appendix D).

- It identified six northern corridors that should be developed. These are surface-based corridors that would improve transport options and overall connectivity.

- Recommended CAN 50 million per year over the next ten years for runway extensions and surfacing, as well as automated weather and landing systems.

Auditor General report on civil aviation infrastructure in the north – Transport Canada (2017)

The Auditor General found that while Transport Canada was aware of "safety- and efficiency-related infrastructure needs" it "had not taken a leadership role in addressing these needs by leading efforts and working collaboratively with its provincial, territorial and industry partners to enhance the safety and improve the accessibility and efficiency of remote northern airports."

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Northern and Arctic Air Connectivity in Canada

This paper examines explicit northern and Arctic connectivity policies in Canada, recognising the vital importance of air services in economic and social life. It comments on existing legislation, regulations, policies and programmes of the federal government as well as of Canada's three northern territories. It also looks at recommendations from past transport policy reviews.

All resources from the Roundtable on Connecting Remote Communities are available at:
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