



# Thoughts on New Technologies, Innovation and the 4th Industrial Revolution From the European Nordics

#WACREN2021

18 March 2021

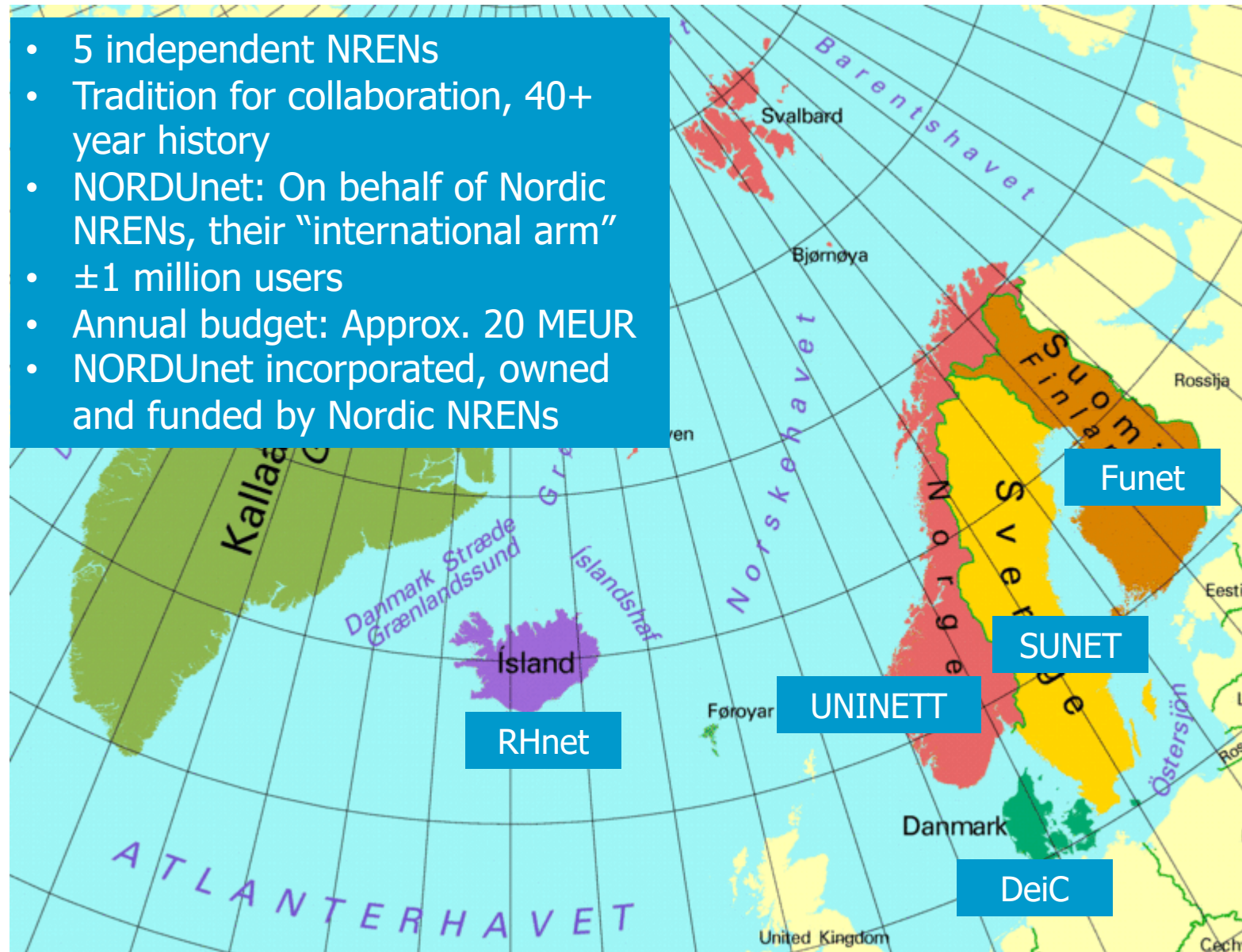
Erik-Jan Bos (NORDUnet)



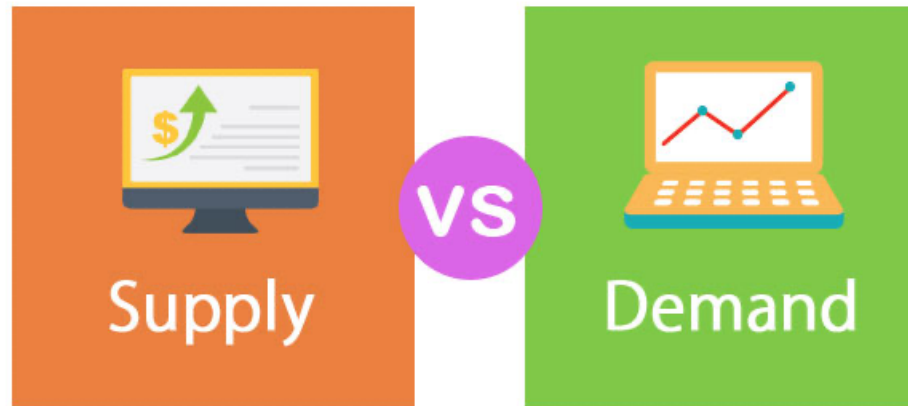
- Congratulations to Dr. Boubakar Barry and Omo Oaiya
  - For successfully organizing WACREN2021
- Thank you for inviting me to this panel
- The covid-19 pandemic has:
  - Underscored the importance of the Internet
  - Highlighted the crucial role of R&E Networks for science and education
  - Has brought 2030 forward, to 2021



- 5 independent NRENs
- Tradition for collaboration, 40+ year history
- NORDUnet: On behalf of Nordic NRENs, their “international arm”
- ±1 million users
- Annual budget: Approx. 20 MEUR
- NORDUnet incorporated, owned and funded by Nordic NRENs



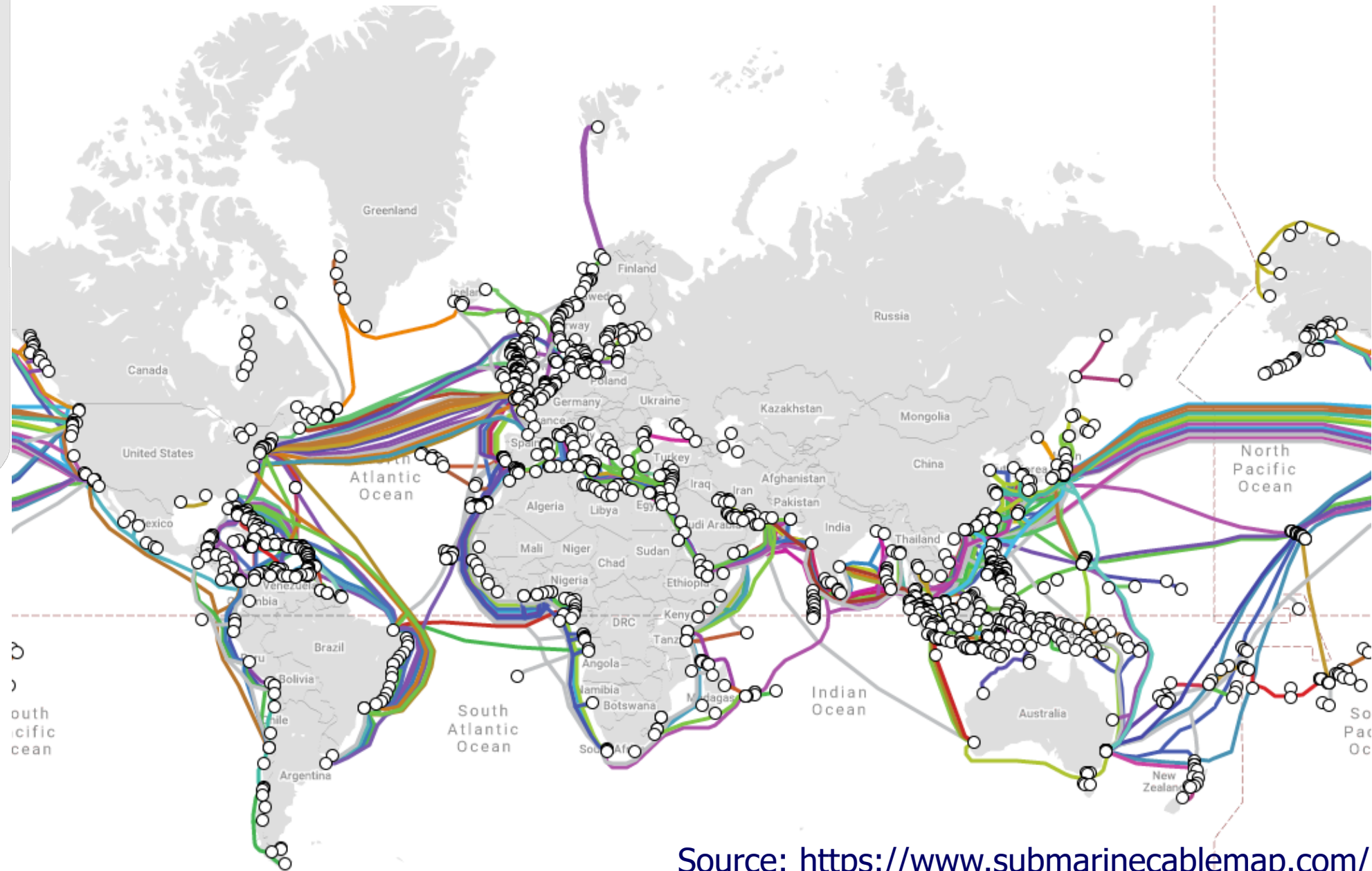
- OTTs are expanding rapidly:
  - Onto desktops and mobile devices
  - Into basic areas as Compute, Storage, Data centers and Submarine Cables
- What is / remains the role of the NREN?



Two examples:

- Bandwidth (intercontinental)
- Video Conferencing

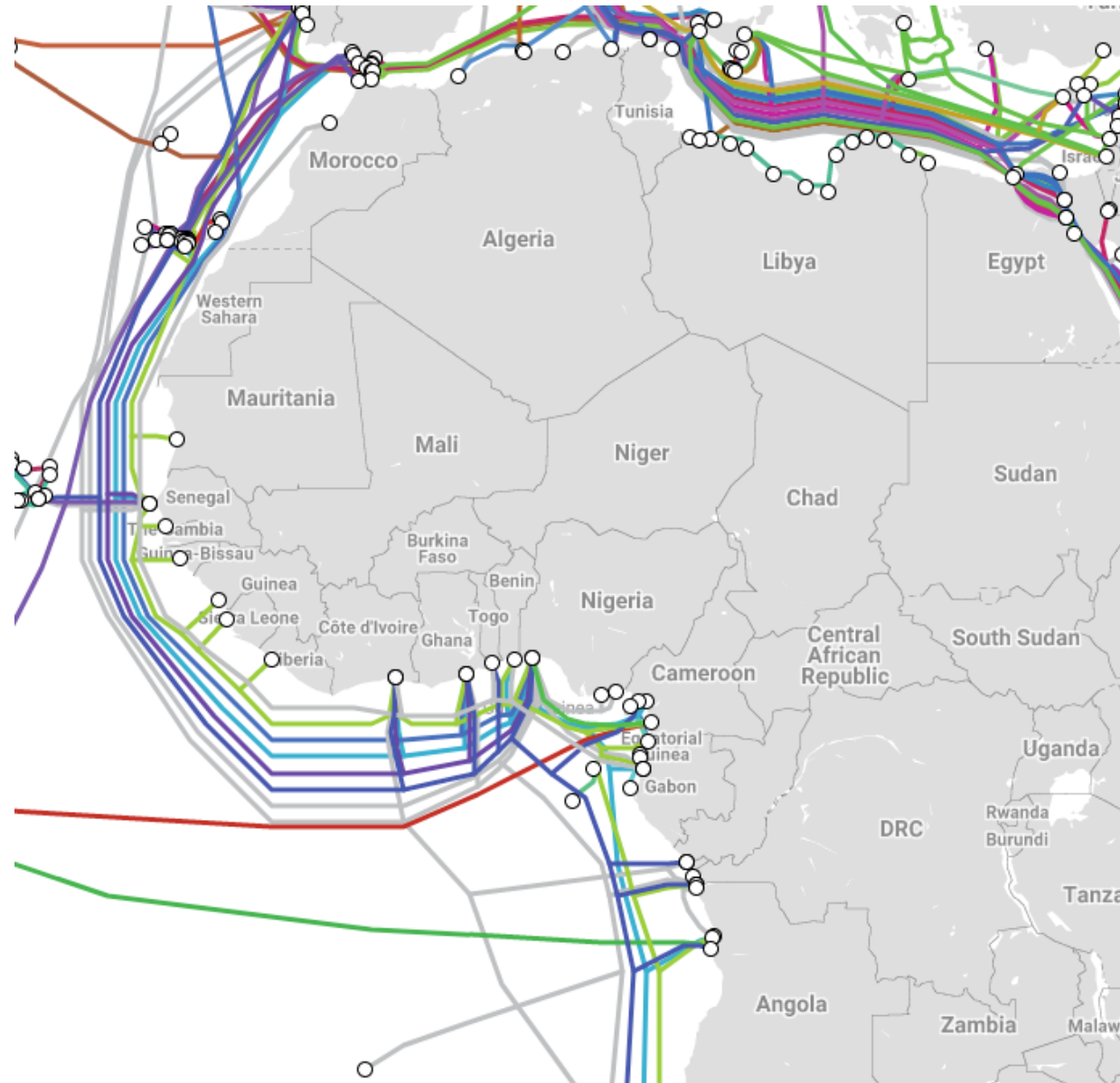
# Let's "dive" into Submarine Cables



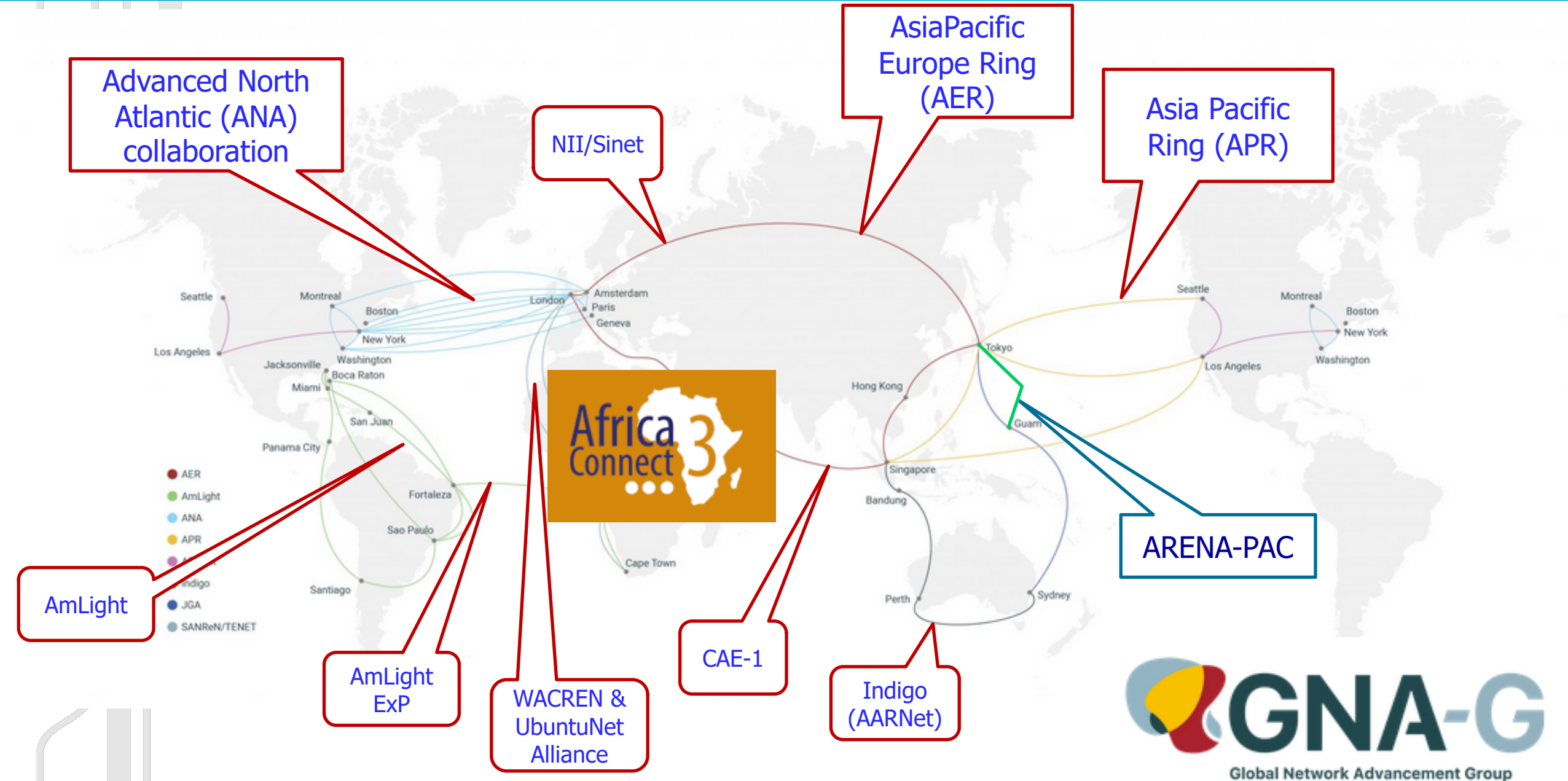
Source: <https://www.submarinecablemap.com/>

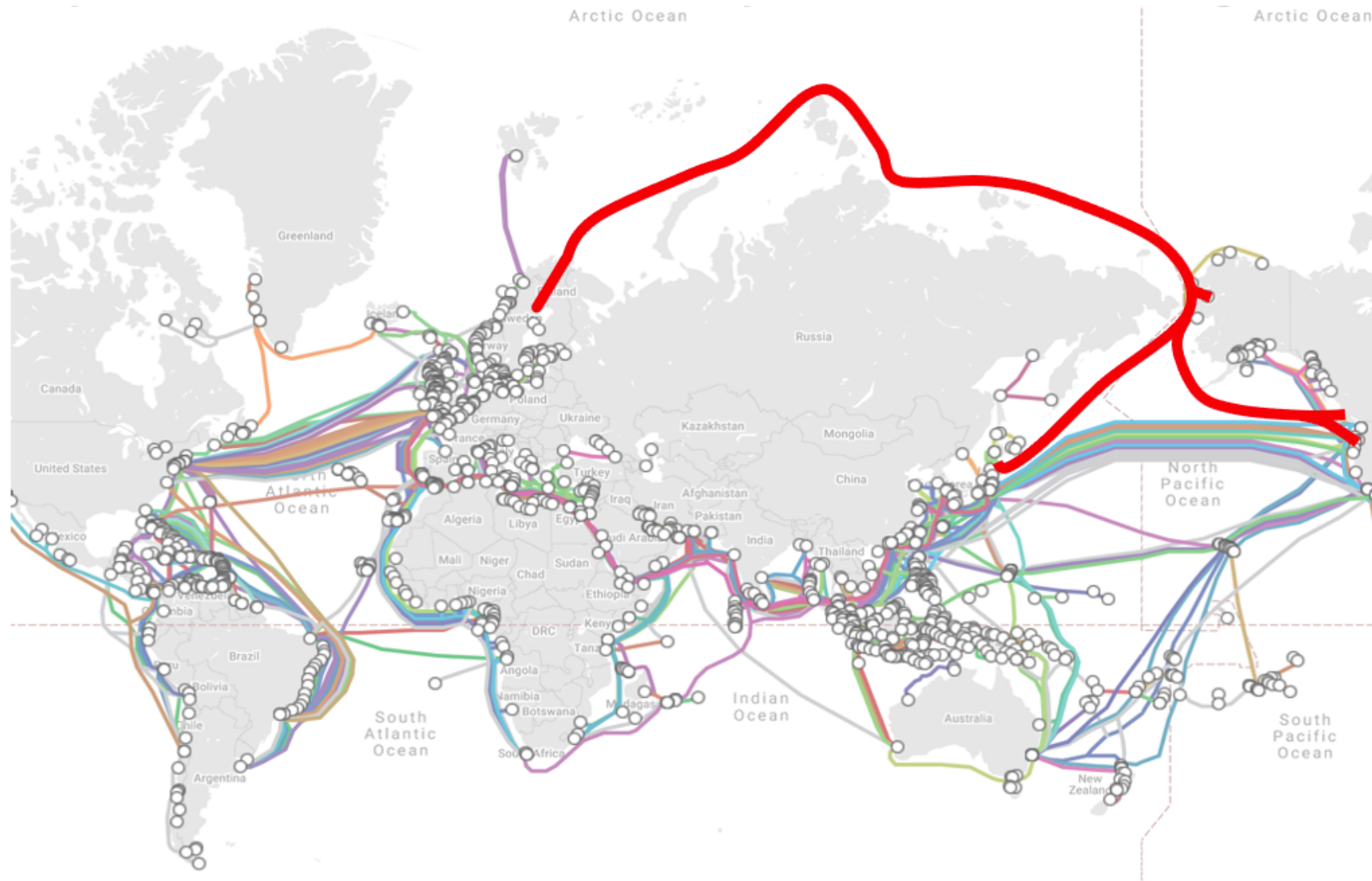


# Let's zoom into West Africa Submarine



Source: <https://www.submarinecablemap.com/>





Arctic Connect Submarine Cable system plotted on TeleGeography's Submarine Cable Map



- Working on the Global Network Interconnect for R&E
- Working Groups on e.g.:
  - Securing the GREN
  - Routing
  - Data Intensive Sciences



[HOME](#) [ABOUT](#) [WORKING GROUPS](#) [RESOURCES](#) [MEETINGS](#) [CONTACT](#)

## Networking – it's in our GNA

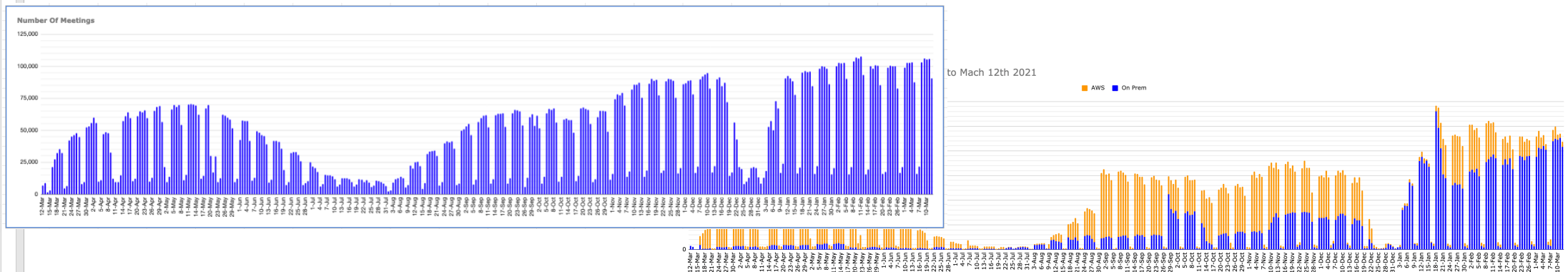
The Global Network Advancement Group (GNA-G) embodies a vision for the international collaboration of national research and education (R&E) networks to help meet humanity's challenges. Our mission is to ensure the technologies, infrastructures and investments of the partners and participants are utilised for interconnecting R&E networks on a global scale.

[DISCOVER MORE](#)

Let's collaborate at <https://www.gna-g.net/>



- Nordic NRENs and NORDUnet selected Zoom
  - As the result of a demand aggregation exercise
  - After running a public procurement process
- Started with a small on-prem cluster in Copenhagen
- Due to pandemic: Six large clusters, supporting 300,000 concurrent users



...in a 4<sup>th</sup> Industrial Revolution that is characterized by  
“a fusion of technologies that is blurring the lines  
between the physical, digital, and biological spheres”

## The Role of NRENs:

- Think Global, Act Local
- Embrace new technologies
- Be the systems integrator, to create new services
- Stimulate Community and Collaboration

THANK YOU !!

For listening to my thoughts  
from the European Nordics

#WACREN2021

18 March 2021

Speaker's e-mail: [bos@nordu.net](mailto:bos@nordu.net)