

Dark fiber and hybrid networking in UNINETT,  
NORDUnet NREN Dark Fiber Workshop,

1. March 2007

[Olaf.Schjelderup@uninett.no](mailto:Olaf.Schjelderup@uninett.no), CTO Networks

# Norway in a nutshell

- ~4.5 mill inhabitants, scattered populated
- Lot of mountains and fjords
- Coastline of 25 148 km
  - ◆ ~62% of the length of the equator
- Shortest distance south to north: 1 752 km
  - ◆ approx 3 days by car
  - ◆ If we turn Norway upside down Spitsbergen will almost reach Africa.
- Only two owners of national fiber infrastructure ...

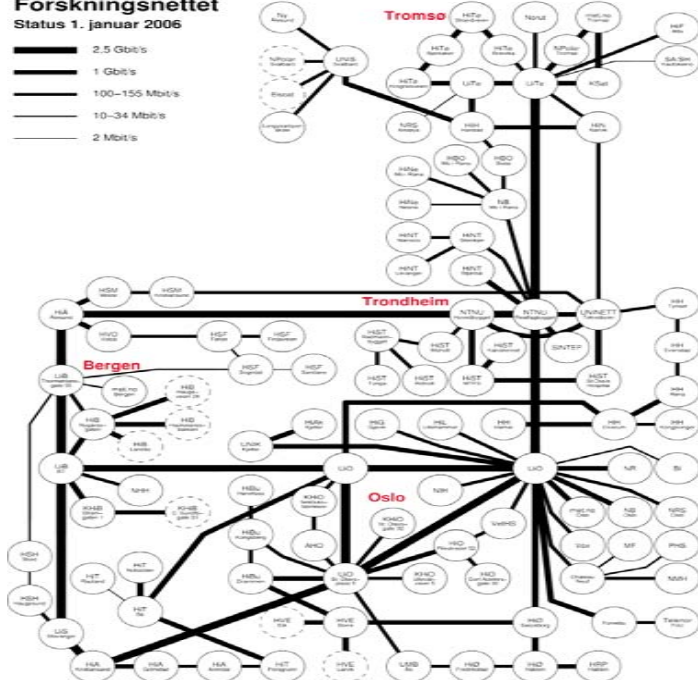


# Norwegian research network, 2004-2006

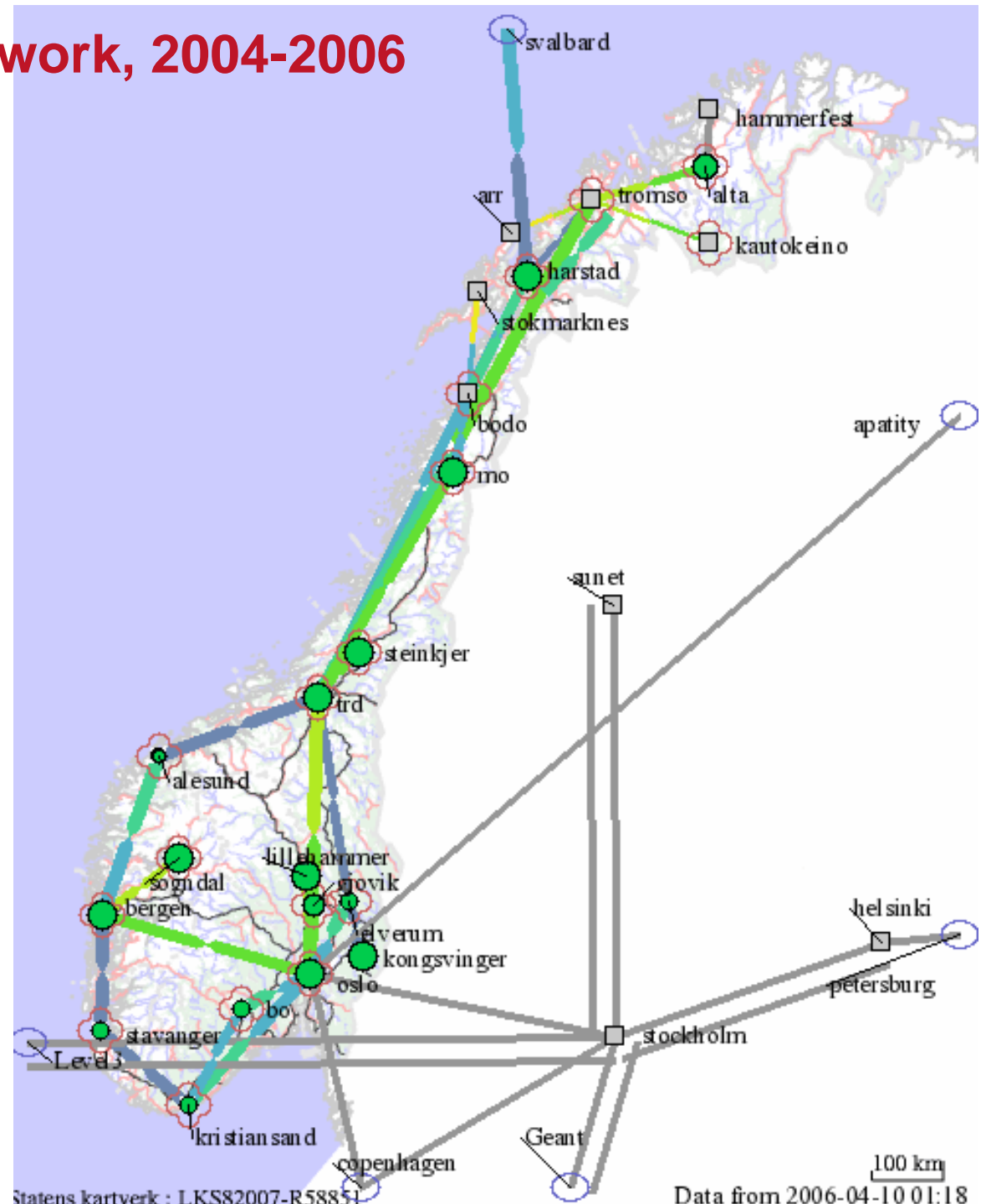
- 1 – 2.5 Gb/s
- Redundancy
- 40 universities and university colleges
- Tradition for support to colleges and cooperation with universities, reestablished with GigaCampus programme from 2006
- > 200 institutions 250.000 users
- Operations from Trondheim
- 15 + 5 year infrastructure IRU
- Plans for 10G and lambdas ...

## Forskningsnettet Status 1. januar 2006

- 2.5 Gbit/s
- 1 Gbit/s
- 100–155 Mbit/s
- 10–34 Mbit/s
- 2 Mbit/s



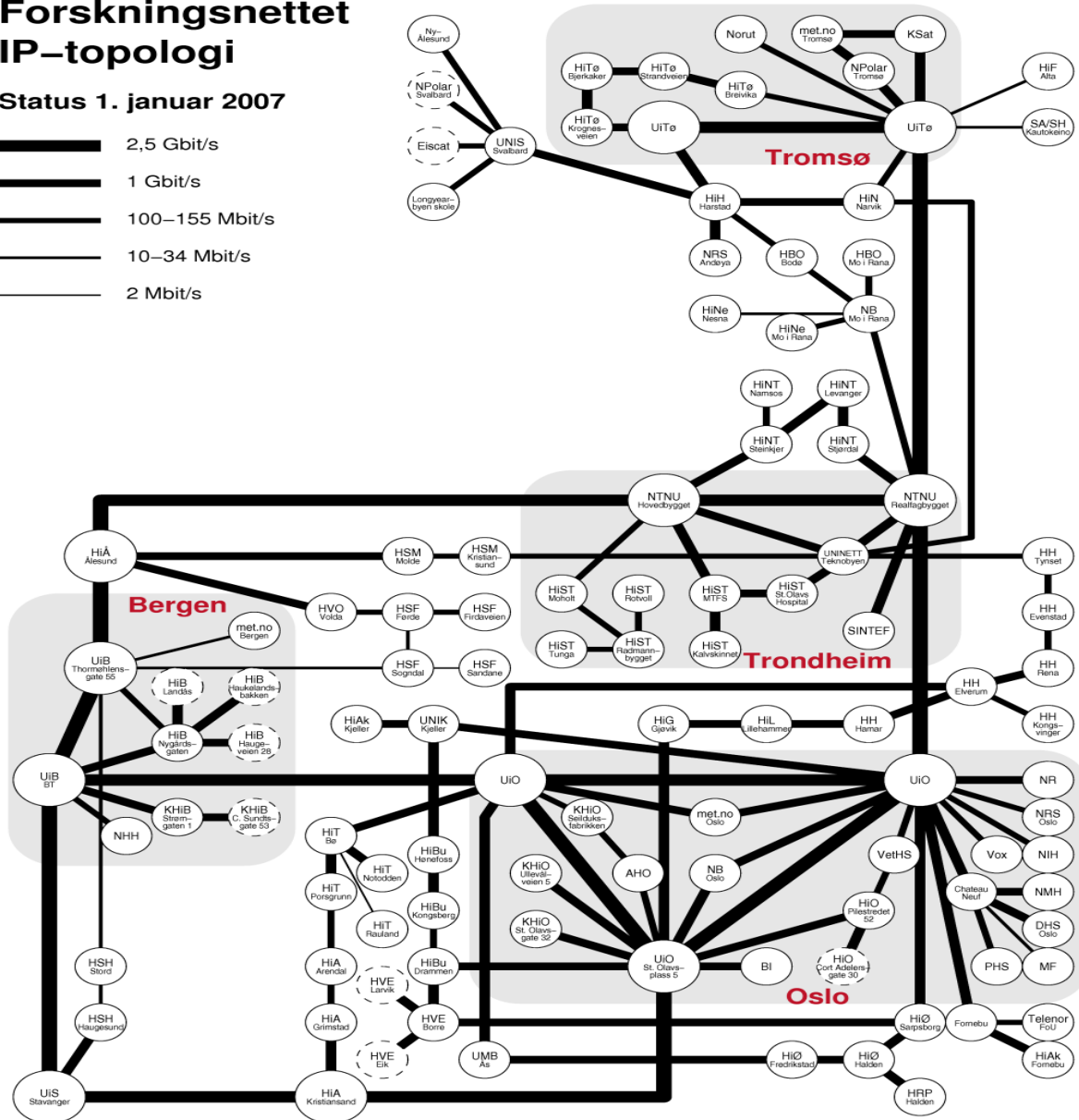
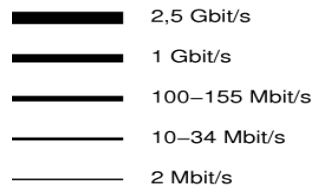
**UNINETT**



# The UNINETT IP Network Today

## Forskningsnettet IP-topologi

Status 1. januar 2007









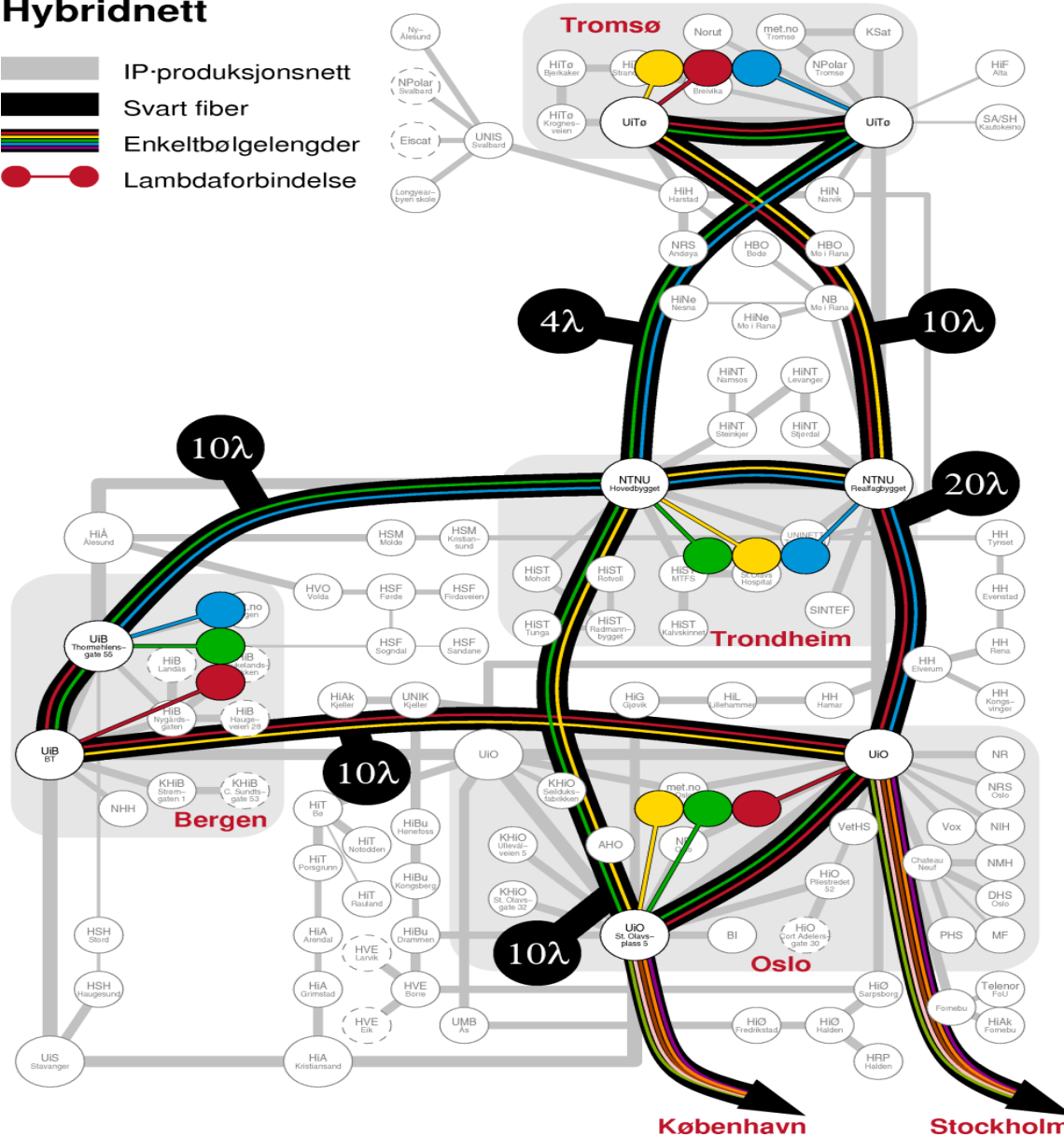
# Towards hybrid networking in Norway

- Cost based upgrade option in existing IRU-agreement with BaneTele, but fiber is a limited resource ....
- Upgrade to "virtual dark fiber" possible by shared use of new DWDM equipment purchased by UNINETT.
- Negotiated CFT process on DWDM equipment since may 2006. Siemens chosen february 2007, negotiation of contract during march 2007.
- Solution includes lambdas provided for BaneTele as payment for Operations & Maintenance, equipment housing and UNINETT's use of a new optical path between Trondheim and Tromsø.

# UNINETT Hybrid Network, 2007/8

## Hybridnett

-  IP-produksjonsnett
-  Svart fiber
-  Enkeltbølgelengder
-  Lambdaforbindelse



# Technical aspects

- Transition to **10 Gbit/s** IP production during 2007 and 2008.
- Increased fiber path redundancy.
- Initially no ROADM functionality, but will be considered later.
- For international lambda connectivity we plan to use Oslo as a branch exchange point for pre-established lambdas to Bergen, Trondheim and Tromsø.

# Questions?

9

# Thanks!

