Redundancy, Reliability and Disruption: Broadband Competition in Rural and Indigenous Regions

Professor Heather E. Hudson

Institute of Social and Economic Research
University of Alaska Anchorage and
University of San Francisco

ISER: More than 60 years
of public policy research

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Redundancy, Reliability and Disruption: Broadband in Remote Regions

- **High costs, low revenues**
- **Competition: mostly facilities-based**
  - **LEOS, particularly Starlink**
- **Capex vs. Opex funding**
- **Strategies to increase participation**
- **Resilience and redundancy**

- **Examples from Alaska and Northern Canada**
- **Examples from the Pacific Islands**
- **Lessons and challenges**

The Remote Northern Context

Alaska Natives:

almost 20% of population
6 major linguistic/cultural groups

Canada's Northern Territories:

from 23% to 86% Indigenous

Isolated villages/communities:

most without road access
majority Indigenous residents
young, growing populations
low/seasonal incomes
limited employment

**Similar isolation and small populations
to conditions in Pacific Islands**

Competition and Disruption

- **Competition: facilities-based**
  - **LEO services are proliferating (Starlink and some others)**
  - **U.S.: federal funding prioritizes fiber**
    - **Alaska: competition since 1970s**
- **Competition: services-based**
  - **Canada: forbearance of wholesale fiber regulation**
    - **Lease charges are expensive**
    - **No requirement for wholesale access in the North**
  - **US: Middle mile not regulated**
    - **Small providers cannot compete**

LEOs: Disruption and Innovation

- **Part of the continuing evolution of telecom technologies and services**
- **Starlink:**
  - **Very popular in rural Alaska and northern Canada**
    - **Residential use; some purchased by communities**
      - **Like picking up pizza boxes when they arrive!**
    - **Alaska Ferries: POS terminals and back-office functions**
    - **Fishing boats: weather, catch reports, online repair manuals**
    - **Construction crews**
    - **Emergency responders: drone video of disasters, etc.**
    - **Emergency communications during evacuations from fires, floods, etc.**

- **Other LEOs:**
  - **OneWeb, also plans by Amazon, Google, etc.**
  - **Canada: government subsidizing planned Telesat LEO system (Lightspeed)**

- **Short term or interim solutions?**
  - **Will be replaced by fiber?**
  - **Will become back-up?**

Financial Sustainability

- **Funding: Capex vs. Opex**
- **U.S.:**
  - **Federal rural broadband Capex funding**
  - **Universal Service Programs: Opex support**
    - **E-Rate, Rural Healthcare, High Cost, Lifeline**
    - **Some Alaska operators obtain significant revenues from these subsidies**
- **Canada:**
  - **Federal funding is only Capex**
  - **Small High Cost fund**
  - **No multiyear funding for schools, healthcare, etc.**
    - **Current CRTC consultation on whether to introduce subsidies**

Participation Models

- **U.S.: Alaska**
  - **Rural co-ops**
    - **Local service: phone and Internet**
    - **Founded with support from REA/RUS**
  - **TBCP: $385 million for infrastructure projects**
    - **Native partnerships with telcos to obtain federal funds**
    - **No equity**
    - **Is TBCP primarily a pass-through to incumbent providers and/or contractors?**
- **Canada**
  - **Indigenous ISPs**
  - **Yukon:**
    - **Northwestel (Bell Canada subsidiary) sold FTTH assets to 13 First Nations Northwestel will operate and maintain network**
    - **No binding commitment to hire and train Indigenous staff**
    - **No Indigenous participation in management**
  - **Proposed sale of Northwestel to Indigenous organizations**
    - **Sale price $C1 billion**
    - **Valuation? Fully depreciated copper; federal infrastructure funding**
    - **Management capacity of Indigenous organizations?**
    - **Future relationship with Bell Canada?**

Alaska Broadband: Indigenous Partnerships

- **Calista and Alaska Communications (ACS)**
  - **Kuskokwim and Yukon communities: fiber**
- **Bethel Native Corporation and GCI**
  - **AIRRAQ fiber**
- **Yukon Kuskokwim Delta Tribal Broadband Consortium**
  - **Starlink: interim broadband solution**

Other projects:

- **GCI: Aleutians fiber**
- **Quintillion: submarine fiber**

Alaska Middle-Mile Infrastructure
Existing and Proposed in 2016
— Fiber
— Microwave
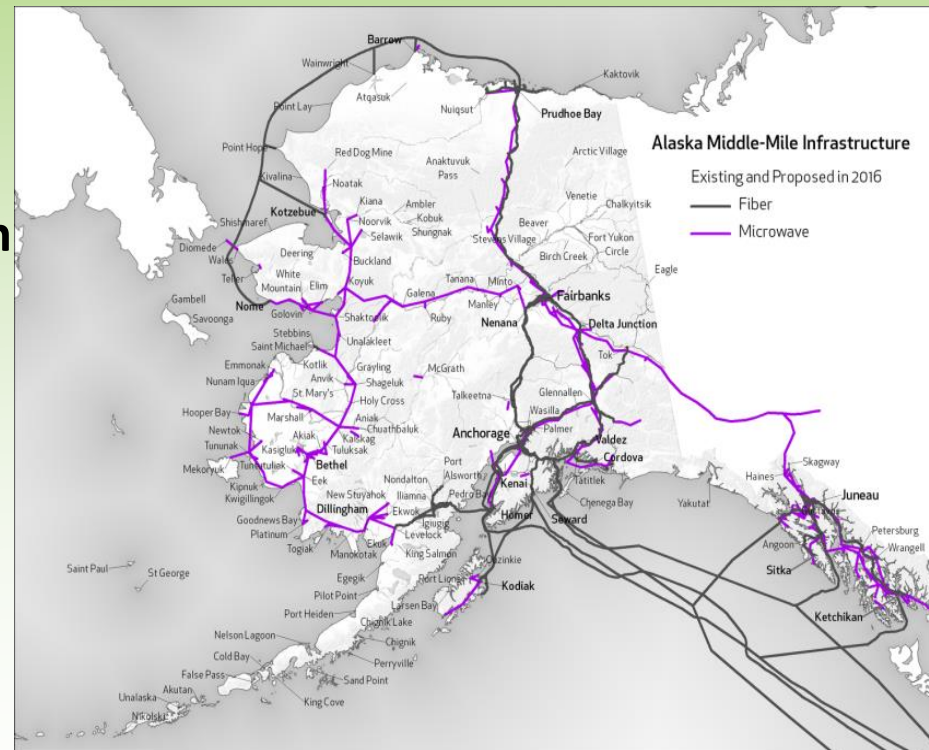
Natural Disasters and Climate Change

Wildfires: May 2024

Flooding: 2023

Technical Sustainability and Resilience

- **Issues:**
  - **Resilience**
  - **Redundancy**
  - **Future proofing**
- **Canada: fiber damage from thawing muskeg and wildfires**
- **Alaska has had at least 4 fiber cuts in past two years**
  - **Bering Sea, North Slope, southeast coast**
  - **Services disrupted: emergency, public services, businesses**
  - **Satellite backup, but limited bandwidth**
  - **Financial risks: GCI is self-insured for fiber damage**
- **Need for future proofing: Canada**
  - **Insufficient capacity during pandemic**
    - **Telemedicine, learning from home, telework**
  - **Insufficient fiber capacity for current broadband requirements**
  - **Some network switching did not allow upgrade for 988**

Strategies to increase Resilience and Competition

- Completing network rings – can route traffic in either direction

- Redundancy
  - Facilities: Additional technologies such as satellite as backup or alternatives
  - Facilities: Additional terrestrial networks
    - e.g. Northern Quebec, summer 2023
  - Wholesale access for additional service providers
    - e.g. Indigenous ISPs, mobile providers

- Local employees/technicians: train and hire
  - Can troubleshoot some problems without fly-in techs
  - Have incentive to ensure access
  - Create local jobs

- Operational subsidies
  - High costs of maintaining services, low population to spread costs
  - All providers need to be eligible

Case Studies: Pacific Islands
Tonga and Vanuatu

Tonga:

- Submarine fiber cut in 2022 after undersea volcanic eruption
- Backup by satellite (Kacific and Starlink) – eventually
- Tonga government had investment in the submarine fiber
- Earthquake cut service to Vava'u and Ha'apai in June/July 2024
- Starlink not licensed until December 2024
    - available through "authorized resellers"

Vanuatu:

- Earthquake in December 2024
- Submarine fiber damaged, other network damage
- Satellite: Kacific being used for backup; some Starlink?
- Starlink applied for license in 2021; not fully legalized until October 2024
    - Imported equipment must have "type approval import permit"
    - Businesses must pay fee to government for each unit

Challenges to Open Competition

- **Conflicts of interest**
  - **Government investment in incumbent(s)**
  - **Dominance of incumbents in market**
- **Government regulation**
  - **Foreign ownership limitations**
  - **Preferential criteria**
- **Lack of regulation or enforcement**
  - **Interconnection: technical and/or pricing**
  - **Concerns about inadequate privacy and/or security**
  - **Concerns about foreign control of networks**
- **Funding: lack of plans/support for Opex**

Impacts from Technological Disruption: Starlink

"**To go from nothing to having this type of speed in our communities is life changing.**"

Research questions:

- **What difference does rural broadband make?**
  - **How are people using Starlink?**
  - **What are the economic, social, cultural impacts?**
  - **What other factors besides access are important?**

- **What are the implications for policy?**
  - **Operating sustainability?**
  - **Affordability?**
  - **Resilience?**
  - **Redundancy?**

Thank You!

For more information:

hehudson@alaska.edu

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***"Digital Connectivity and Rural Development:
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Telecommunications in Alaska
from Telegraph to Broadband

**Connecting
Alaskans**

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