



Teleinfrastructure of Greenland

-Extreme conditions on the Worlds Biggest Island

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CTO

tusass

A wide-angle photograph of a mountainous landscape, likely in Greenland. In the foreground, dark, rugged peaks are partially covered in snow. A large, light-colored mountain peak rises prominently in the center. To the right, a deep blue fjord or bay stretches towards the horizon, framed by more mountain ranges. The sky is overcast with soft, grey clouds.

Telecommunications infrastructure in Greenland

- Submarine cables
- Tusass Strategy
- Satellites

Name
Title

A changing world

New threats, new risks, and new opportunities

- Global pandemic
- War in Europe and a new world order
- Cyber threats
- Climate change
- Technology changes the world, and we also change
- Digitalization and disruption

Extreme weather conditions cause special challenges for telecommunications infrastructure

- Radio chains experience ice accretion
- Technicians threatened by polar bears
- Postal workers defy half a meter of daily snowfall
- Cargo delayed for days due to pack ice in North Greenland

Based on a solid business model and a robust organization, Greenland's reliable supplier of telecommunications, Tusass, constantly adapts



- Tusass connects the 56.000 inhabitants of Greenland. Spread out over an area the size of Europe



Here at 1600 meters above sea level on the Qinngaaq Mountain



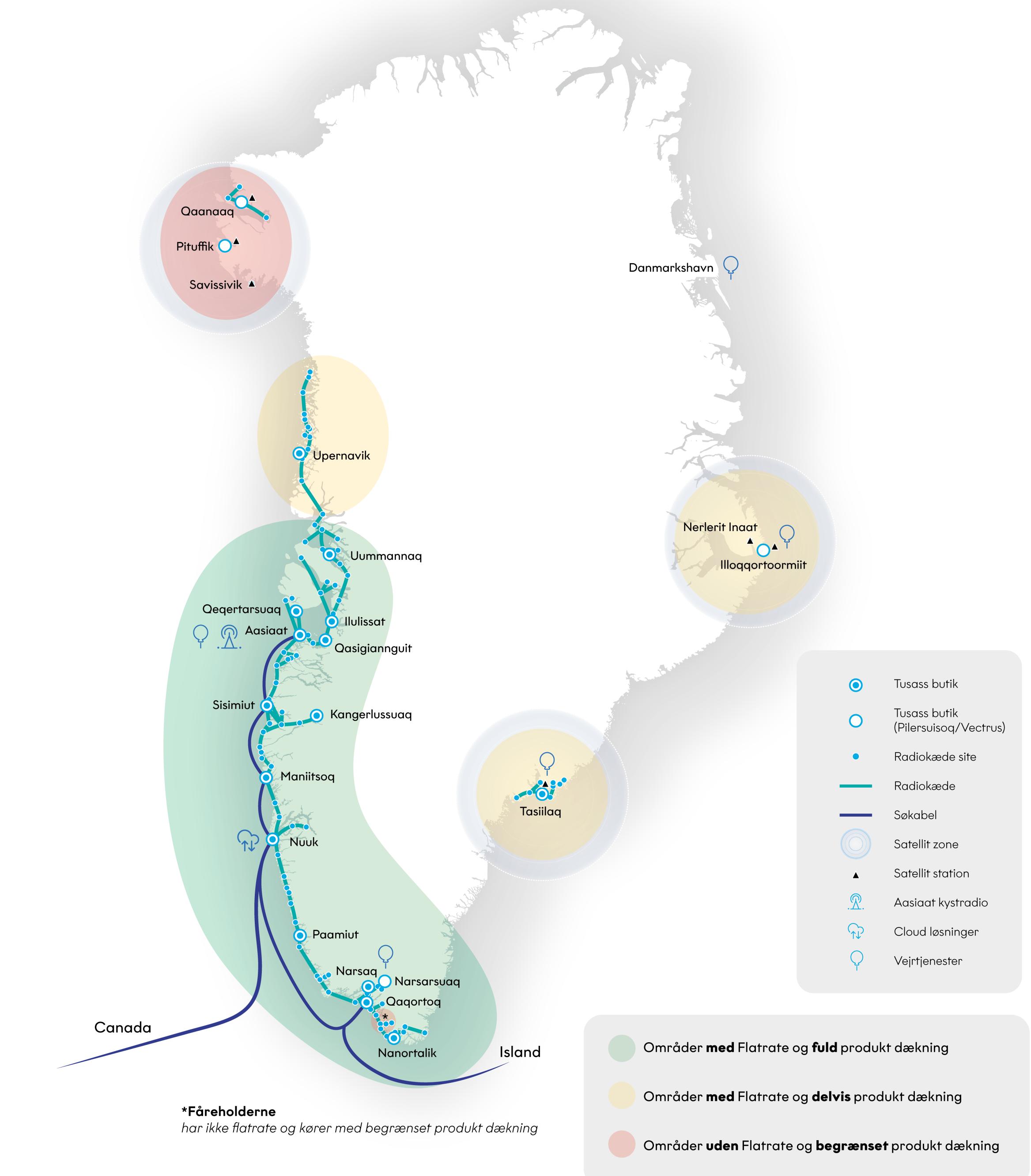
And all the way to a depth of three kilometers

Greenlandic telecommunications infrastructure

- ✓ Securing telephony and internet connections to all of Greenland. Security of supply is the main concern
- ✓ Infrastructure constantly expanded, securing connections that enable delivery of up to date, relevant products for customers

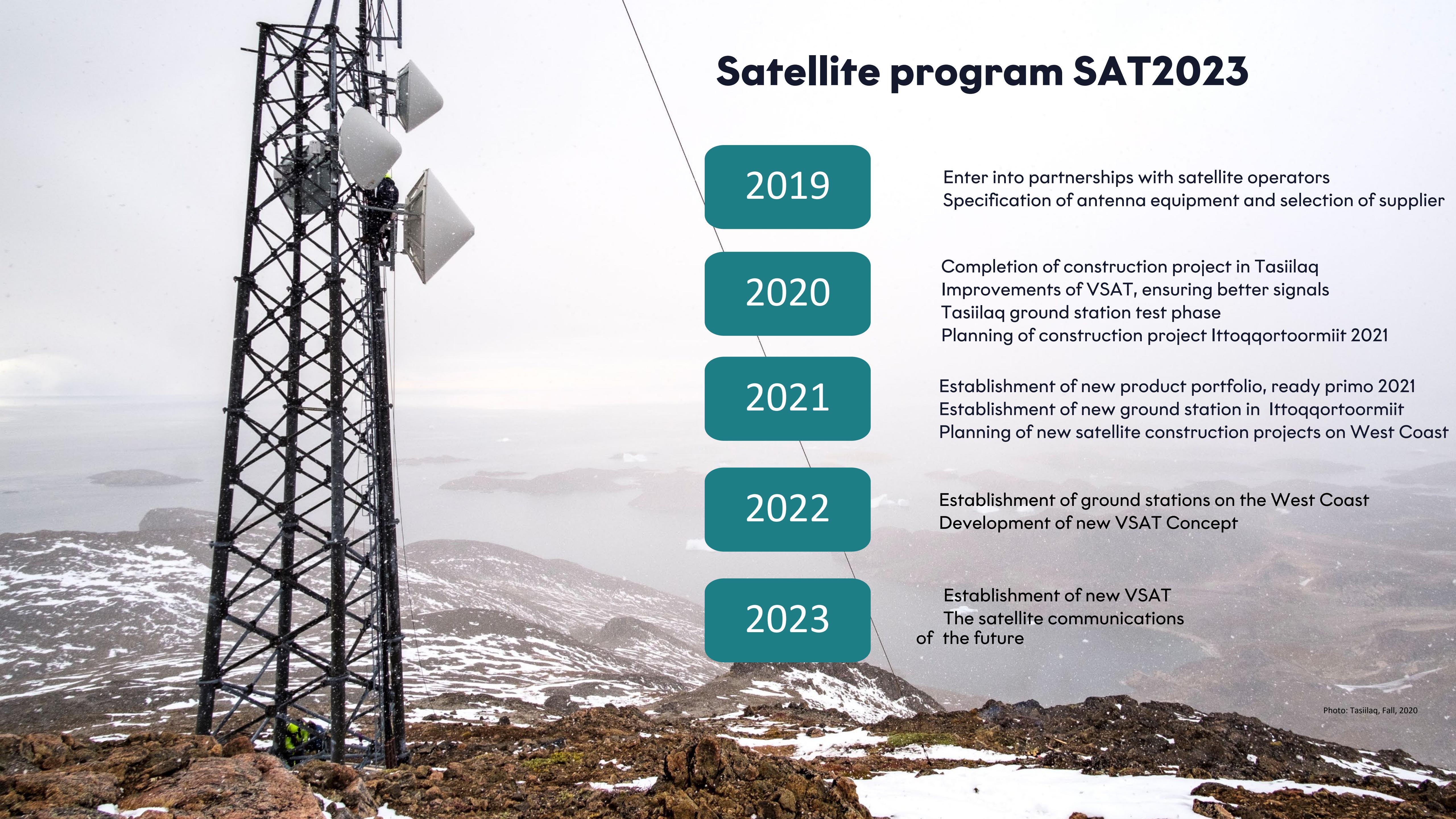
Tusass' infrastructure

5.404 km		Submarine cable
1.710 km		Radio chain of 57 sites
2		Satellite accords
98,3 mio.		DKK. Investments in 2021



Arctic satellite program 2020-2023 (SAT2023)





Satellite program SAT2023

2019

Enter into partnerships with satellite operators
Specification of antenna equipment and selection of supplier

2020

Completion of construction project in Tasiilaq
Improvements of VSAT, ensuring better signals
Tasiilaq ground station test phase
Planning of construction project Ittoqqortoormiit 2021

2021

Establishment of new product portfolio, ready primo 2021
Establishment of new ground station in Ittoqqortoormiit
Planning of new satellite construction projects on West Coast

2022

Establishment of ground stations on the West Coast
Development of new VSAT Concept

2023

Establishment of new VSAT
The satellite communications
of the future

Qaanaaq 2023

Flatrate internet in North and East Greenland -
Traffic reverted to Greensat in 2023

- 4/1mbps for Tusass customers in satellite towns
- Data delivered via LTE 4G FWA
- Supply coverage for VSAT, Mines+EBL
- Other customers



Possible future solutions

Work is being done to investigate alternative satellite solutions to cover Greenland after the 61W capacity is used up, as well as redundancy. Primarily the following solutions:

- OneWeb
- Space-X
- O3b – M Power



Submarine cables

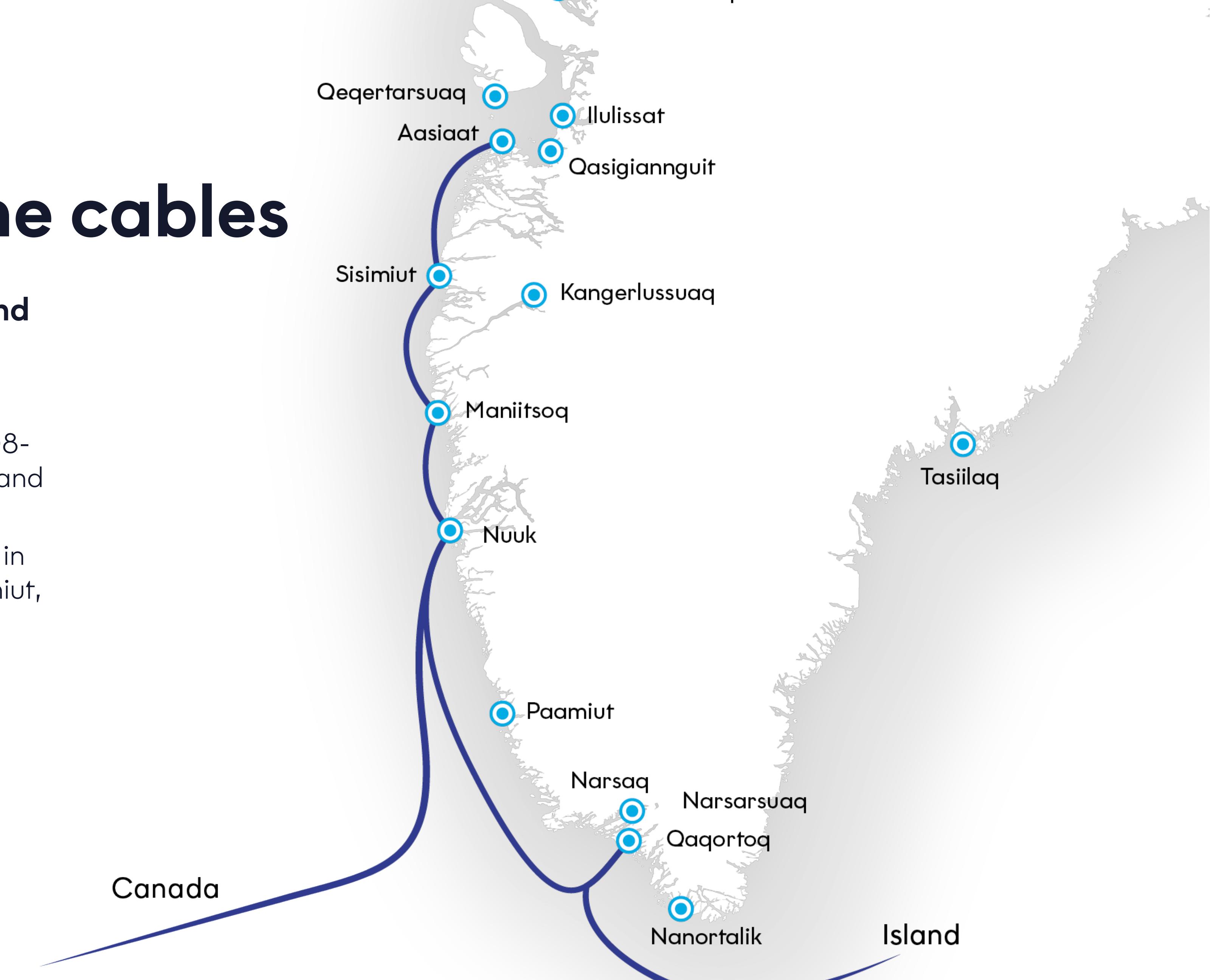
The digital umbilical of Greenland
"Kalaallit Nunaatta Taqarsuq"

Current submarine cables

Tusass has two cable systems, Greenland Connect, 5.400 km. In length

- Greenland Connect was established in 2008-2009 and connects Greenland to Canada and Iceland
- Greenland Connect North was established in 2017 and connects Nuuk to Maniitsoq, Sisimiut, and Aasiaat

The cable systems are exposed to errors and breaches



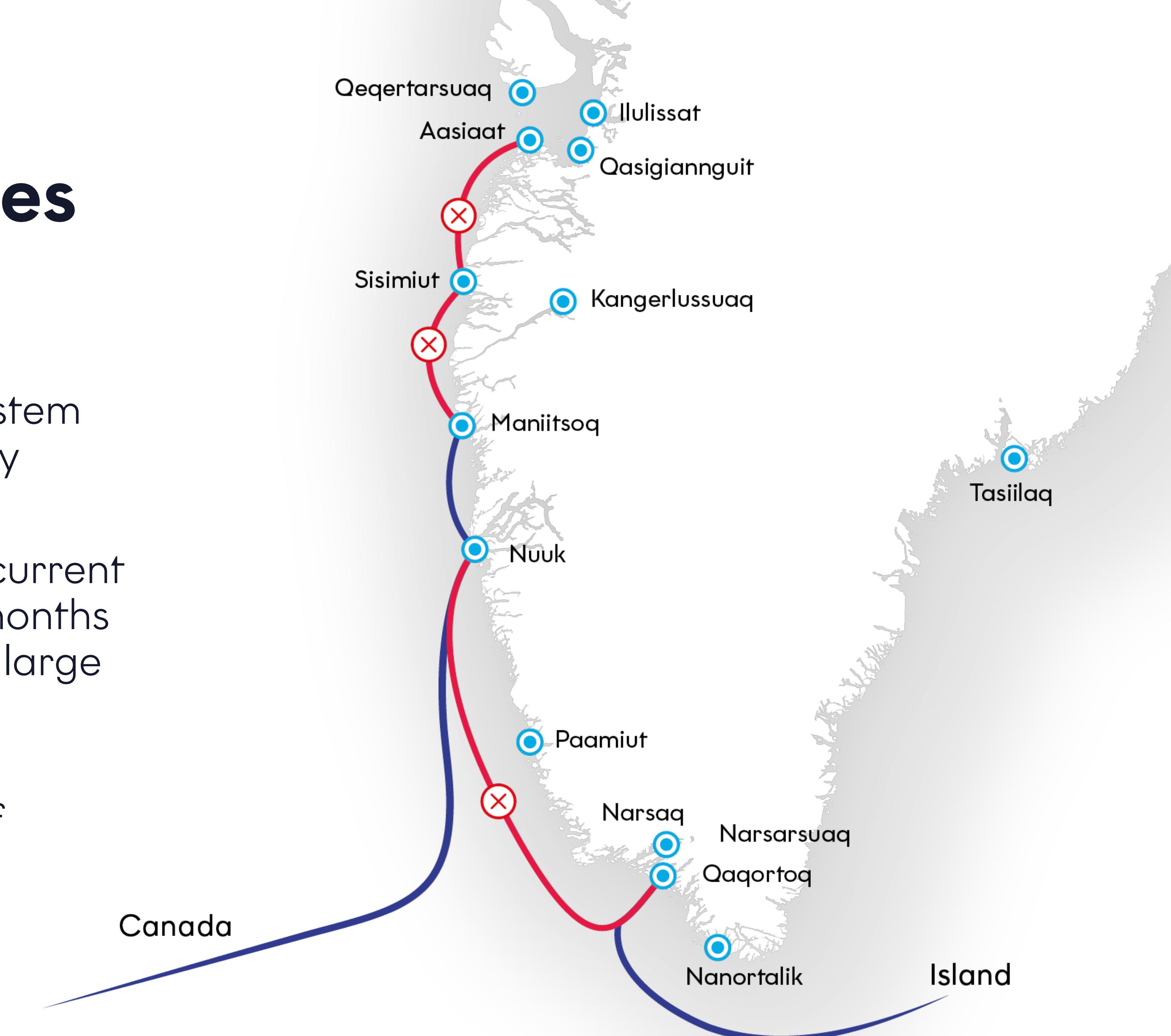
Stability challenges

Limitations of present redundancy

The present submarine cable system offer limited levels of redundancy

In 2019 Tusass fought three concurrent cable errors, which resulted in months of reduced quality of service for large parts of the population

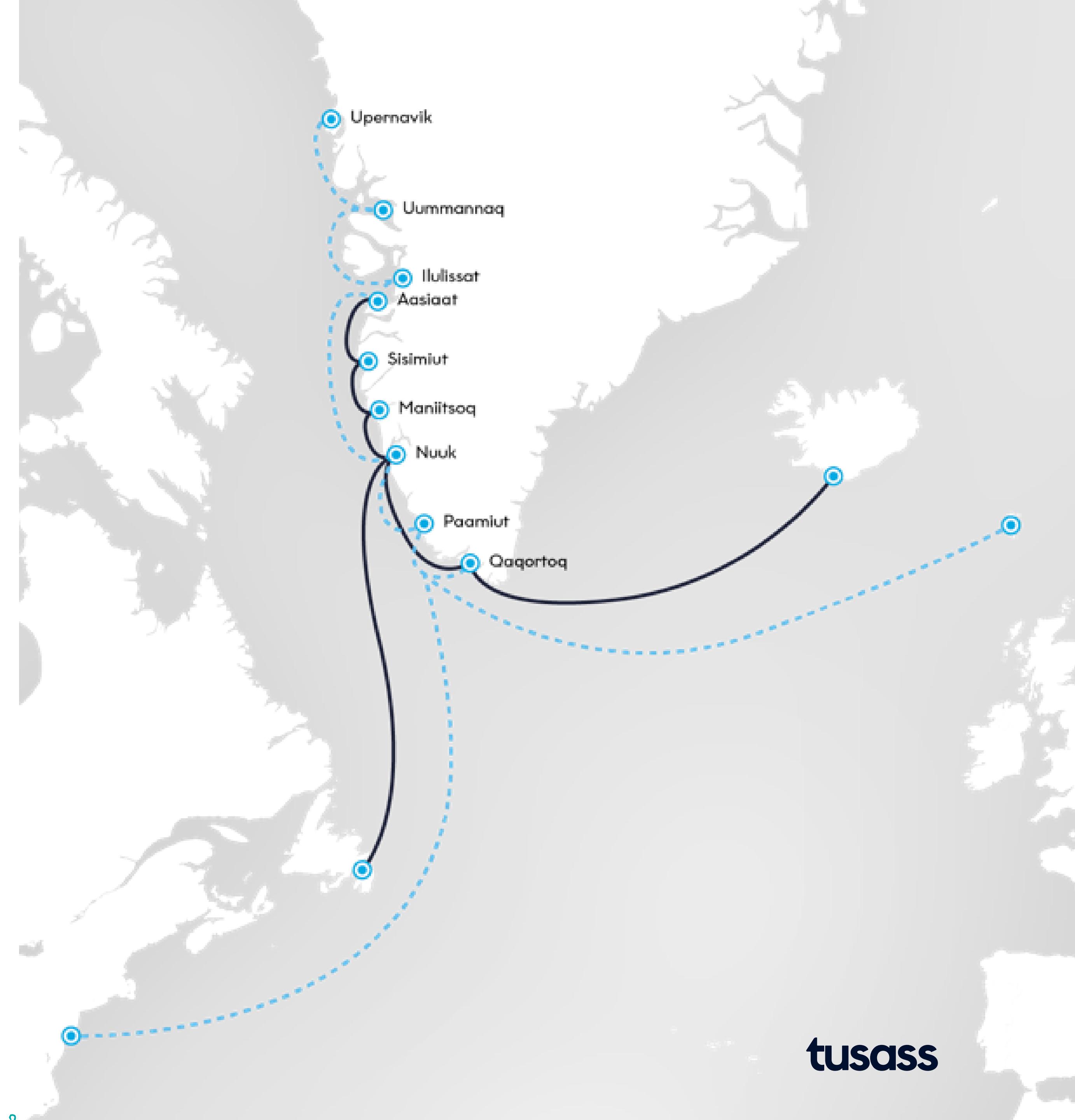
Society is increasingly afflicted if internet services are affected



Redundant connections

New satellite solutions and submarine cables

- Increased security of supply
- Greater data capacity
- New business potentials
- Involvement of stakeholders
- Prerequisite for digitization and societal development



Visions for the development of submarine cable systems in Greenland

Tusass has a long term vision for the development of submarine cables in Greenland

National connections

- Increased redundancy
- Expansion of coverage

International connections

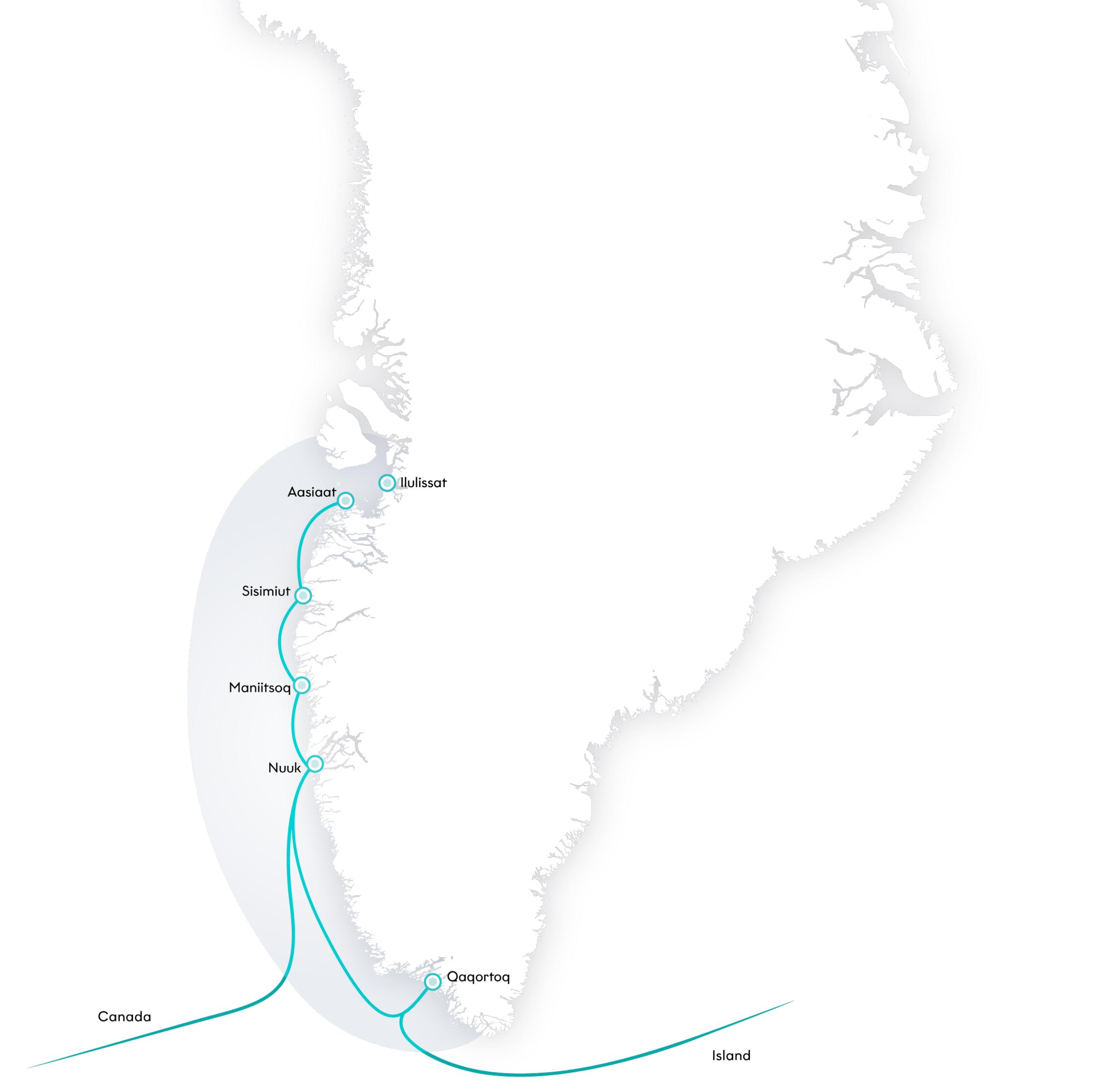
- OS
- EU
- Asien?

The common denominator for further expansion is that financing and time frame is yet to be determined.



Seabed study with EU support of DKR 66 million.

The project will take place in 2023 and is a study of the seabed along the west coast of Greenland, which is prior to being able to build new submarine cables.



Co-funded by
the European Union

tusass