

> The Deaconesses' Foundation



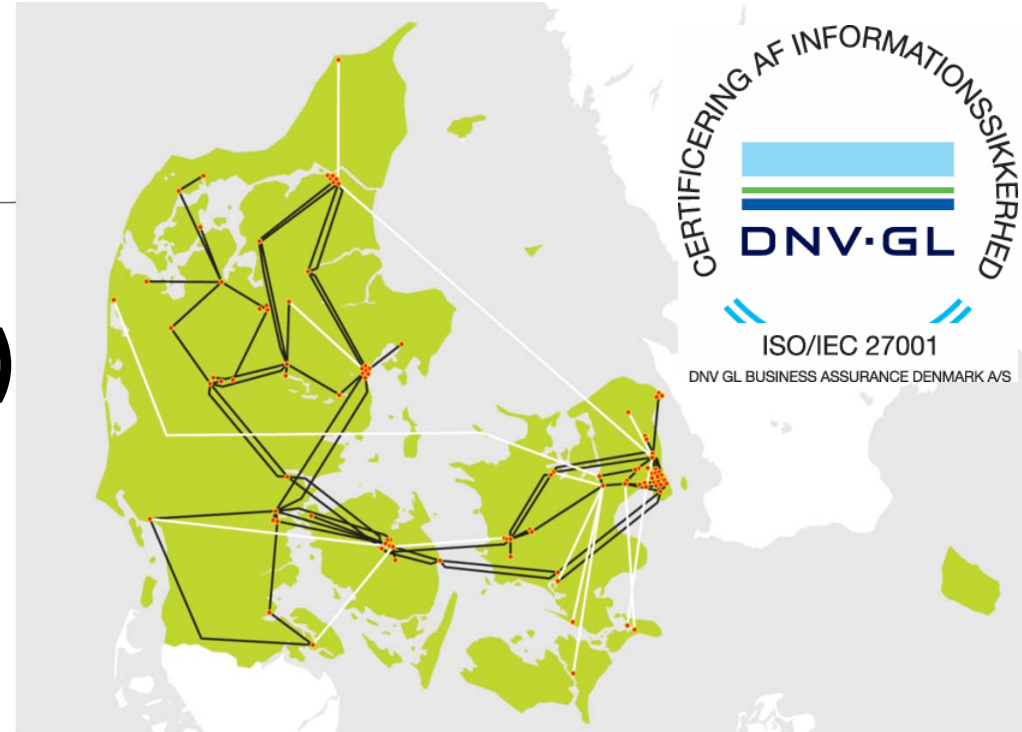
DIAKONISSESTIFTELSEN

- > A protestant equivalent of nuns working in healthcare
- > Established in 1863 (These buildings were ready from 1876)
- > Bachelor of Science in Nursing
- > Bachelor of Christianity, Culture and Communication
- > Social and Health Care Education (SOSU)
- > Produce sacramental bread for the whole of Denmark (and for export)



> DeiC NREN (Forskningsnettet)

- Short overview
- Priorities 2024



SIG-MSP, Copenhagen

13th March 2024
Head of NREN Martin Bech
martin.bech@deic.dk

> DeIC as a whole

> DeIC = Danish e-Infrastructure Consortium

Four main areas of infrastructure

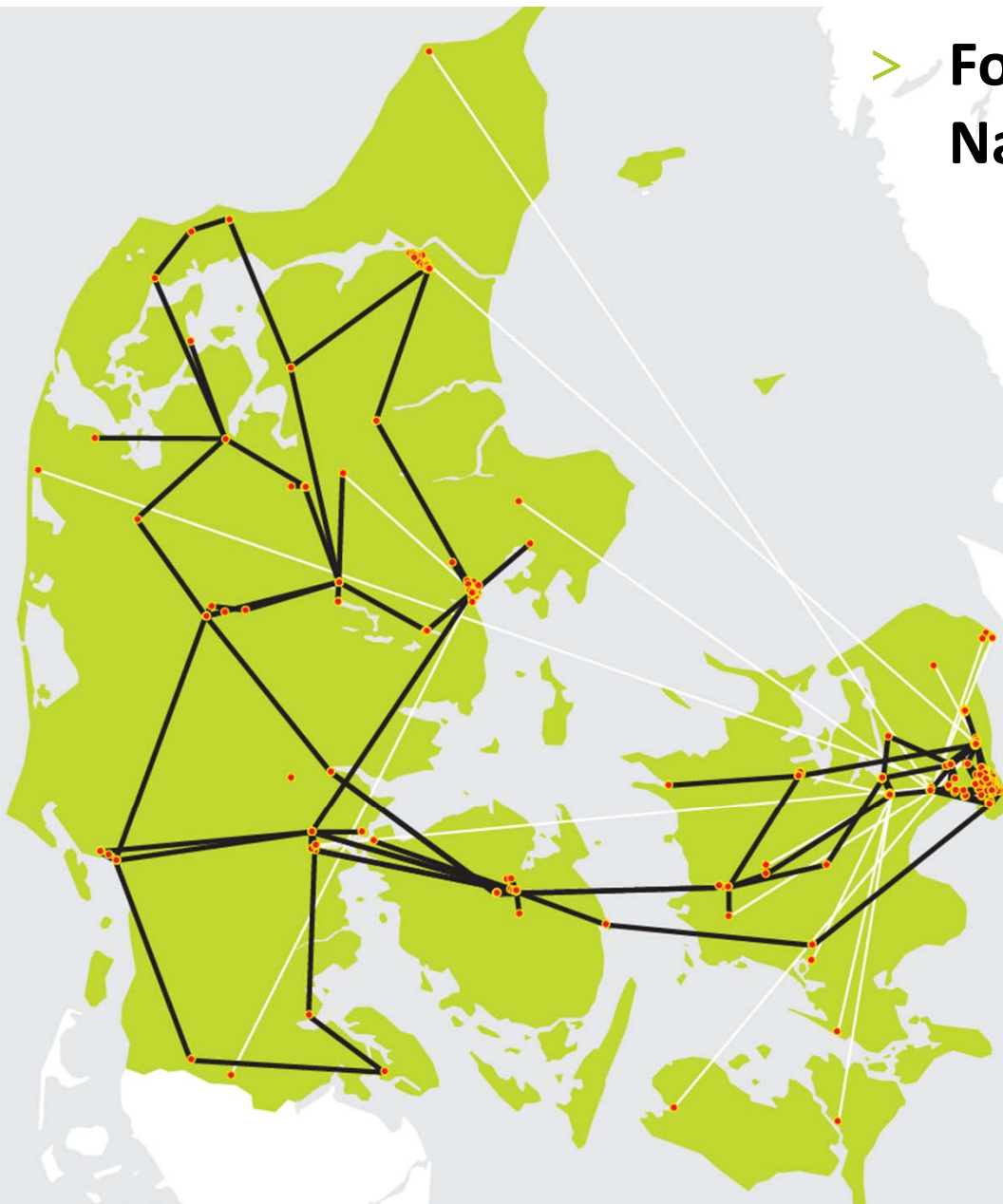
- > HPC
- > Data Management
- > Quantum initiatives
- > NREN and services



> Forskningsnettet: National backbone network

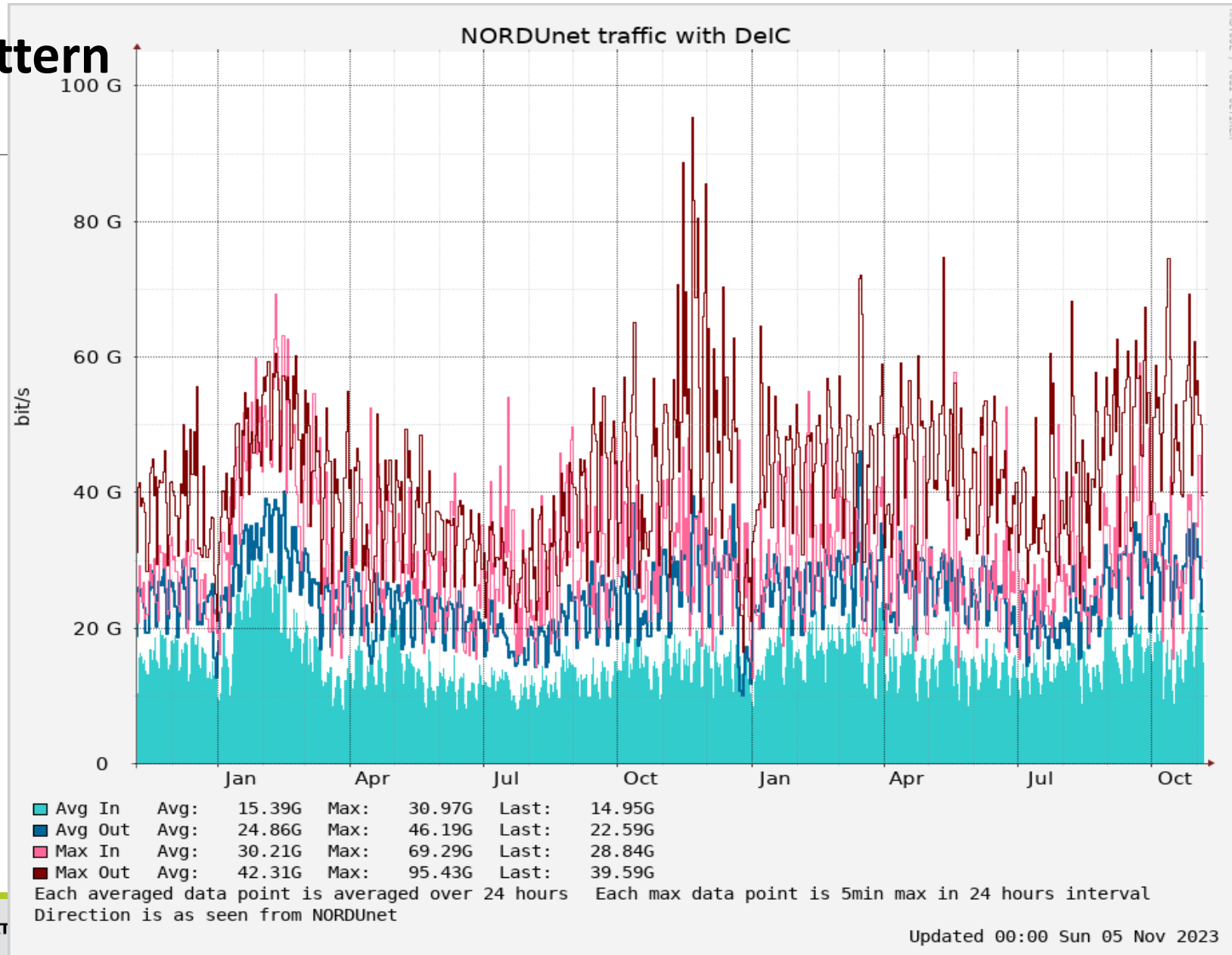
- > 354 locations
- > 4371 km dark fiber
- > 327 dark fiber connections
- > 31 telco MPLS connections
- > 24 ECI ROADM nodes
- > 17 PanDacom sites
- > + passive WDM
- > 106 routers/switches
- > Cost (incl. depreciation):
2023: 3,5 M€ 2024: 3,8 M€

Type	n/a	0.1 G	0.5 G	1 G	2 G	10 G	40 G	100 G	200 G	Total
Core	2	8	0	12	0	62	6	12	0	102
Cust	3	0	0	64	0	109	0	4	0	180
Intern	21	0	1	30	1	122	0	13	1	189
n/a	0	0	0	6	0	4	0	0	0	10
	1	0	0	1	0	1	0	0	0	3
Total	27	8	1	113	1	298	6	29	1	484

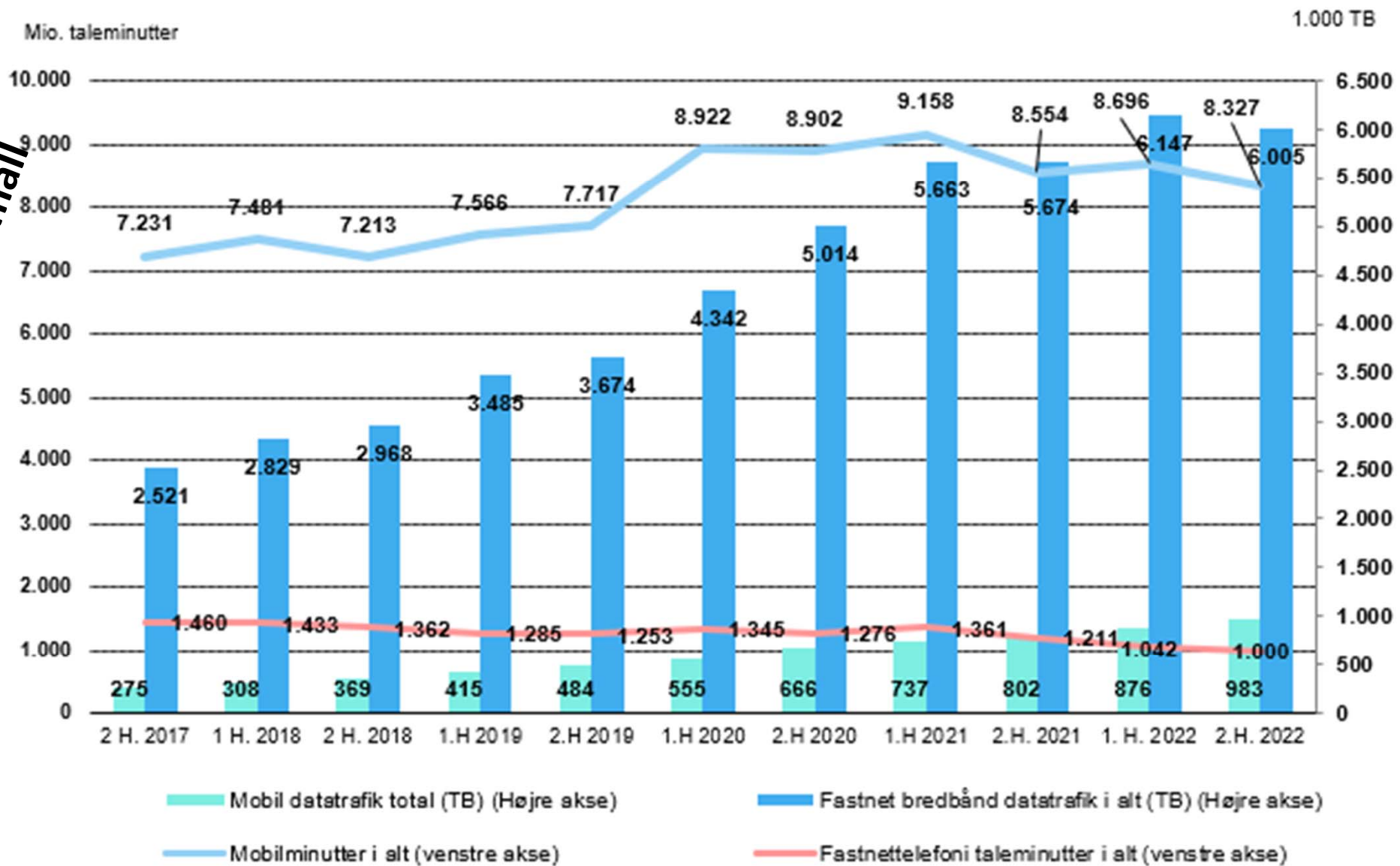


> New traffic pattern after Covid

> But still a growing tendency



Afgående taleminutter og bredbåndsdatatrafik



As opposed to commercial telcos that experience a small decrease in traffic



> **Bornholm has always been on the map**
...but not connected by the NREN until now

> Bornholm is ready for service some time in 2024

- > Sweden-Rønne-Sassnitz
- > (Partly) thanks to GN3-5N



> Foto: GC

Nu bliver Bornholm tilsluttet nyt hurtigt internet



Foto: TV 2/Bornholm

En specialfartøj er begyndt nedlægningen af over 500 kilometer kabel, der skal koble Bornholm til en ny højhastighedsforbindelse, som virksomheden bag, Global Connect, selv kalder for Nordeuropas nye digitale motorvej.

Af: Martin Poul Gangelhoff Hansen

Udgivet: 13.07.2022

kl: 18:38



Besøgende på Galløkken i Rønne har hele onsdagen kunnet se et 87 meter langt skib med hejst kran.

- Vi trækker et fiberoptisk kabel fra Bornholm til Sassnitz i Tyskland, fortæller Tony Petterson, der er projektleder i Baltic Offshore, som ejer skibet Pleijel, der er specialdesignet til netop nedlægning af fiberoptiske kabler.

Det svenske firma Baltic Offshore er hyret af virksomheden Global Connect, som også er svensk og en af Nordeuropas førende virksomheder indenfor datakommunikation.

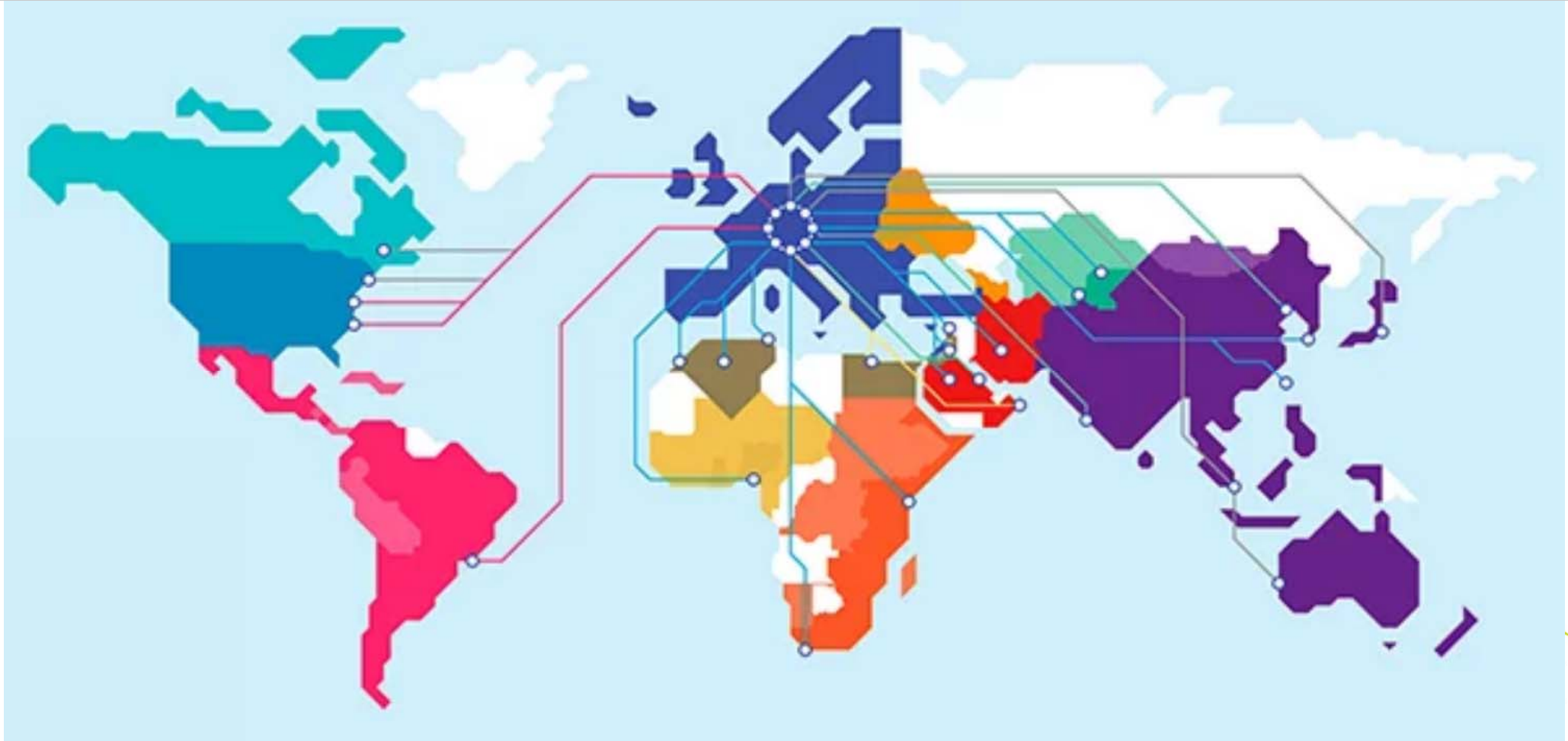
Global Connect står i spidsen for at lægge højhastighedsinternet i form af fiberoptiske kabler mellem Berlin og det nordlige Sverige, hvor der ligger en del store datacentre. Og undervejs lægger Global Connect også afstikkere til andre dele af Østersøen - og det er disse kabler, som nu bliver koblet til Bornholm via en landtilslutning.

> **Greenland has a telco monopoly infrastructure today**

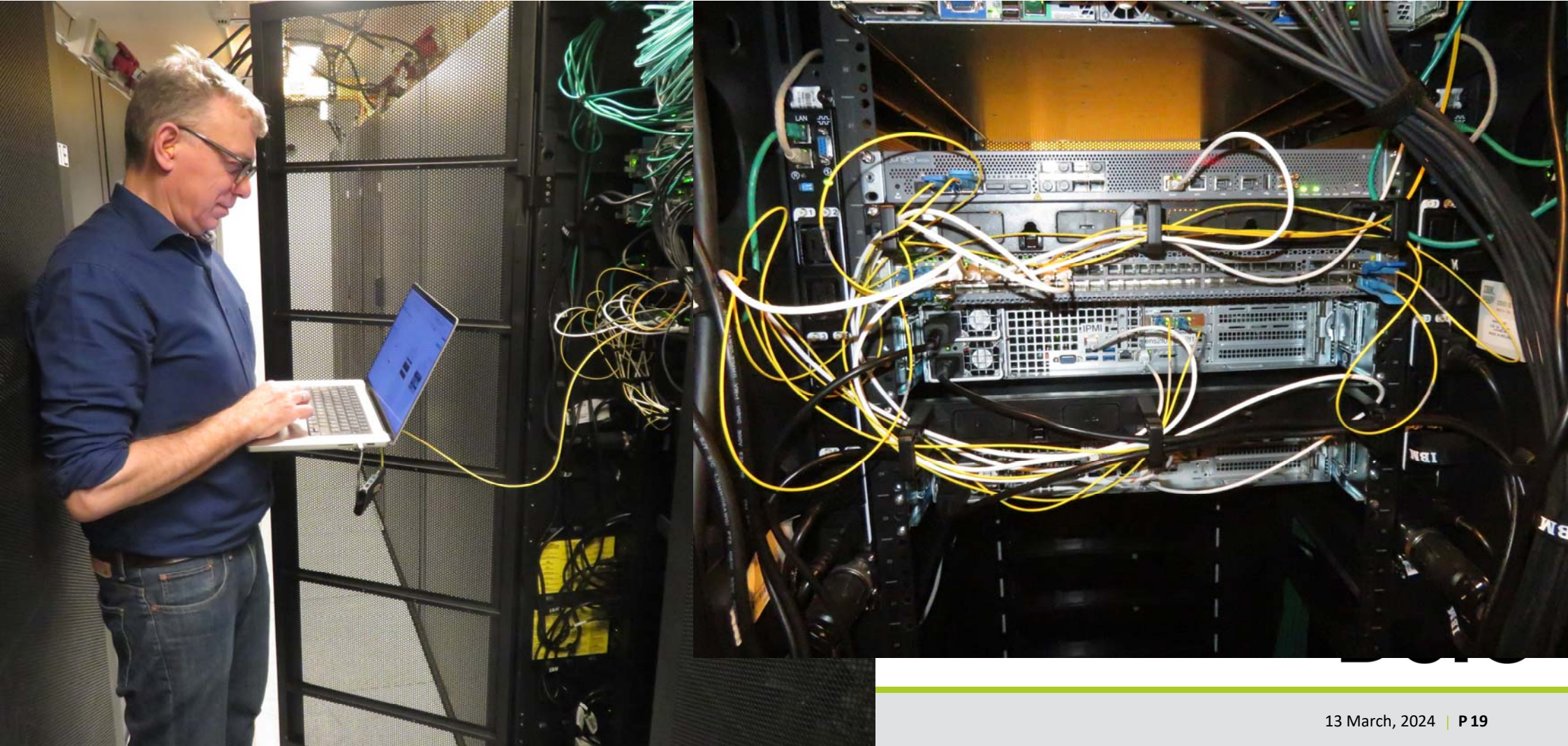
- > Tusass offers a GSM service
- > ADSL is gradually phased out
- > WiMax/WiFi coverage of cities/settlements



- > **Greenland was one of the last countries in the world without NREN services**



> Installation of our PoP in Nuuk

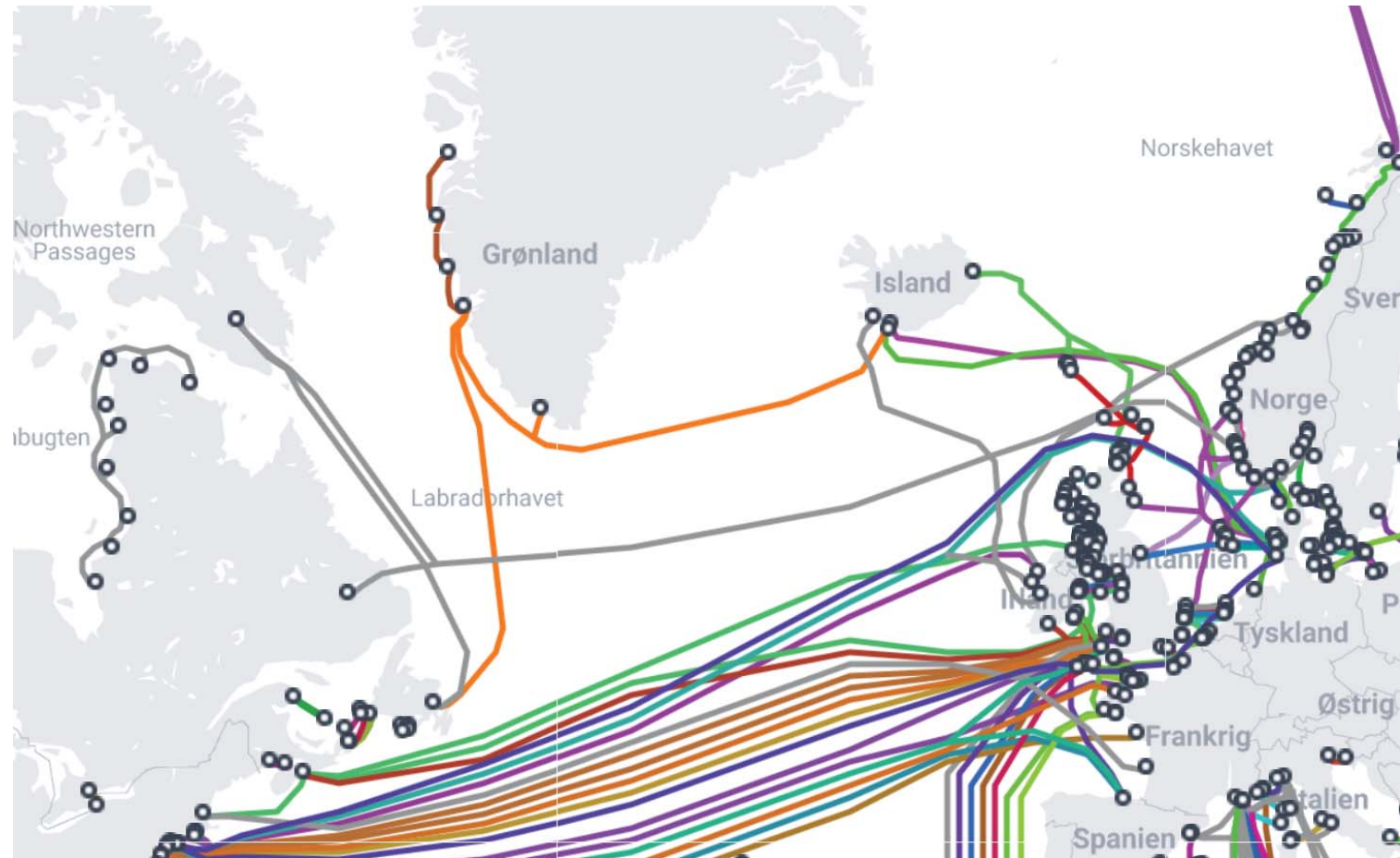


> With Tusass in Nuuk



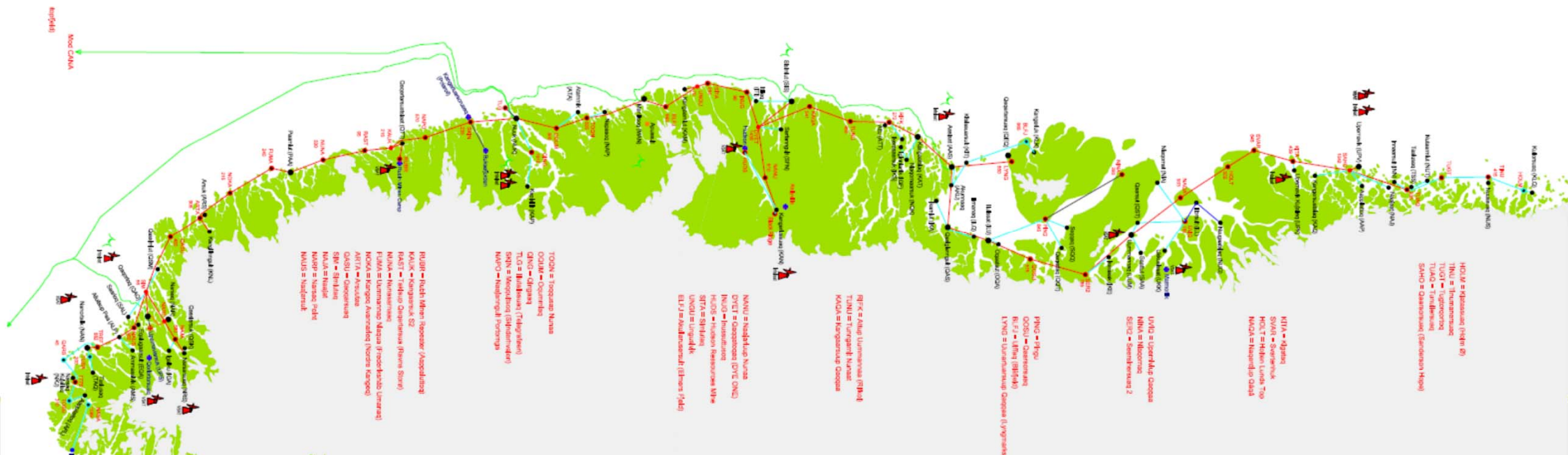
> Connection via the two submarine cables

- > Connections to Ballerup and Secaucus, NY
- > Landfall in 5 places: Qaqortoq, Nuuk, Maniitsoq, Sisimiut, Aasiaat
- > Every landfall is expensive and difficult as it requires drilling a tunnel inside the bedrock that emerges on the sea floor at 450 meters of depth



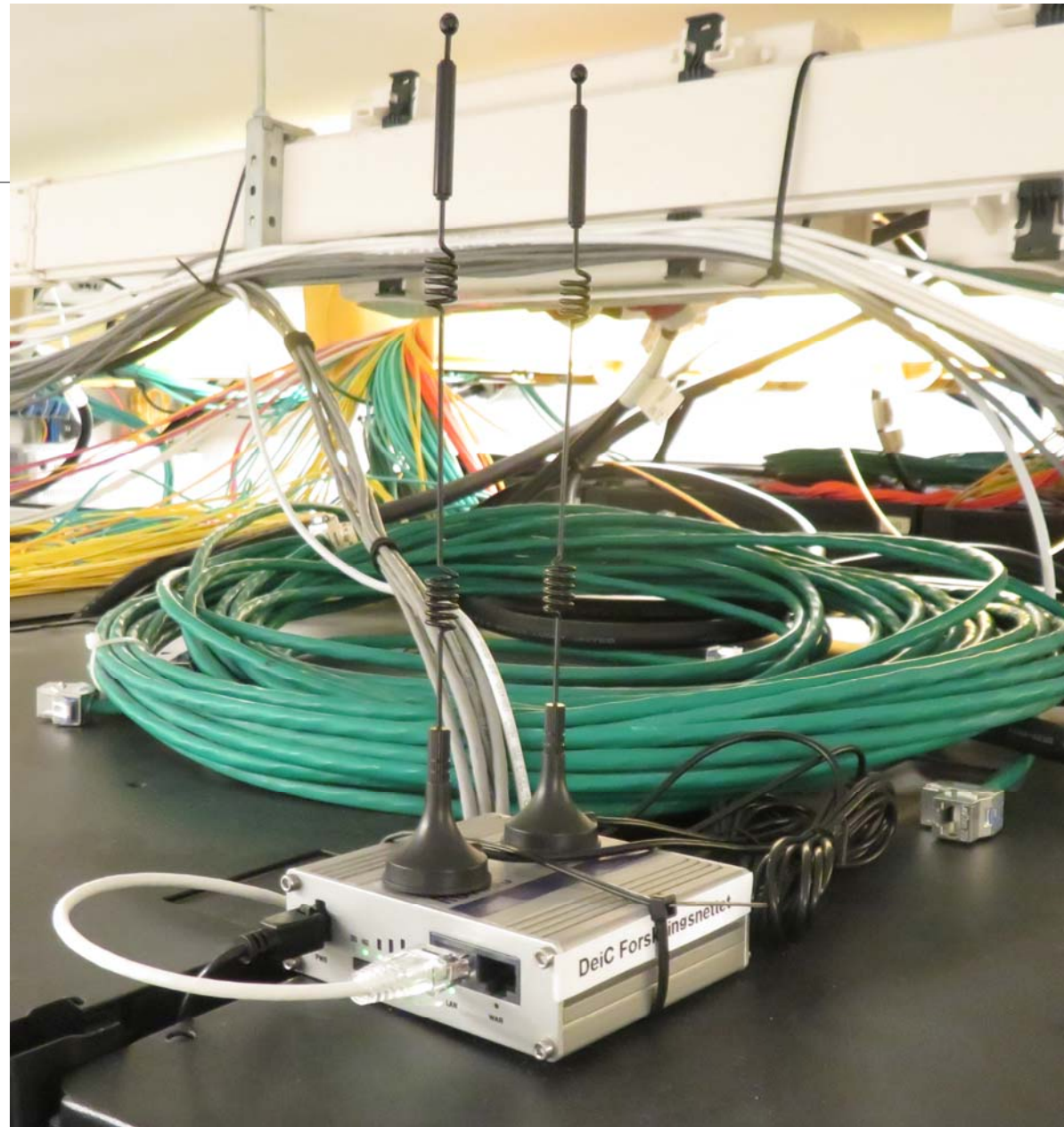
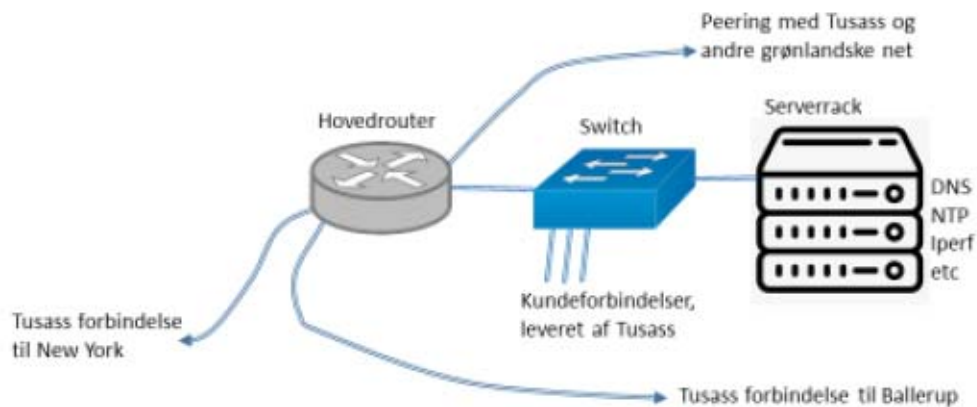
> Grønland today: A long radio chain on the west coast

- > All other cities/settlements on the west coast are served by a long structure of radio links 300Mbps -> 10Gbps
- > (Mostly) double antennas, but essentially only one chain



> What did we install?

- > Double connection to Denmark – normally 62ms away
- > Central router (192.38.3.255)
- > A /22 pool of IP-addresses (AS 212543)
- > A Switch
- > Servers with basic services (DNS, NTP, iperf, speedtest, web, etc)
- > ...and when the main connection is down, we have a 3G modem as back door



> What do we offer:

- > A 100Mbit/s connection (shared among all Greenland NREN users) from around 6800 €/år
- > (Even) smaller bandwidths at lower prices
- > Everywhere in the Tusass coverage area
- > Connection to the world's NREN are significantly better than those of Tusass
- > Enabling institutions to have IT-support "like in Denmark"
- > Guaranteed service levels and quality for Zoom, data transfer etc.

- > This also includes the other bundled NREN services (like in Denmark): WAYF, FileSender, eduroam, DKCERT m.fl



> Who are the possible users?

- > Institutions with buildings: Sisimiut, Disko Island, Nuuk
- > Field stations
- > Automatic measuring equipment
- > Satellite downlinks

Such as:

- KU, DTU, AU, SDU
- Ilisimatusarfik (Grønlands Universitet)
- Pinngortitaleriffik (Grønlands Naturinstitut)
- GEUS og ASIAQ (Greenland Survey)
- DMI (med mange stationer)
- EUMETSAT, ESA og CNES
- Nunatta Katersugaasivia Allagaateqarfialu (Grønlands Nationalmuseum & Arkiv)
- Den arktiske forskningshub



> Some remote locations/projects can *not* benefit

- > Tusass only covers populated areas. Otherwise you need to use Iridium and the new LEOsat services (OneWeb, Starlink etc)
- > In principle, all services are to be procured through Tusass, but we are working on a scheme to authorise use of bring-it-yourself equipment



> Joint procurement for satellite services

We try to invite all NRENs interested in this, to have a joint procurement for satellite services:

- > LEOsat operators (Starlink, OneWeb, Telesat)
- > Iridium
- > Maybe VSAT services

Do your institutions have activities that could use this?



> Services today (beyond the network itself)

Tjenester

- > Netnære tjenester: NTP, DNS, DNSSEC, dnsadm, Mail-Relay, måling, fejlfinding, statistik
- > DDPS – DDoS beskyttelse
- > eduroam – wifi-opkobling overalt
- > eduVPN – open-source VPN til Forskningsnettet og til din institution
- > WAYF
- > FileSender
- > Serviceinfo
- > Medie- og samarbejdstjenester - Zoom, Kaltura, Panopto
- > Amberscript

DKCERT tjenesterne

- > Incident Response
- > Fælles MISP
- > Nyheder & advarsler
- > Scanninger – også interne
- > DPO-tjenesten

Projekter

- > GÉANT
- > Fælles projekter i NORDUnet
- > eduVPN udvikling
- > EuroQCI
- > PolarConnect
- > (Satellittrafik)

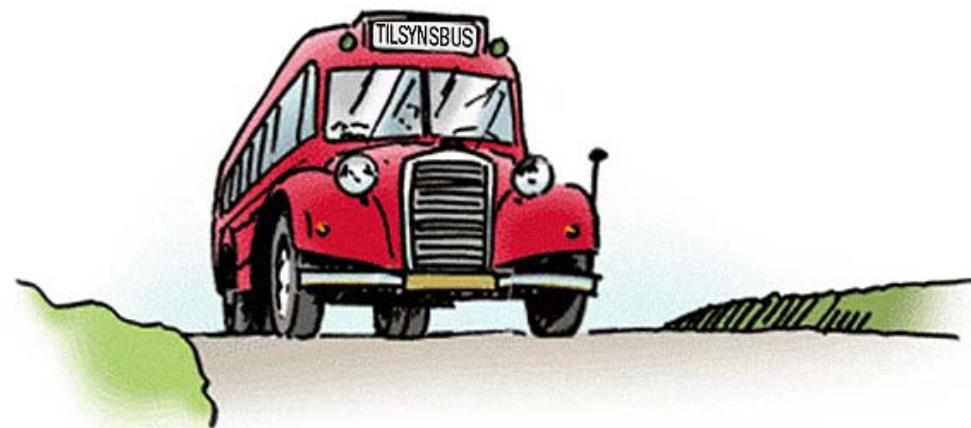
Fælles indkøb

- > Certifikater
- > OCRE - Cloud Rammeaftaler
- > LMS-rammeaftale



> The Audit Bus

- > We have DPAs for many services
- > Institutions demand audits/inspections individually
- > Needs considerable resources
- > We found a way to rationalize this:
- > One common audit per service for everyone
- > Based on questions/themes collected in a survey among the institutions
- > Like an "omnibus" survey
- > Good experiences so far

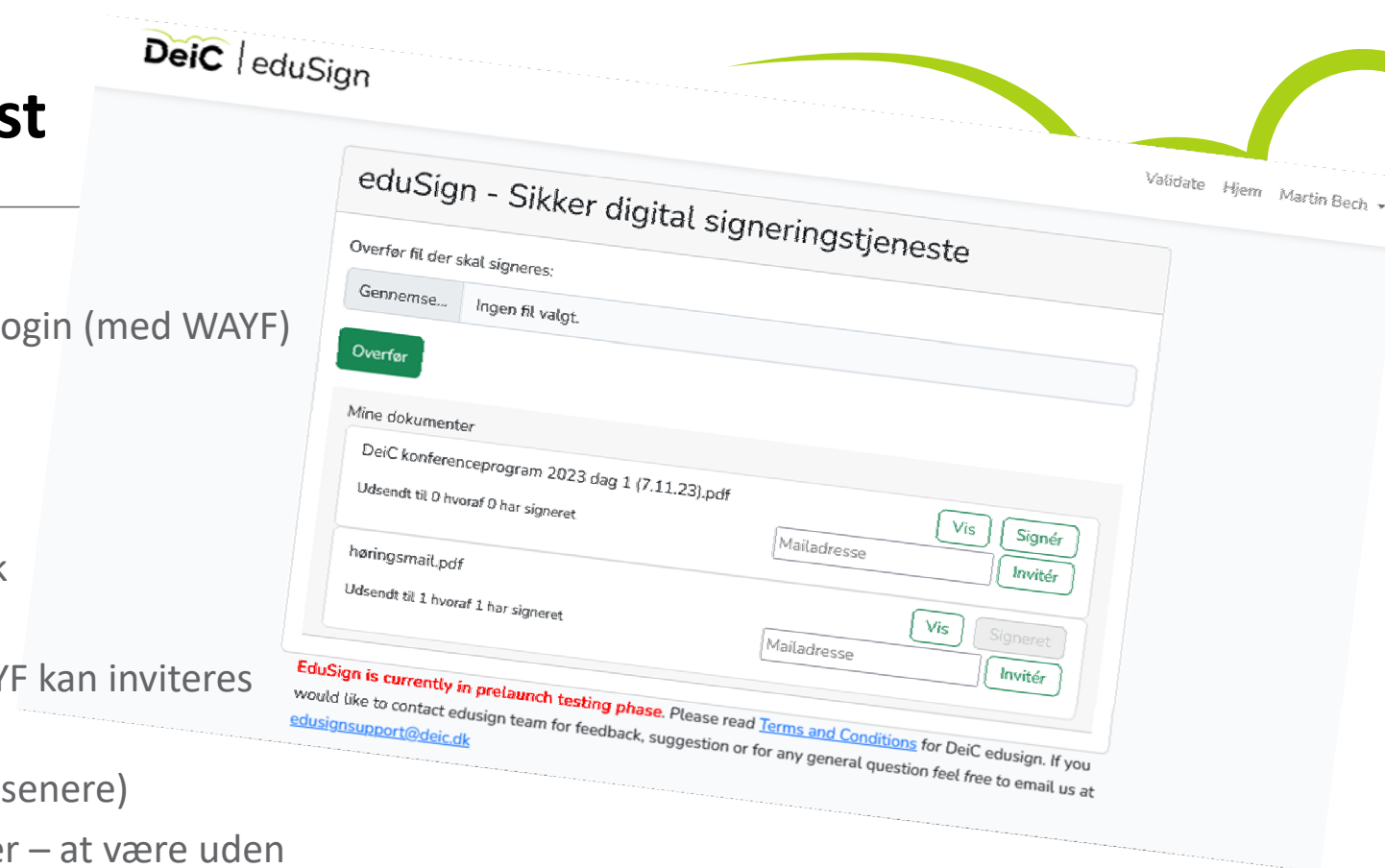


> eduSign in pilot test

Signing of PDF documents

- > Baseret på institutionernes eget login (med WAYF)
- > Licens- og reklamefri
- > Open source
- > Uden betaling
- > Med dansk infrastruktur og dansk databehandleraftale
- > Eksterne parter som ikke har WAYF kan inviteres via e-mail
- > (Integreret med MitID – kommer senere)

Tjenesten tænkes – lige som FileSender – at være uden særskilt betaling, men kræver selvsagt at brugerne har et WAYF-login



> **Current priorities**



- > First of all: Most resources and attention goes to the daily operations of everything

Development goals:

- > Greenland, Bornholm and other **extensions**
- > A new **measurement** regime for operational efficiency
- > New initiatives in **cyber security**
- > Hardening the infrastructure in light of the **new threats**
- > **Quantum and T&F** initiatives
- > Expand the scope of our **ISO27001** certification
- > Renewal of our portfolio of **media** services
- > **Green** accounting



> Operational efficiency (SLA) – how to measure

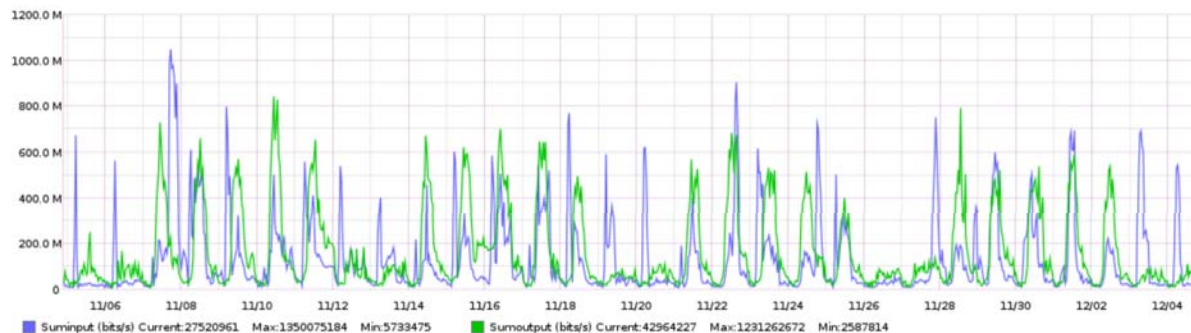
- > We offer our user an SLA and thereby promise minimum operational efficiency (uptime) for all service. Generally, we meet those targets.
- > Historically, however, we have not measured this exactly for all circuits we provide.

The aim is to be able to answer questions like:

- > Where do we "bother" the user most?
- > Which fibre or telco link performs worst?

The idea is that we can use this in a more data-driven and quality management of our network and services

Latest month



130.226.136.182
130.226.214.166
172.22.150.1
172.22.150.216
172.22.150.4
172.22.150.8
172.22.199.37
172.22.199.68
172.22.199.69
172.22.2.60
172.22.2.61
172.22.2.62

99.993000 oppe i seneste år
99.997000 oppe i seneste år
99.868000 oppe i seneste år
100.000000 oppe i seneste år
100.000000 oppe i seneste år
99.932000 oppe i seneste år
99.924000 oppe i seneste år
99.924000 oppe i seneste år
99.922000 oppe i seneste år
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> Performance vs. SLA

- > Our SLA is calculated for each calendar quarter
- > Just like it is in the contracts we have with our suppliers
- > We give ourselves a margin of one measurement (10 minutes)
- > Calculation of one single number doesn't make sense
- > But we can find the most problematic connections

	2022Q1	2022Q2	2022Q3	2022Q4	2023Q1	2023Q2
abacus	100	99,9984	99,9975	99,9984	99,9992	100
au-sn3	100	100	99,9927	100	99,9992	100
ly2	99,9992	100	99,9926	100	97,9623	100
Nordunet						
nordunet-lgb	100	99,9992	99,9984	100	99,9984	100
nordunet-ore	100	99,9956	97,8554	100	100	100
or2	100	99,9854	99,9992	99,9942	100	100
ore	100	99,9978	99,9952	100	100	100
RH	100	100	99,9984	99,9955	100	100
riso	100	99,9855	99,9921	99,9961	99,995	100
RUC	99,9992	100	99,9907	99,9992	100	100
ruc-sn1	99,9992	99,9935	99,993	99,9976	99,9898	100
ruc-sn2	99,9967	100	100	100	100	100
sit-vpn-kvl	100	100	99,9984	100	100	100
Statsbiblioteket						
USG	99,9992	99,496	99,9862	99,9631	99,9967	99,9692
AAMS	100	100	99,9975	100	99,9815	100
Aarhus_Supercomputer	99,9992	99,9144	99,9984	100	100	100
AAU	100	100	99,9984	100	100	100
aau-sn1	99,9976	99,9958	99,9959	99,9984	99,9992	99,9727
aau-sn2	100	100	99,9937	99,9992	100	100
aau-sn2	100	100	99,9937	99,9976	100	100

	2022Q1	2022Q2	2022Q3	2022Q4	2023Q1	2023Q2
abacus	100	99,9984	99,9975	99,9984	99,9992	100
au-sn3	100	100	99,9927	100	99,9992	100
cariberg	100	99,9992	99,9992	99,9992	99,9992	100
clio2	100	100	99,9926	100	99,9992	100
clio3	100	99,9984	99,9911	99,9916	99,9927	99,9864
clio4	100	100	99,9984	99,9916	100	99,9824
clio5	100	100	99,9927	99,9954	99,9984	99,9852
clio6	100	99,9992	99,9984	99,9984	99,9984	99,9852
clio7	100	100	99,9984	100	100	100
clio8	100	100	99,9984	100	99,9992	100
clio9	100	100	99,9984	100	99,9992	100
clio10	100	100	99,9984	100	99,9992	100
clio11	100	100	99,9984	100	99,9992	100
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clio97	100	100	99,9984	100	99,9992	100
clio98	100	100	99,9984	100	99,9992	100
clio99	100	100	99,9984	100	99,9992	100
clio100	100	100	99,9984	100	99,9992	100

> New initiatives in cybersecurity

- > Security is of strategic importance to our NREN (and to DeiC in general)
- > Expansion of the scope of our ISO27001 certification
- > Considering ISO27701
- > What does NIS2 compliance entail?
- > Trying to gather all universities in a common initiative to have a SOC/SAC operating 24/7

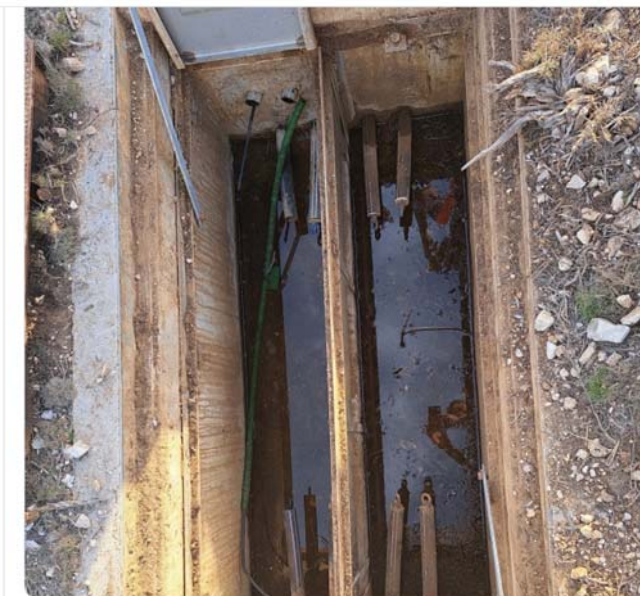
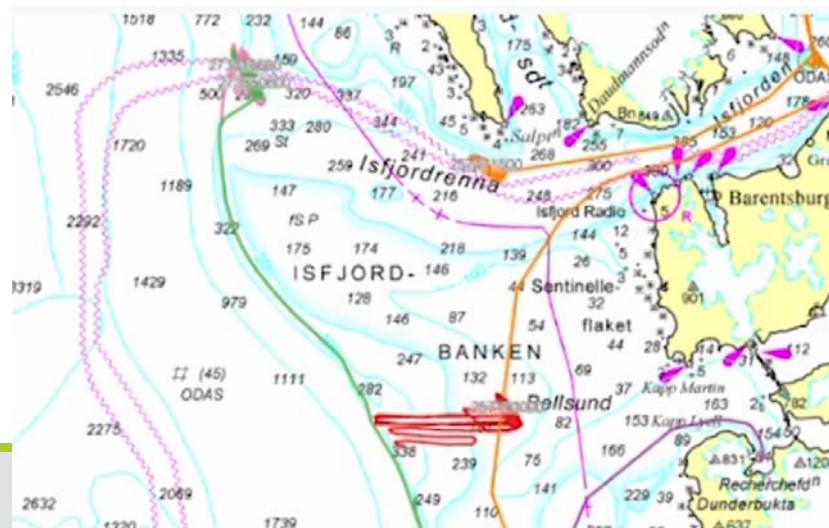
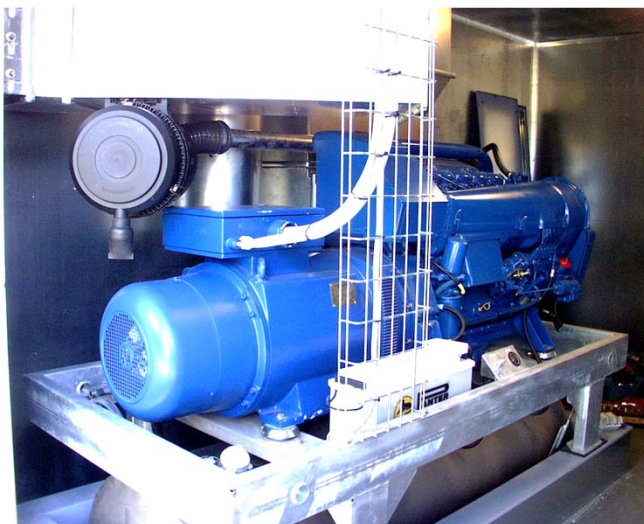


> New physical threats to the infrastructure

- > Beyond the "normal" cybersecurity threats, we now have to consider a range of physical threats to the infrastructure:
- > "Brownouts" and sabotage to the power grid
- > Targeted sabotage to submarine cables – and all cables and installations

Readiness analysis:

- > Vulnerability assessment regarding these threats are now a part of regular operation
- > Improvement of the weak spots uncovered by the analyses



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92 Répondre Copier le lien

> New uses of the fiber infrastructure

Such as

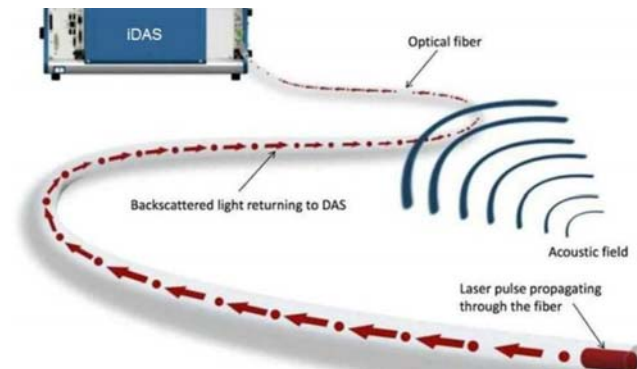
- > Quantum Key Distribution
- > Time and frequency distribution
- > Distributed Acoustic Sensing



DECLARATION ON A QUANTUM COMMUNICATION INFRASTRUCTURE FOR THE EU

All 27 EU Member States

have signed a declaration agreeing to work together to explore how to build a quantum communication infrastructure (QCI) across Europe, boosting European capabilities in quantum technologies, cybersecurity and industrial competitiveness.



> Media hosting



- > Now, we have the media services Kaltura and Panopto in an on-premise installation operated by NORDUnet
- > Both vendors are abandoning their on-prem version and only supporting the cloud in the future
- > Are we and our users ready for the compliance implications of this?
- > Should we create our own service, self hosted and based on license free software?

> Thank you

> Questions and comments

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