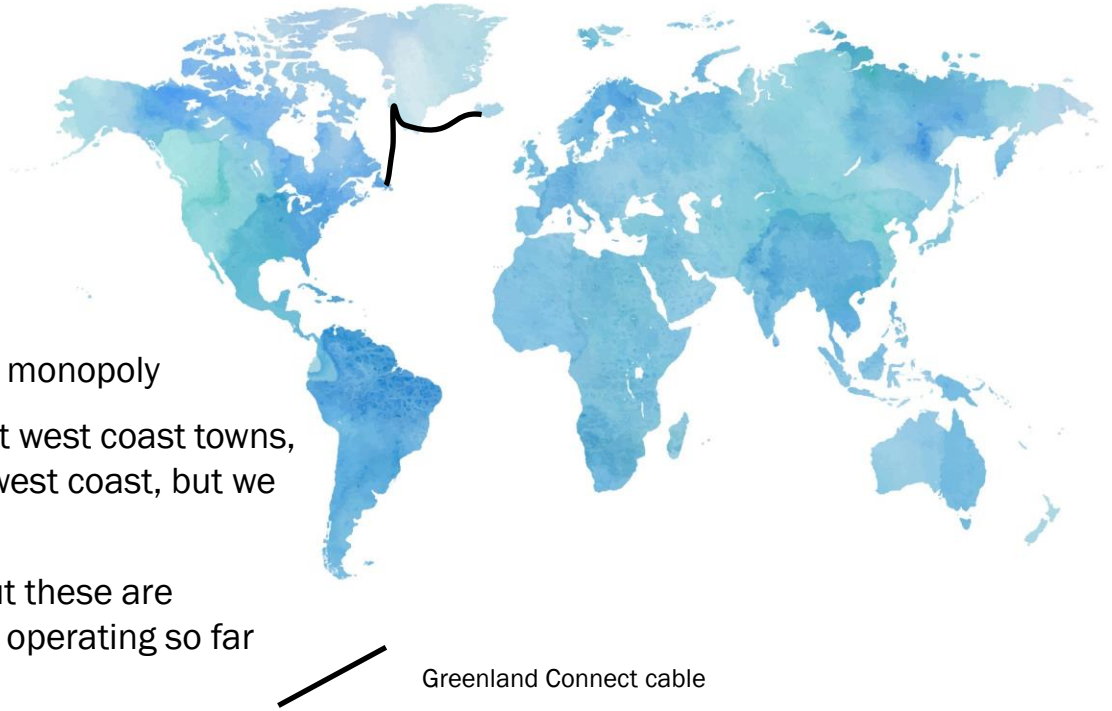
2 October 2023

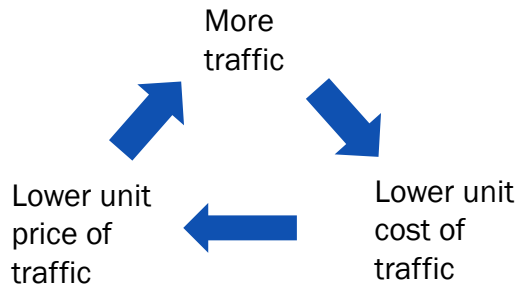
Summary of problem

- Greenland is large, sparsely populated, and highly geographically isolated
  - 2M km^2, 80% covered in ice
  - ~60000 population (of whom ~33% live in the capital Nuuk)
- The fixed internet retail market is liberalized, but mobile communications is still a monopoly
- National connectivity was poor due to extreme conditions (no roads between most west coast towns, for example). It has subsequently been improved via additional sea cable up the west coast, but we do not discuss this further here.
- International connectivity was originally poor, based on GEO satellite solutions, but these are expensive and relatively high latency; these services also need large dishes when operating so far north.
- It was greatly improved by Tusass (former TELE Greenland) 2009 investment in a sea cable linking 2 points in west Greenland with Canada and Iceland. The ~4800km cable cost EUR90M to build.
  - There have been various cable breaks caused by vessels and by icebergs, needing fixes and upgrades to the landing cable segments
  - There is only one such cable and it is owned by the former incumbent, which can be regulated
  - Reported capacity is 128*10Gbit/s * 2 fibre pairs; reportedly 1*10Gbit/s is lit on each pair
- The competing fixed retail players wanted access to this sea cable, to compete in selling broadband Internet services in Greenland



Summary of solution

- In 2011 the Greenlandic telecoms regulator responded to the monopoly control of the sea cable by Tusass, and forced the incumbent to sell:
  - IP Transit (ie connectivity to anywhere on the Internet, provisioned as links over the sea cable plus IP Transit (bought from others, elsewhere)))
  - Leased capacity to Iceland / or Canada
- Prices were set based on a cost model
  - actual costs / actual traffic
  - In effect, TD-FAC, using straight line depreciation
- Within the cost model, commercial traffic from "Canada to Iceland" (not interacting with entities in Greenland) was treated differently
  - There is in effect a market price for "Canada to Iceland" (based on alternative routes across the Atlantic)
  - If this service were priced the same as "Canada to Greenland" + "Greenland to Iceland" then none would be sold (alternative routes from Canada to Iceland would be much cheaper)
  - Instead, the revenue from this "Canada to Iceland" traffic is treated as a "negative operating cost"; the benefits are therefore shared with the buyers of the wholesale services including IP Transit
- As Greenlandic traffic grows, the unit cost of traffic between Greenland and the Internet falls
- But the annual costs of the cable are roughly constant, as the regulator is using "straight line" depreciation, and these annualized costs are in effect being shared by the Greenlandic broadband subscribers
- This means that, all other things equal, although the traffic is growing and end users connected to the sea cable are receiving a much more capable service, unless the total number of Greenlandic broadband subscribers grows, each year the subscribers tend to face the same high monthly costs for the International component (ie their Internet connectivity is better, but not cheaper)



- The higher quality (higher traffic per subscriber) may lead to modest increases in broadband service takeup, and these may in turn lead to some decreases in the unit costs of broadband

Lessons for this workshop

- 1) It is possible to cost such services
- 2) If you are a small or isolated country then the unit costs of carrying your traffic to the Internet (or the costs per subscriber) may be intrinsically high (though maybe lower than those faced by Greenland)
- 3) Aggregated traffic can be carried much more efficiently
- The problem in Greenland is that the traffic of the 60k population needs to be carried over 1500 km (either east or west) to get to major node infrastructure shared with (say) tens of millions of subscribers (or more), and it doesn't join up with the traffic of millions more on the way
  - By comparison, traffic leaving my desk in Cambridge will be aggregated with that of ~ 70 million people, and at a major node in London, within ~80km
    - (via a series of intermediate points bringing together traffic from other towns and cities)
    - >10 times less far to get to a major node and
    - ~10-1000 times more subscribers sharing (part of) the costs to get to that major node
- 4) Price control based on the cost model was an option in this case; whether it is feasible or advisable in a given case will be highly case-specific
- 5) Using the price control did not actually decrease the costs: it just made it possible for the altnets to compete with Tusass to provide broadband Internet services in Greenland

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