RHnet

The Icelandic research and university network

WELCOME!

This will be a short intro on

RHnet and few affiliated networks,

presented by

Jón Ingi Einarsson,

the general manager of RHnet

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RHnet Inc. – background

- **RHnet was formally established on the 24th of January 2001 by most of the Universities in Iceland and several of its research organizations - seventeen altogether**
- **The establishment was initiated by the University of Iceland and in collaboration with NORDUnet.**
  - **NORDUnet provided in the beginning a 45 Mb/s international capacity to RHnet through an agreement with Teleglobe, the main owner of the only cable connecting Iceland: CANTAT-3. (Capacity was very expensive.)**
  - **the government was not involved at any point**
  - **no direct government funding then and since**

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RHnet is affiliated with NORDUNet A/S – www.nordu.net

NORDUnet is a joint collaboration by the 5 Nordic National Research and Education Networks:

- DeIC - Danish e-Infrastructure Cooperation
  deic.dk
- Funet, the Finnish University and Research Network
  Is a part of CSC – IT Center for Science: www.csc.fi/funet-kaikki-palvelut
- RHnet in Iceland
  rhnet.is
- SUNET in Sweden
  sunet.se
- UNINETT in Norway
  uninett.no

NORDUnet operates a world-class Nordic and International network and eInfrastructure service for the Nordic research and educational community. Towards GÉANT, NORDUnet acts as the Nordic representative.

www.geant.net www.nordu.net

RHnet Inc. – background

- **Staff:**
  - **One full time member (the general manager).**
  - **Including two to four part time, through agreements with the University of Iceland and Deloitte. (These together roughly equal one FTE).**
- **Five people are on the governing board**
  - **Three appointed by the University of Iceland (the biggest shareholder)**
  - **One representing the research institutes**
  - **One representing other universities and institutions outside the Reykjavik area**

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RHnet – practical/technical aspects

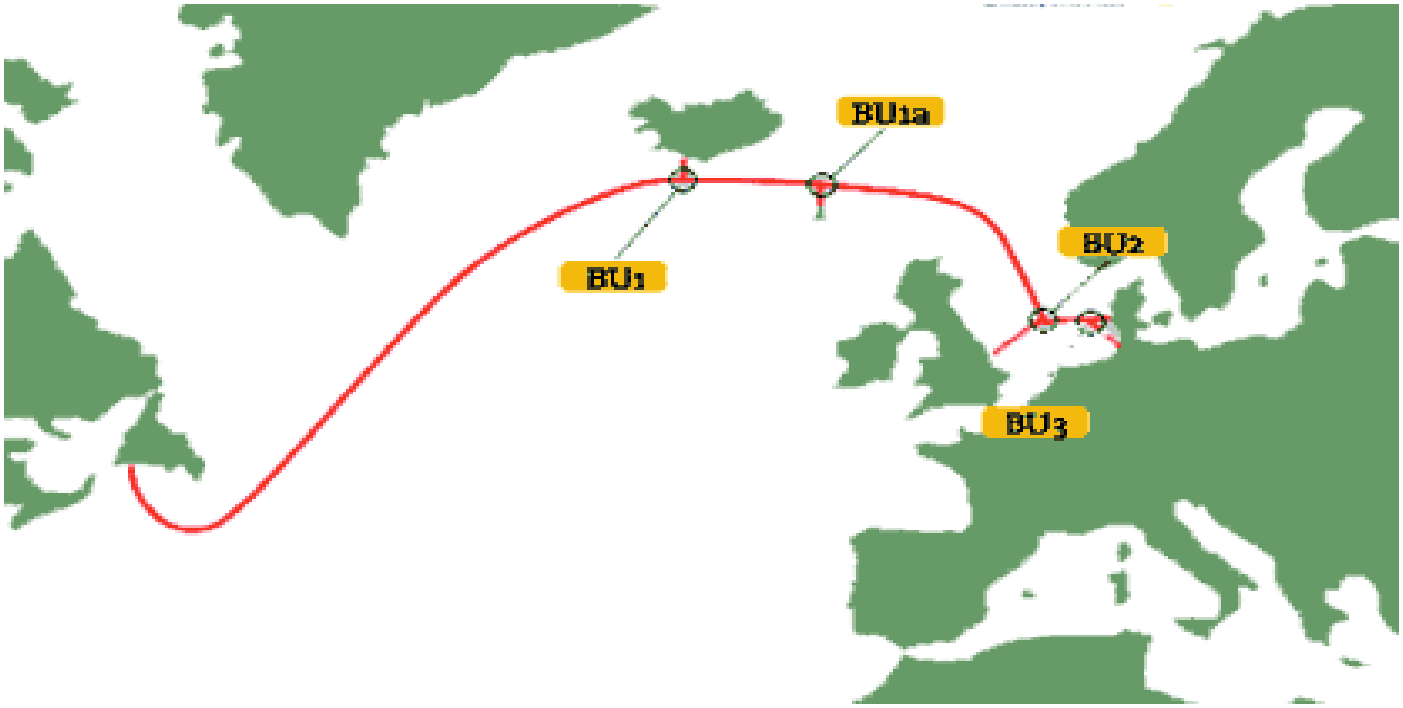
- **The aim from the start was to lease or own dark fibers and have physical diversity as well (min two connections per point)**
- **Thanks to recent (in 2000) and ongoing fiber layout in Reykjavík and Akureyri, it was possible to lease dark fiber in those areas**
  - **Leased dark fibers have therefore been used for most of the links from the beginning.**
  - **Having dark fibers is a means to an end: To provide state of the art connectivity and thereby a better environment for the research and educational sector to work in. => Be a possible catalyst to new research and collaboration.**
  - **The use of dark fibers enabled gigabit connectivity. Institutions at that time (2001) had connectivity from 64 kb/s to 2 Mb/s (only one had 10 Mb/s). They were therefore "forced" to go to 1 Gb/s.**
    - **Having leased dark fiber between points we were not willing to connect with lesser speed than 1 Gb/s**
    - **This was at the time meant to be a "gentle" tug into the 21st century ☺**

CANTAT-3 submarine optical cable (from 1994)
The only cable to Iceland from 1994 to 2003

The main bottleneck for RHnet in the beginning was the international connectivity.

NORDUnet tried their best to increase the connectivity.

We even tried to get support from the state.
But it did not pan out.



Connectivity to Iceland finally improved in 2004 when the *Farice* cable came operational.
A breakthrough in 2009: Two new submarine cables came into operation:
The *Danice* and *Greenland Connect* cables.

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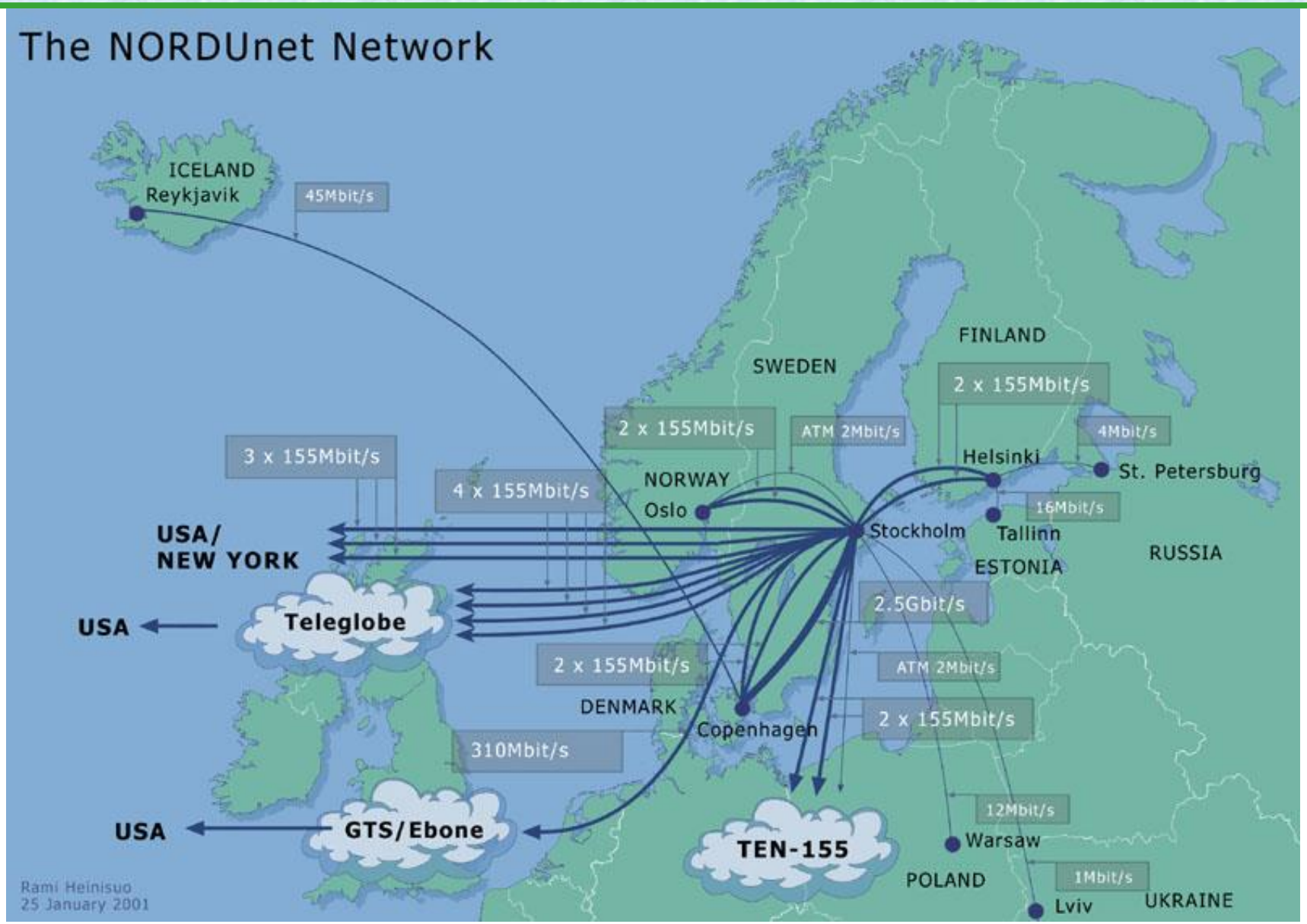
Looking back: The NORDUnet network on 25 of January 2001



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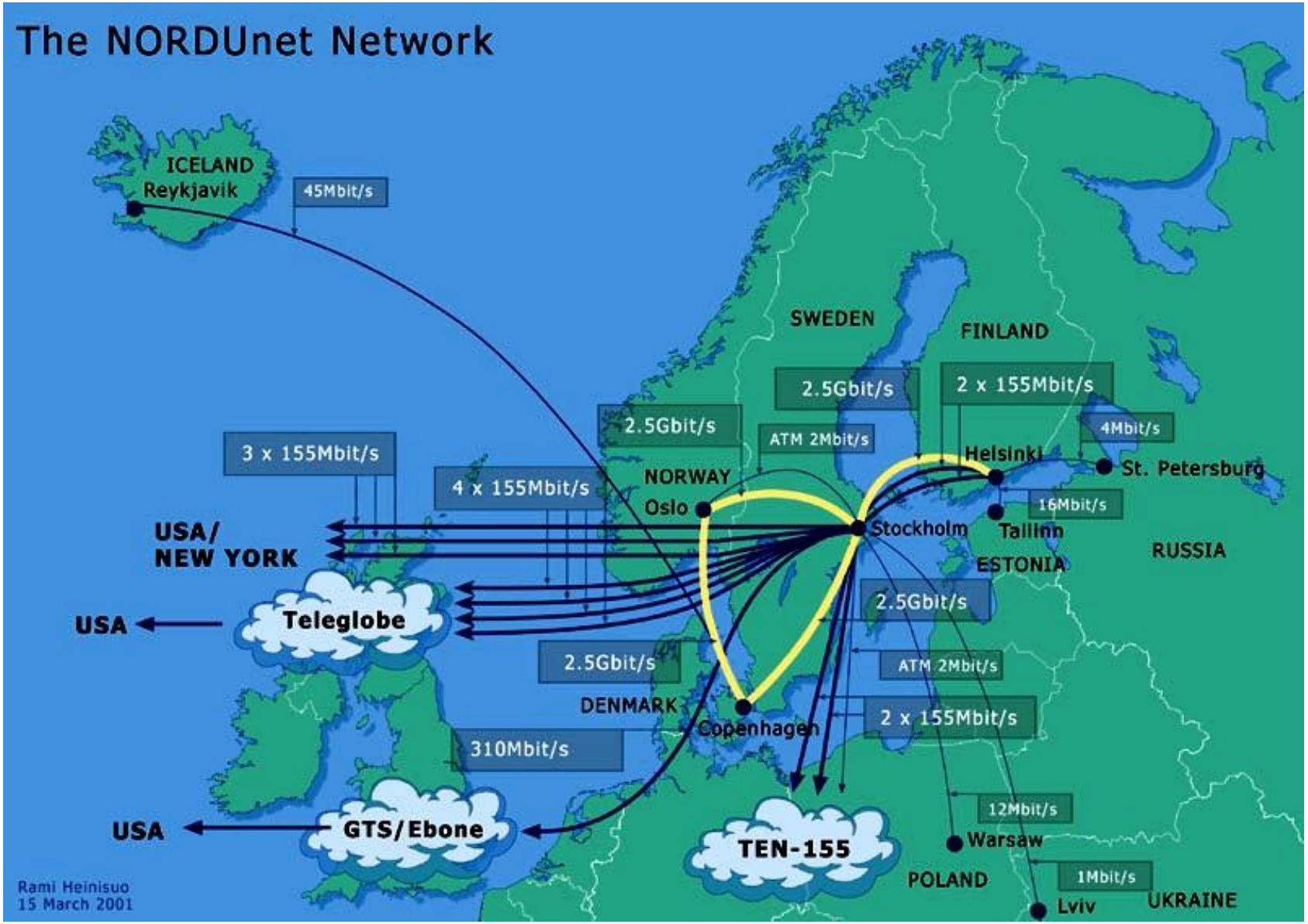
The NORDUnet network in March 2001



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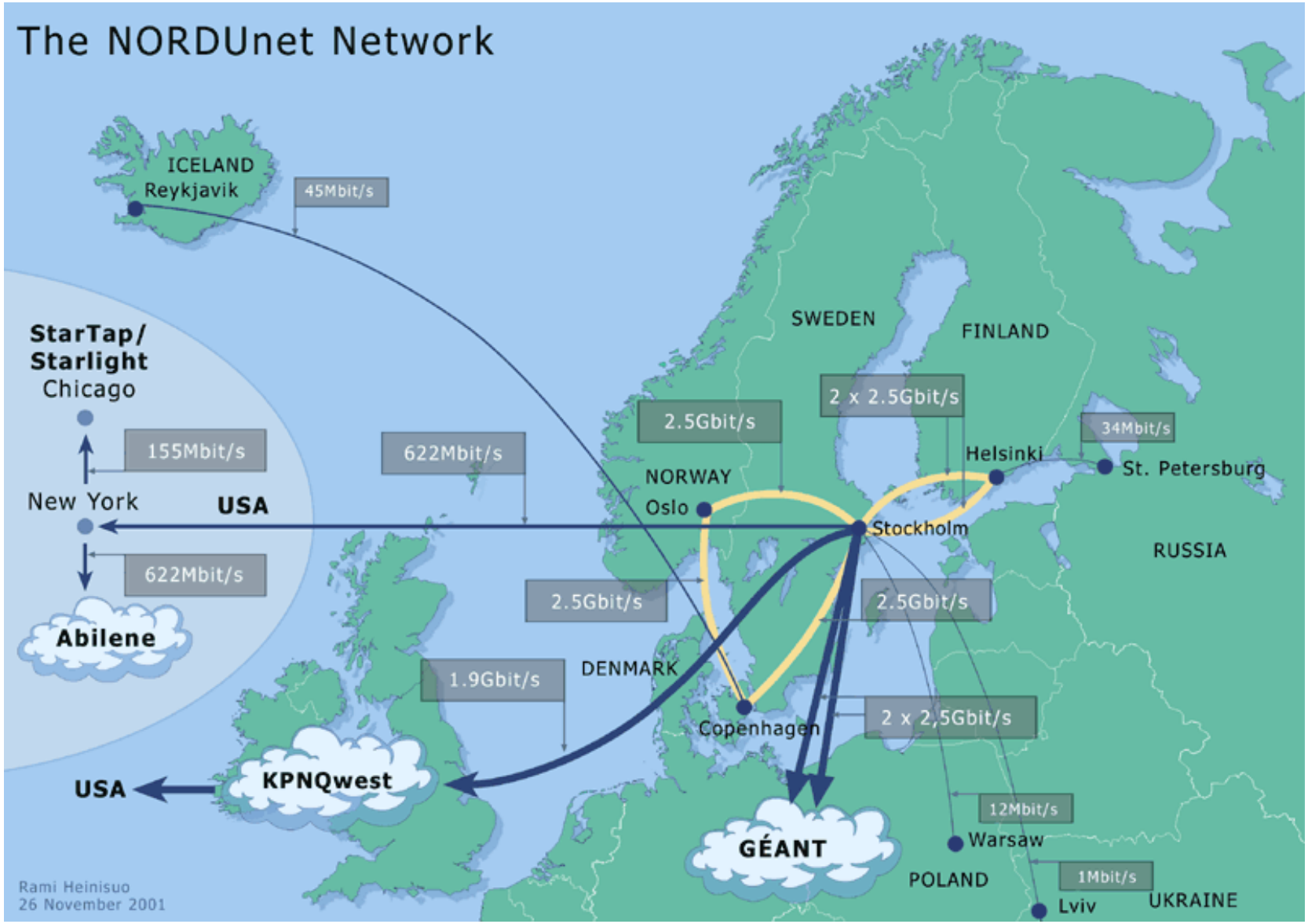
The NORDUnet network in November 2001



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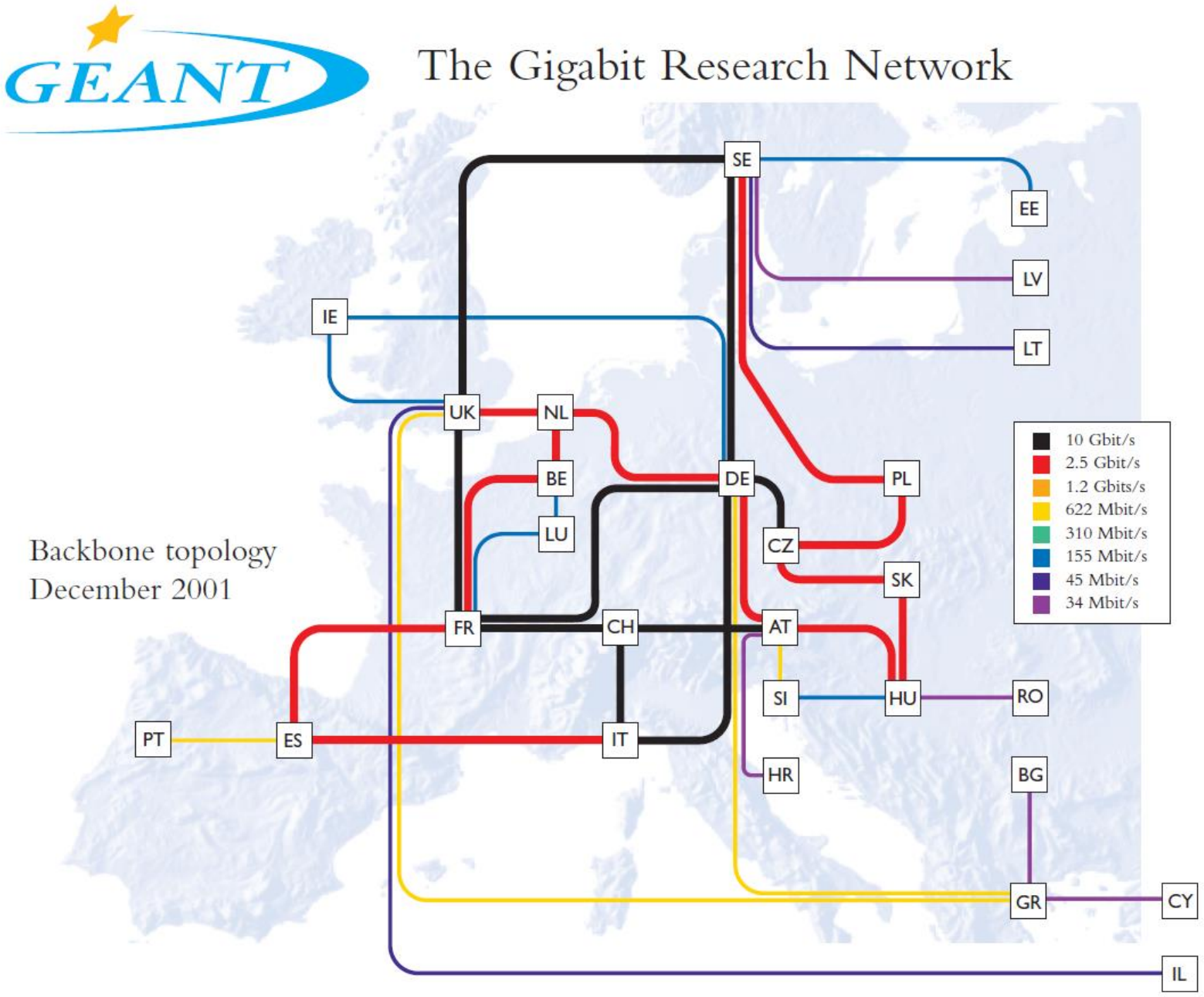
The GÉANT network in the beginning: December 2001



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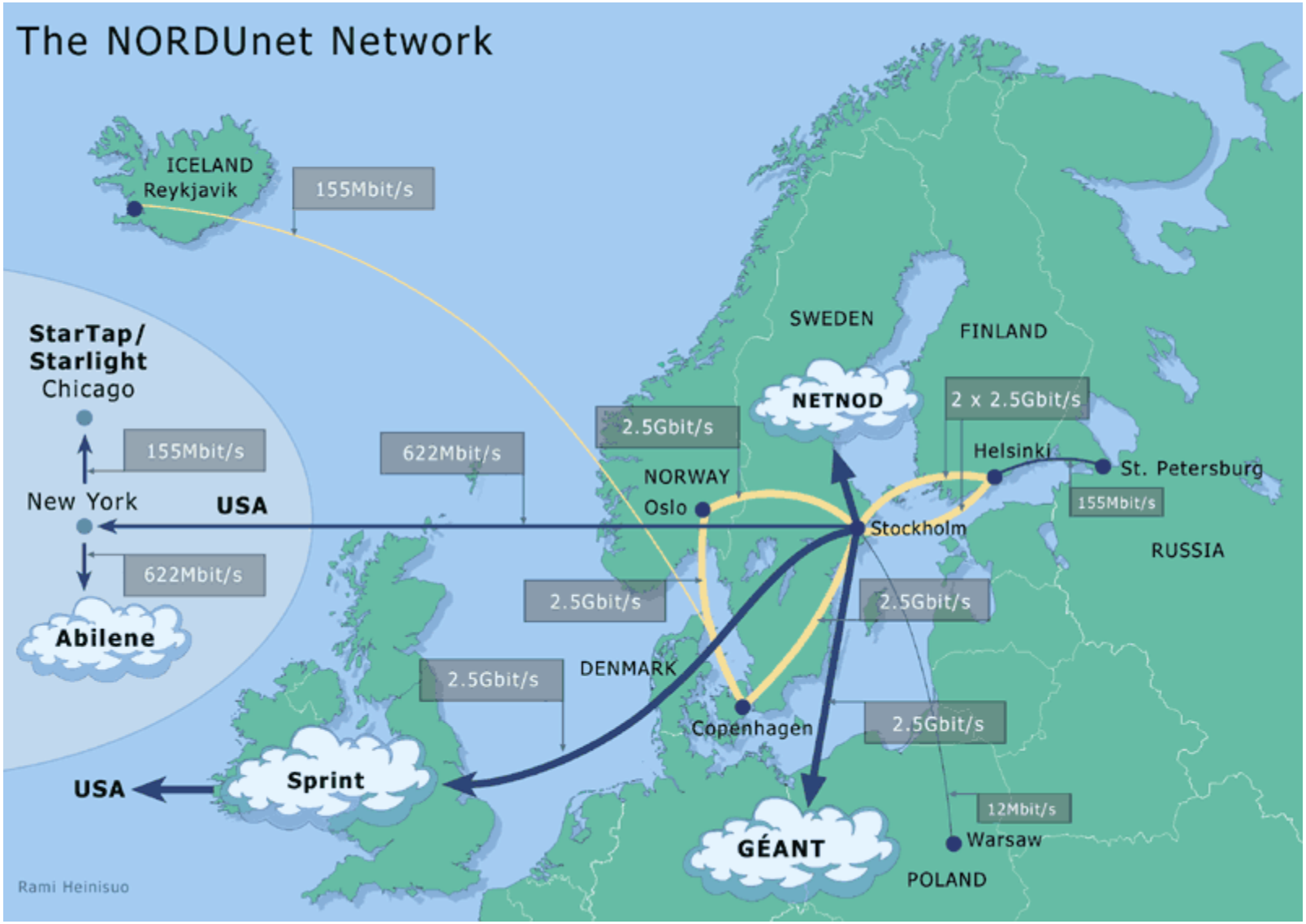
The NORDUnet network in January 2003



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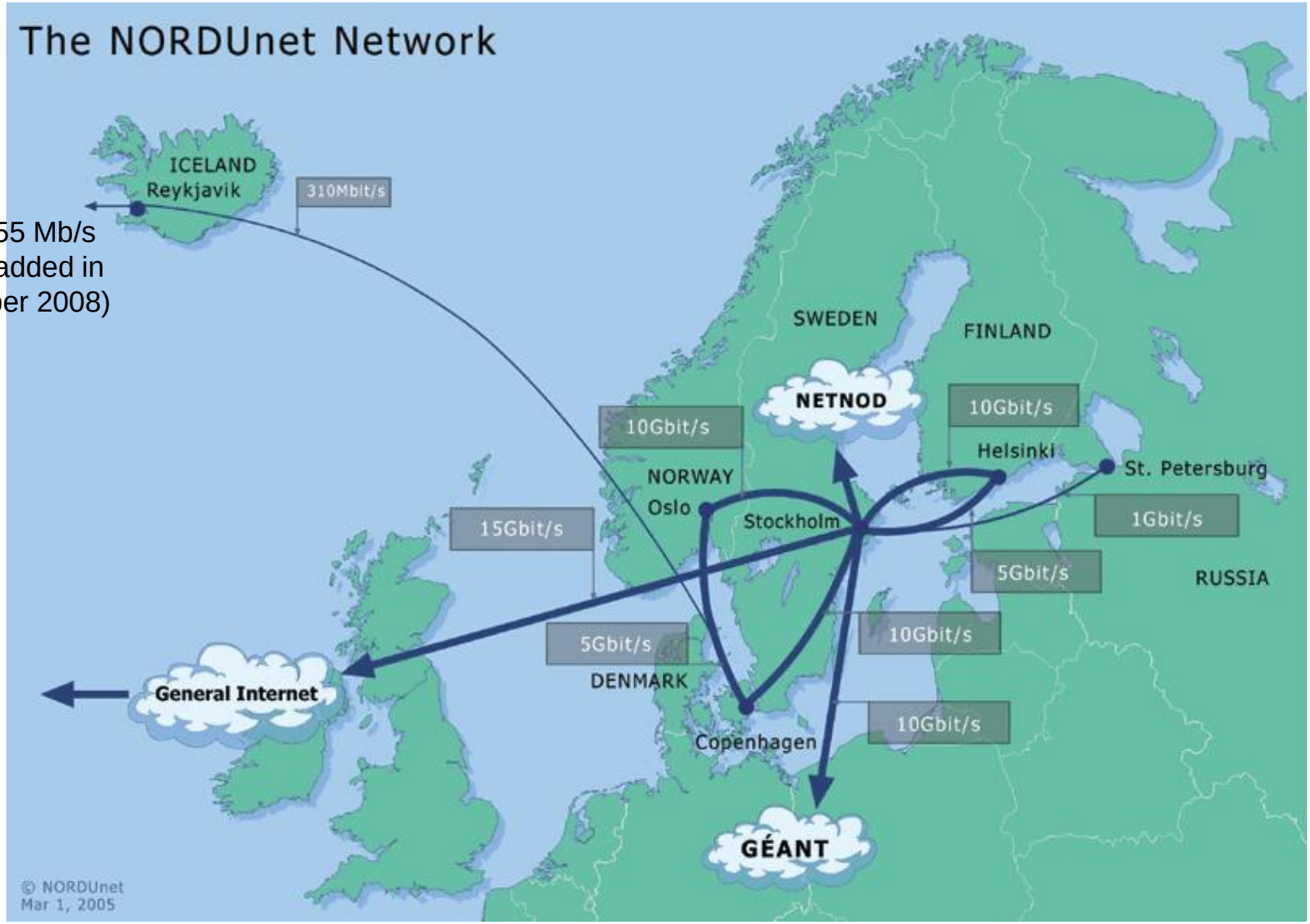
The NORDUnet network in March 2005

(extra 155 Mb/s to USA added in November 2008)



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Finally in the summer/autumn 2009 Iceland had what many consider the bare minimum of individual cables connecting the country.

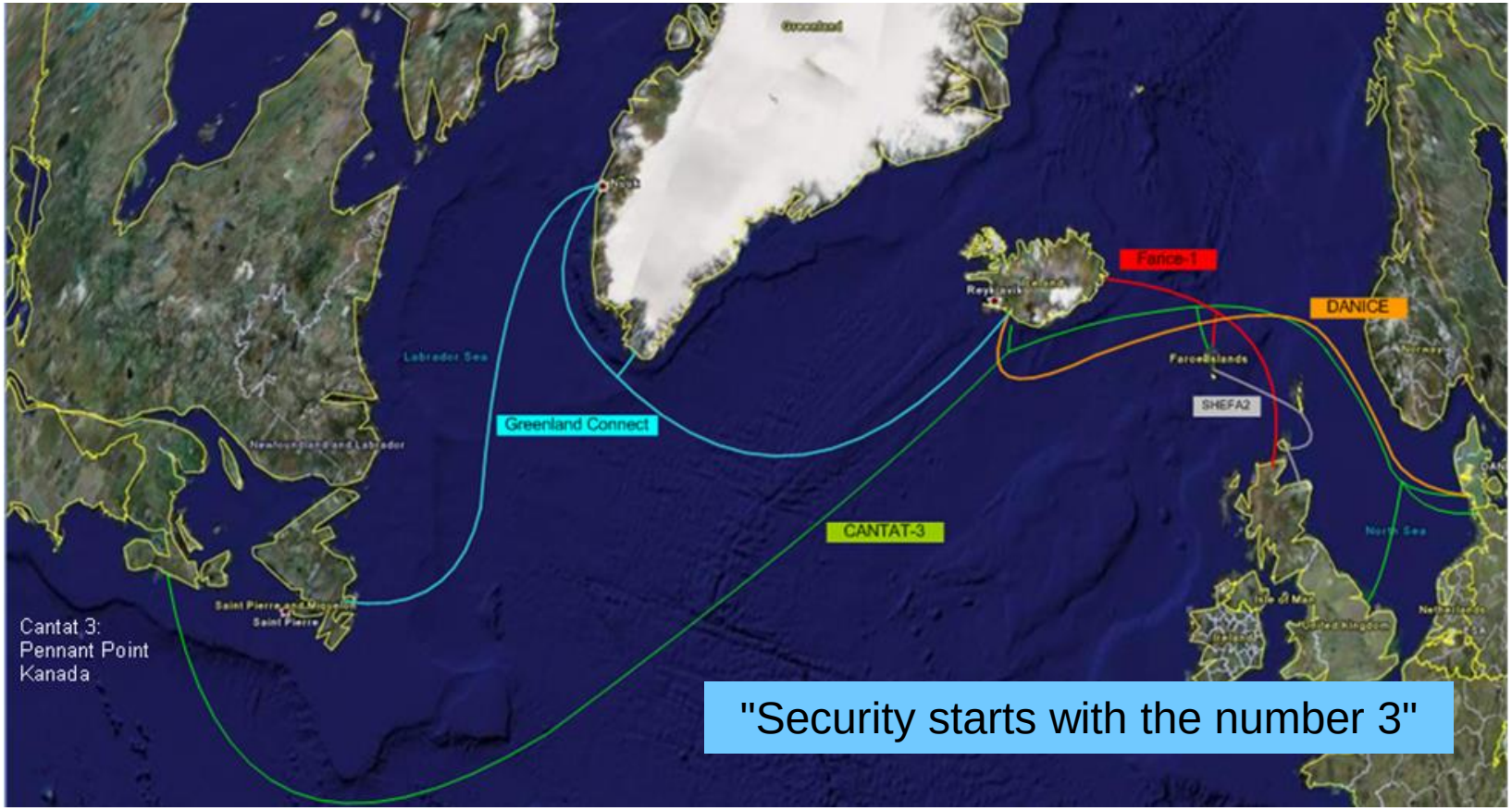
Danice (initially):
4x128x10Gb/s
= 5,12 Tb/s

Farice (initially):
2x36x10Gb/s
= 720 Gb/s

Greenland Connect:
2x96x10Gb/s
= 1,92 Tb/s

SHEFA-2:
10 fibers
unrepeatered

CANTAT-3:
(3x2,5Gb/s
= 7,5 Gb/s)



CANTAT-3 was retired in the beginning of 2010, but bought by the Faroese Telecom and repurposed for connectivity to oil platforms.

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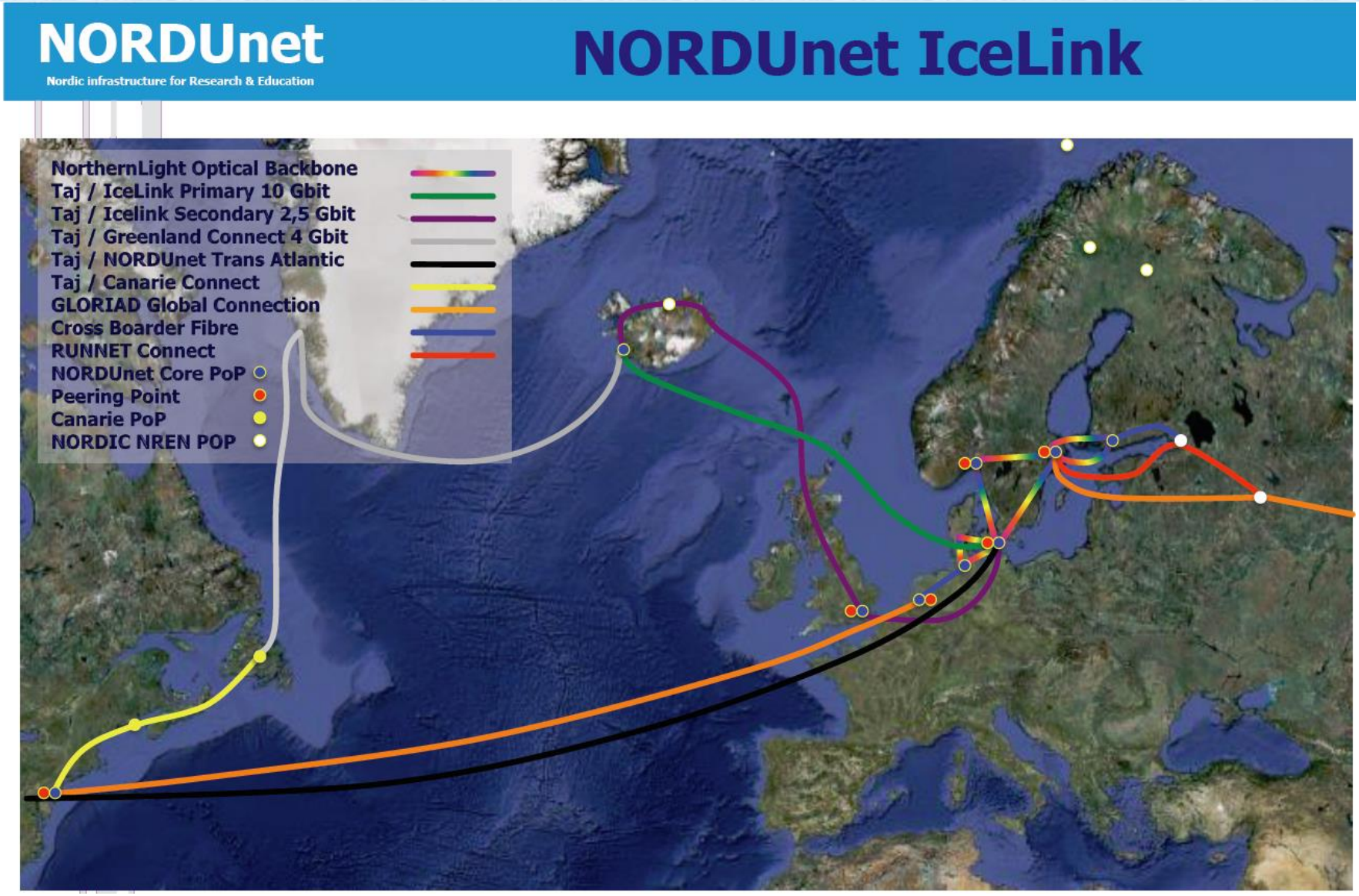
Connectivity provided by NORDUnet from January 2010



Picture from a talk by René Buch in December 2009

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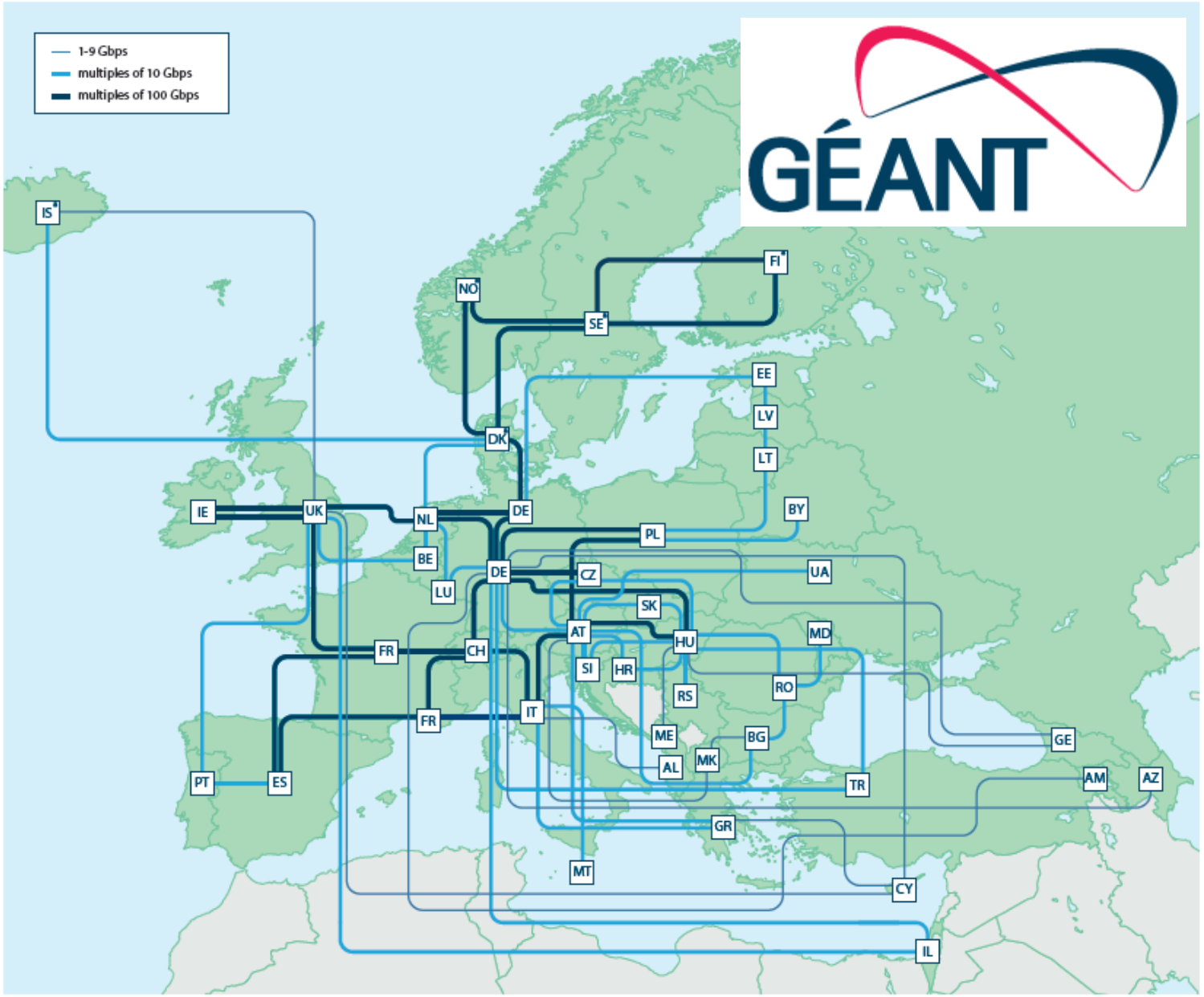
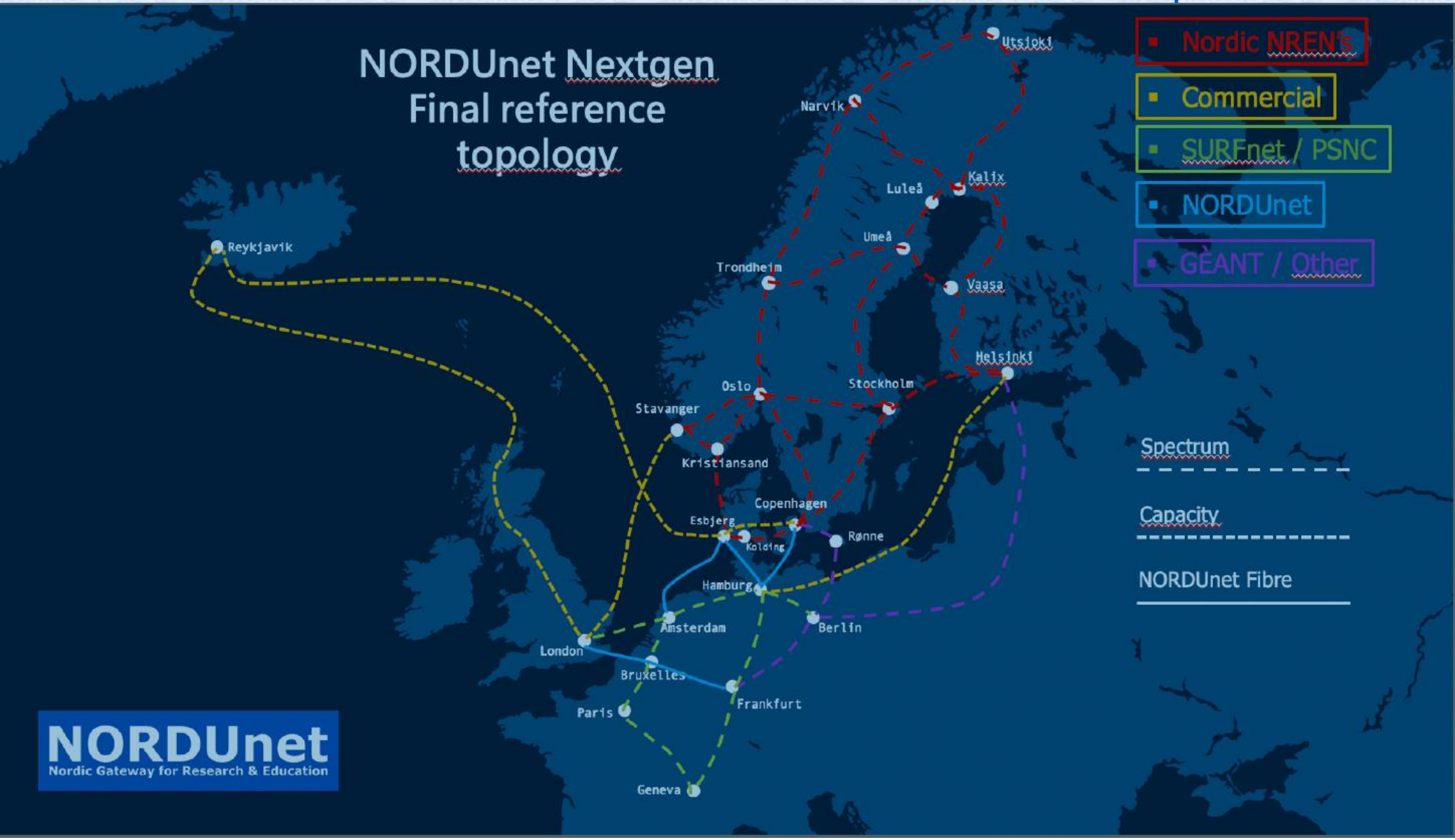
The GÉANT network in December 2018

GÉANT's pan-European **research and education network** interconnects Europe's National Research and Education Networks (NRENs).
Together we connect over **50 million users** at 10,000 institutions across Europe.



Overview of the new NORDUnet network being built in close collaboration with the Nordic NREN‘s and other partners



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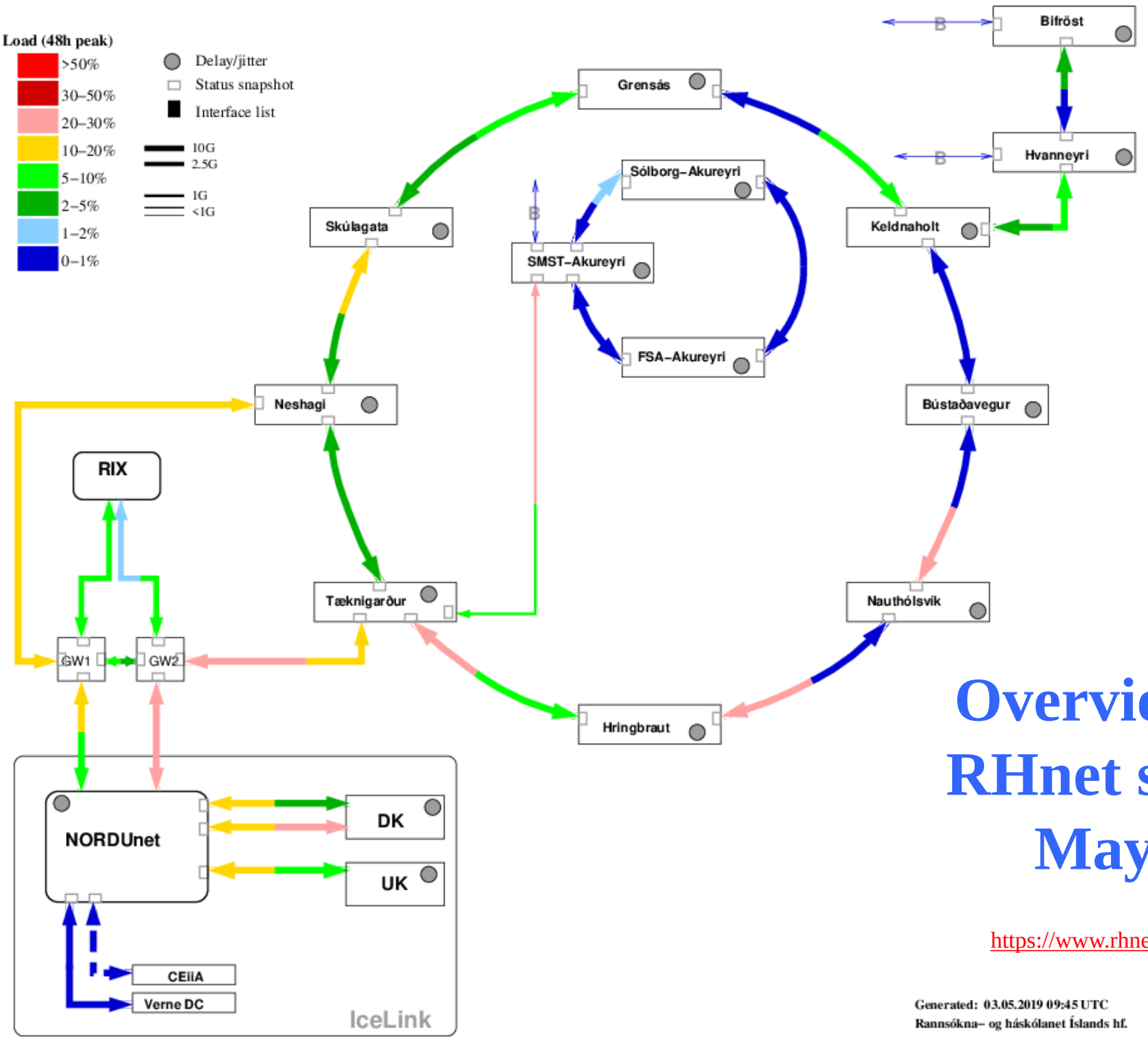

Overview of the RHnet system in May 2019

https://www.rhnet.is/traffic-map.html

Generated: 03.05.2019 09:45 UTC
Rannsókna– og háskólanet Íslands hf.

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Closing remarks

- We have had reasonable success in keeping up with the demands on the network from the very start.
- We hav als been fortunate that all major and most minor incidents have been in external networks, that were beyond our control.
- We of course strive to minimize the effect of such forces where we can.

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And finally!

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