NORDUnet Update

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CEO

NORDUnet

Nordic Infrastructure for Research & Education

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Nordic infrastructure for Research & Education

Key strategy drivers

- ### Globalization and International Competition

  To push the scientific borders further Global Collaboration is necessary and to pool global resources and knowledge fx. CERN, eVLBI GLEON etc. This raises the competition between international scientists and institutions.

- ### Cross Boarder Collaboration

  To be a recognized as participant in Global Research Projects it requires that national and regional institutions collaborate and pool resources. The Nordic NREN experience is that a coordinating and facilitating interregional coordination body add significant value to the national efforts as a common level play ground.

- ### Network Paradigm shift

  In addition to the general usage of the network the requirements for specialized high capacity E2E connections are rapidly increasing. This requires a new approach to inter network and inter organizational provisioning and coordination.

- ### Interdependencies of various disciplines

  In addition to the paradigm shift in networking the interdependencies between multiple disciplines like Networking, Storage, GRID, AAI etc. raises the international and inter regional coordination challenges to a new complexity level.

"NORDIC Infrastructure for Research and Education"

Mission:

➢ Serve the Nordic NRENS

The NORDUnet method of facilitating and coordinating Nordic & Global activities has proven very successful placing the Nordic NRENS in Line with major international players that would otherwise be unreachable at a cost efficiency level unobtainable on individual basis.

➢ Coordinate NORDIC NREN Development

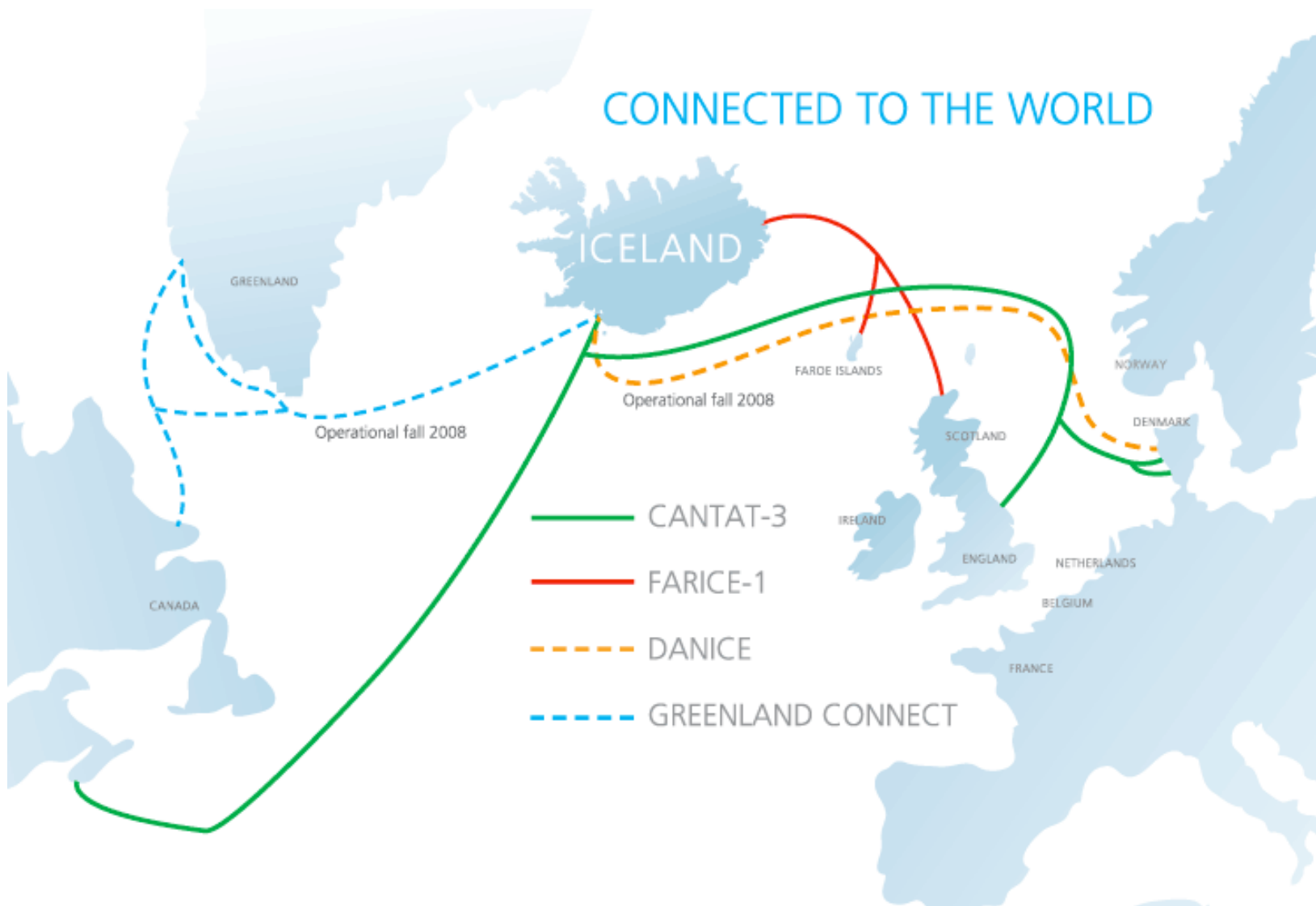o Nordic Projects
o GEANT Projects
o Global Projects

➢ eInfrastructure Services

➢ Nordunet3
➢ NDGF
➢ ...

➢ International Dimension

Facilitating and Coordinating Local-Global-Local contacts and project opportunities.

CONNECTED TO THE WORLD

ICELAND
GREENLAND
Operational fall 2008
FAROE ISLANDS
Operational fall 2008
NORWAY
DENMARK
SCOTLAND
IRELAND
CANADA
ENGLAND
NETHERLANDS
BELGIUM
FRANCE

CANTAT-3
FARICE-1
DANICE
GREENLAND CONNECT

- ## **NORDUnet Network Services:**

  - ### **NorthernLight**
    - Pan Nordic Redundant Dark Fibre Optical Infrastructure

  - ### **NORDUnet NOX** (NorthernLight Optical X-Change)
    - Distributed Open Optical Exchange

  - ### **NORDUnet IP**
    - Pan Nordic Redundant IPv4 & IPv6 Infrastructure

  - ### **NORDUnet NUNOC**
    - 24x7 eInfrastructure operation centre.

- ## **NORDUnet Project Services**

  - ### **NORDUnet3**

  - ### **NDGF – Nordic Data Grid Facility**

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Unique Hybrid Architecture for Next-Generation Transport Switching

"Processing" decoupled from "Switching"

- **Universal Switching**
  - Agnostic switching architecture ("quantum-switching")
  - Switching synch traffic (circuits) or asynch traffic (packets) in native format (technology-independent)
  - Non-stop forwarding (not affected by traffic congestion)

100% TDM   Any Traffic Mix   100% Packet

Specific Traffic Processing Line Cards

- Technology-dependent traffic line cards
- Host all specific traffic processing functions (classification, policing, perf monitoring, OAM, etc)
- Open to future packet-based protocols (T-MPLS)

1850 TSS

Universal Switch

TDM
TDM
PKT
PKT

Integrated WDM
- CWDM/DWDM, OADM, Mux/Demux, Transponders
- ROADM, OTH

CARRIER ETHERNET
MEF Certified Compliant

LIGHT READING'S
LEADING LIGHTS
2005 AWARD WINNER
BEST NEW PRODUCT PUBLIC COMPANY
Alcatel 1850

InfoVision AWARD
WINNER

- Cost-optimized network consolidation
- Freedom in planning network resources, reduced investment risk

Core Network Features
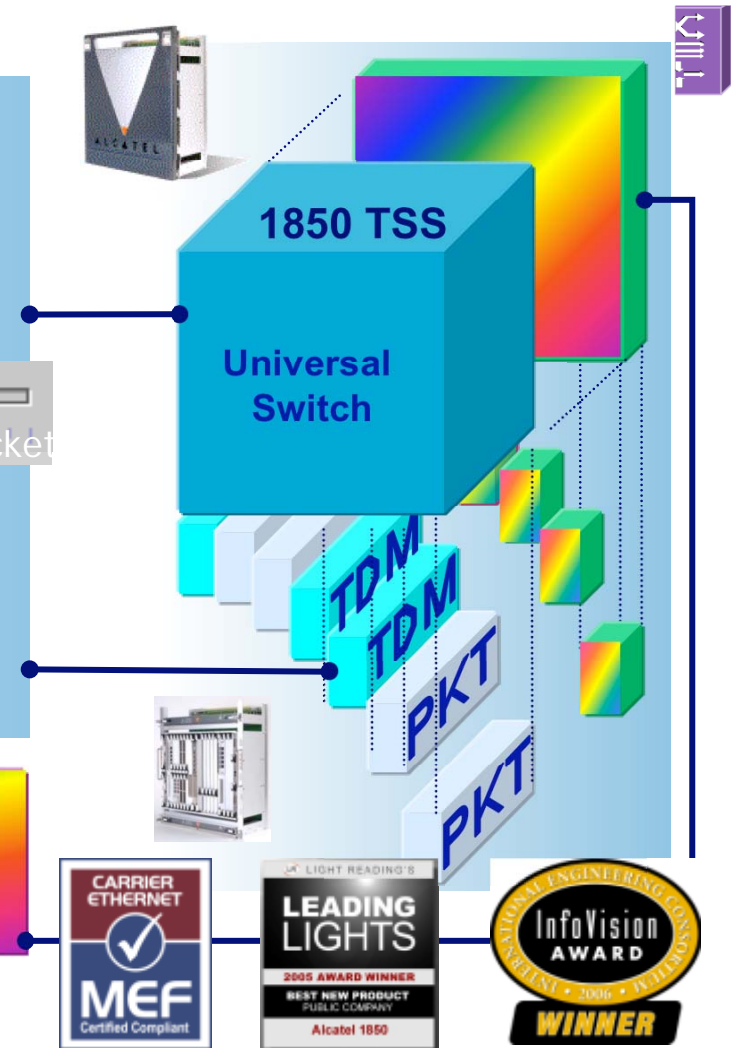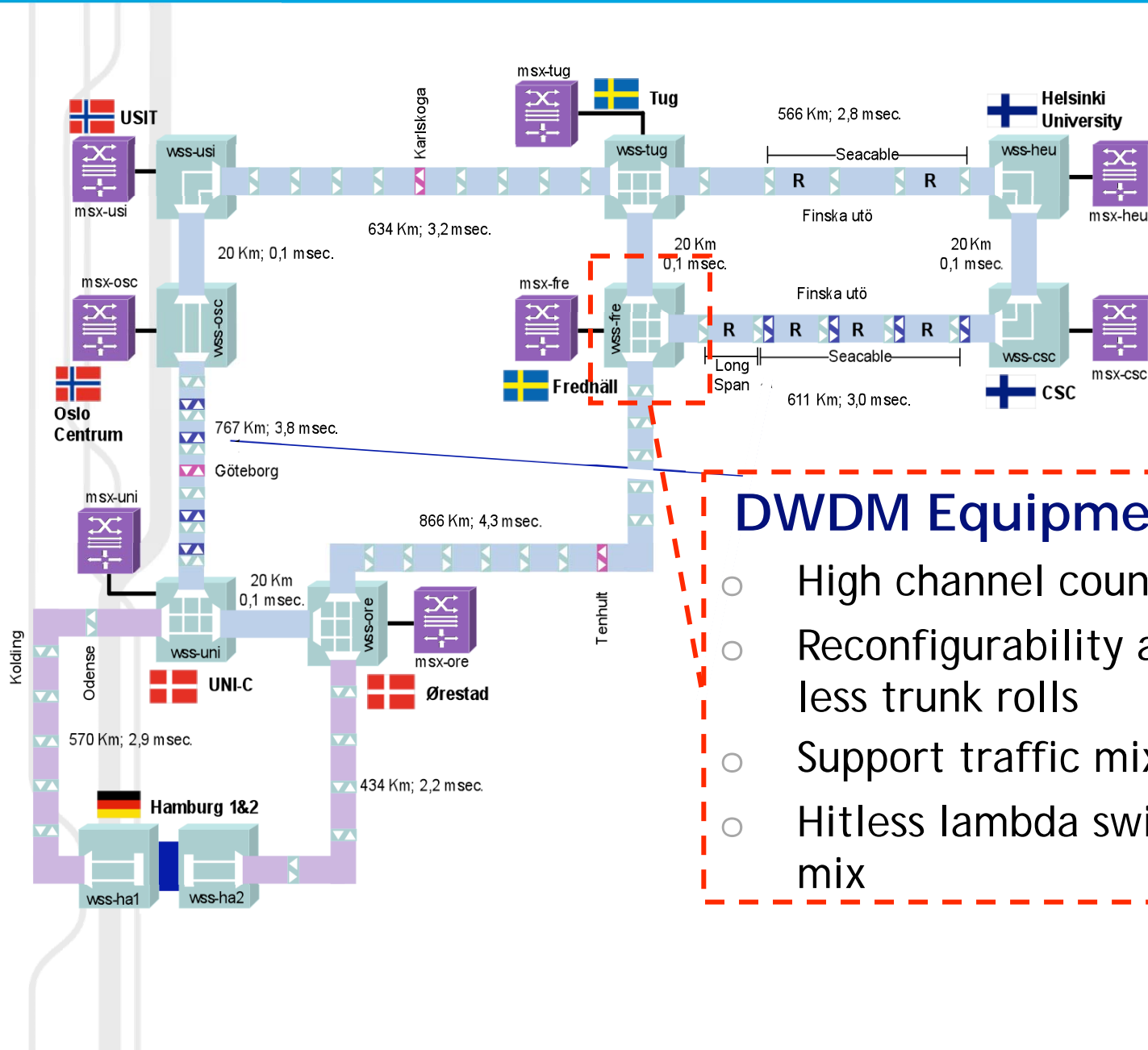
DWDM Equipment

- High channel count up to 88
- Reconfigurability and tunability for less trunk rolls
- Support traffic mix of 10G / 40G
- Hitless lambda switching of traffic mix
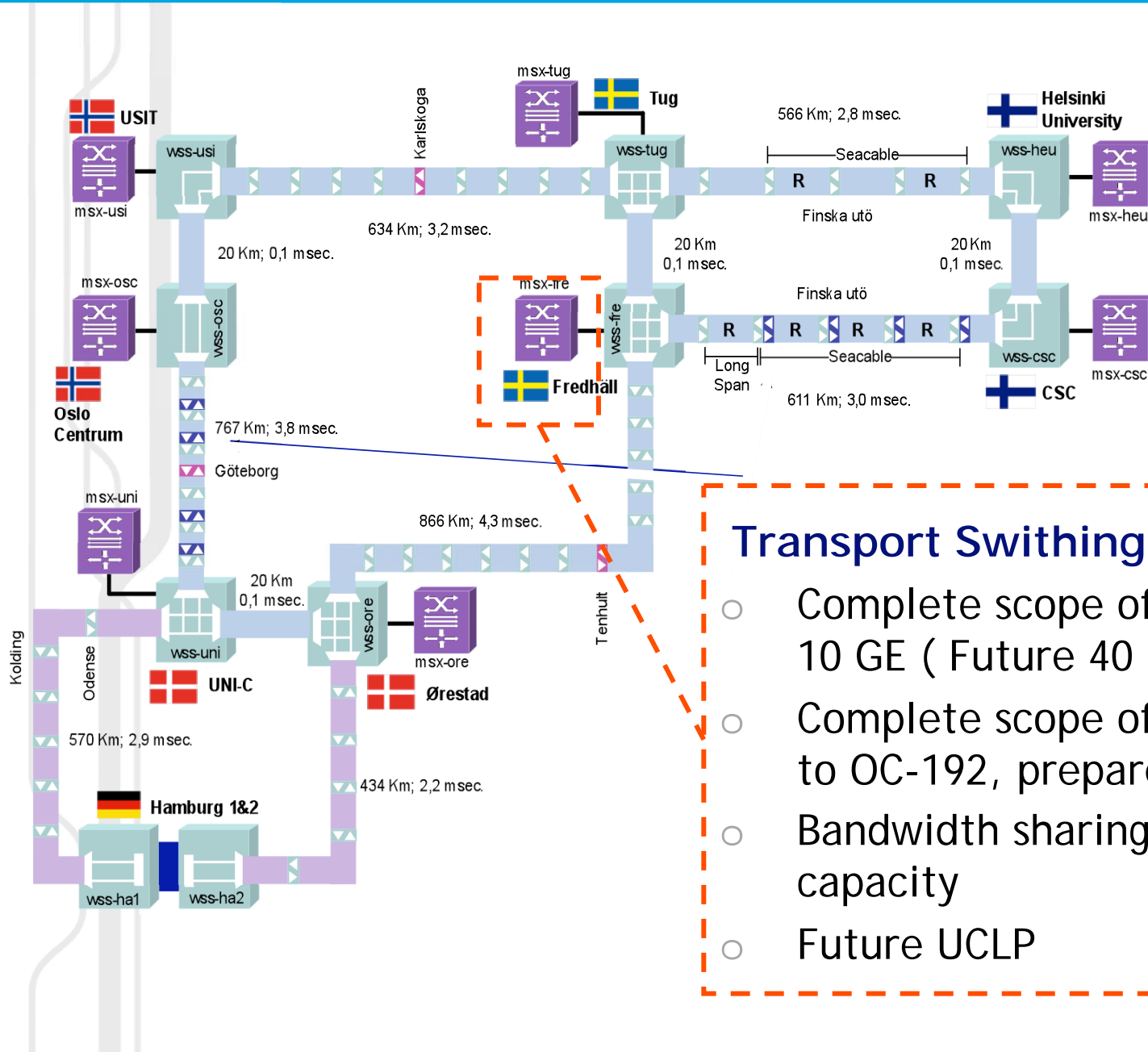
Transport Swithing Equipment

- Complete scope of Ethernet 1 GE, 10 GE (Future 40 & 100G)

- Complete scope of SDH / SONET up to OC-192, prepared for OC-768

- Bandwidth sharing, dynamic use of capacity

- Future UCLP

NORDUnet NorthenLight Optical X-Change

Unique Hybrid Architecture for Next-Generation Transport Switching

T-MPLS

TSS
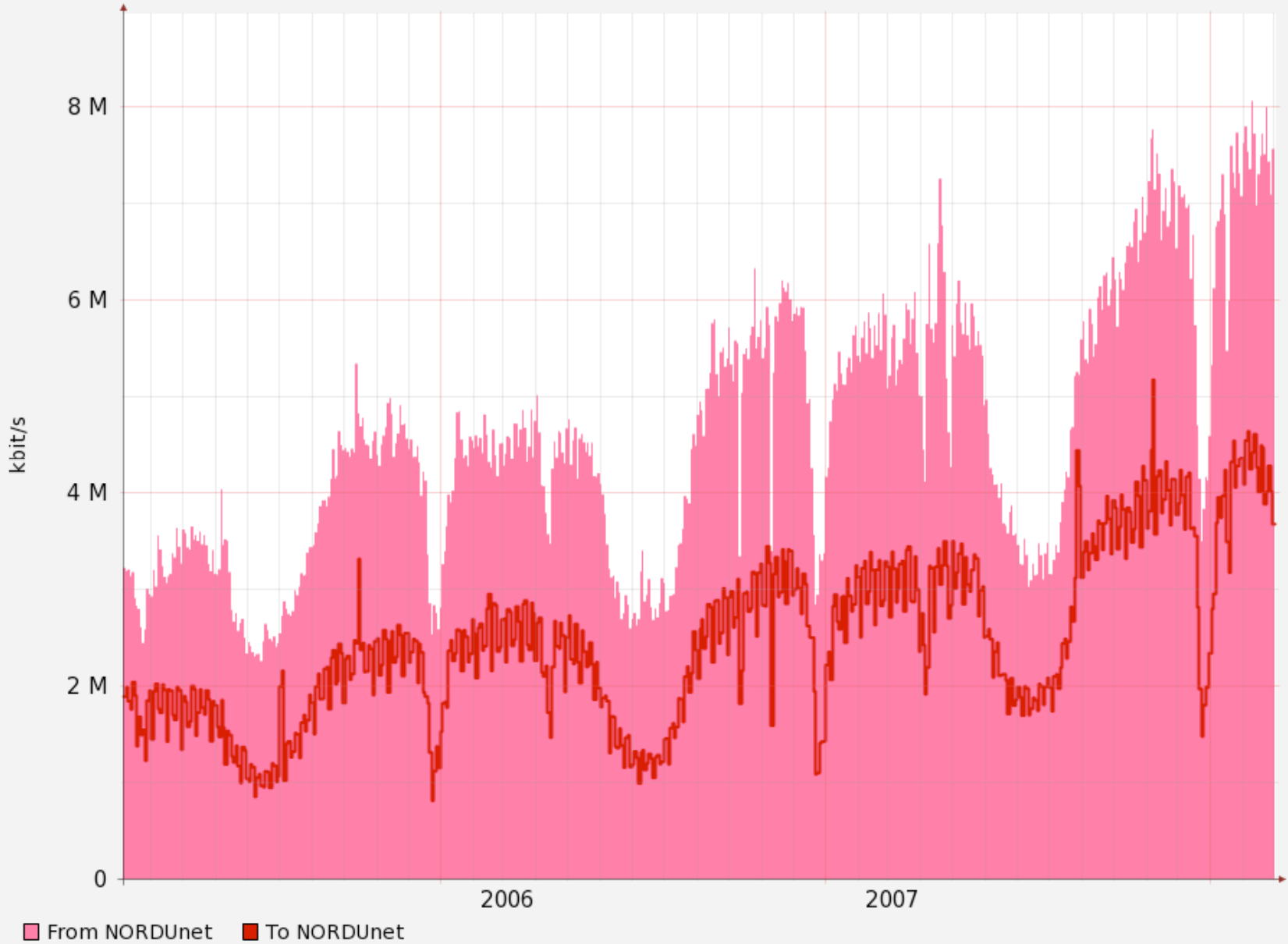
- ## A Distributed Open Optical Exchange
  - Redundant nodes in Copenhagen, Helsinki, Oslo & Stockholm
  - Connect anywhere, switch connections anywhere
- ## A GLIF Open Lightpath Exchange
  - Part of GLIF network of GOLEs
- ## Open
  - To all collaborators, Nordic and international
  - To all types of services

NORDUnet IP Network
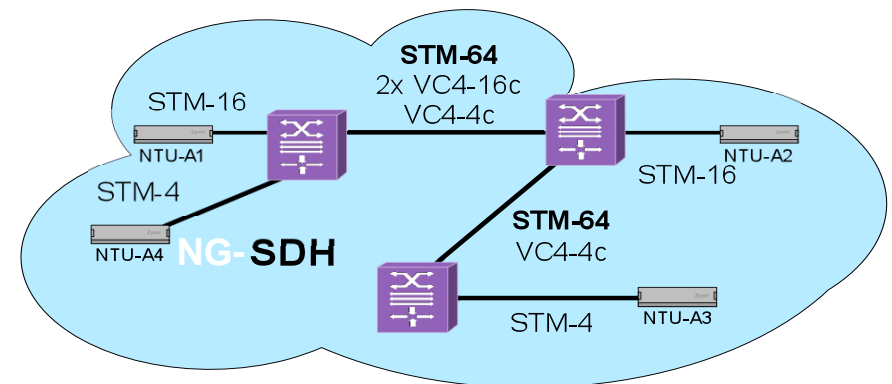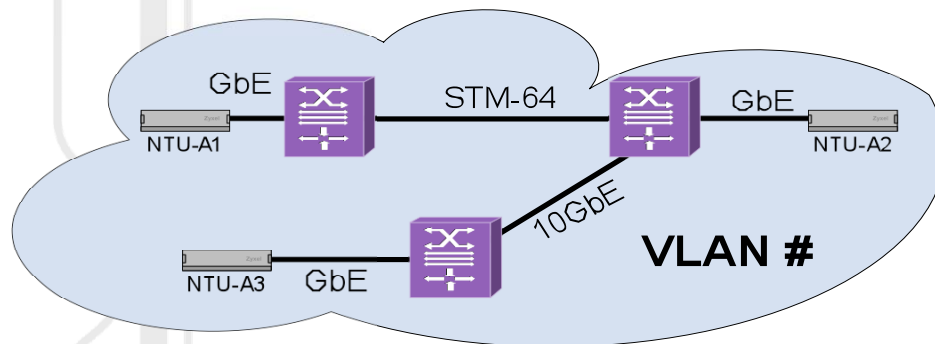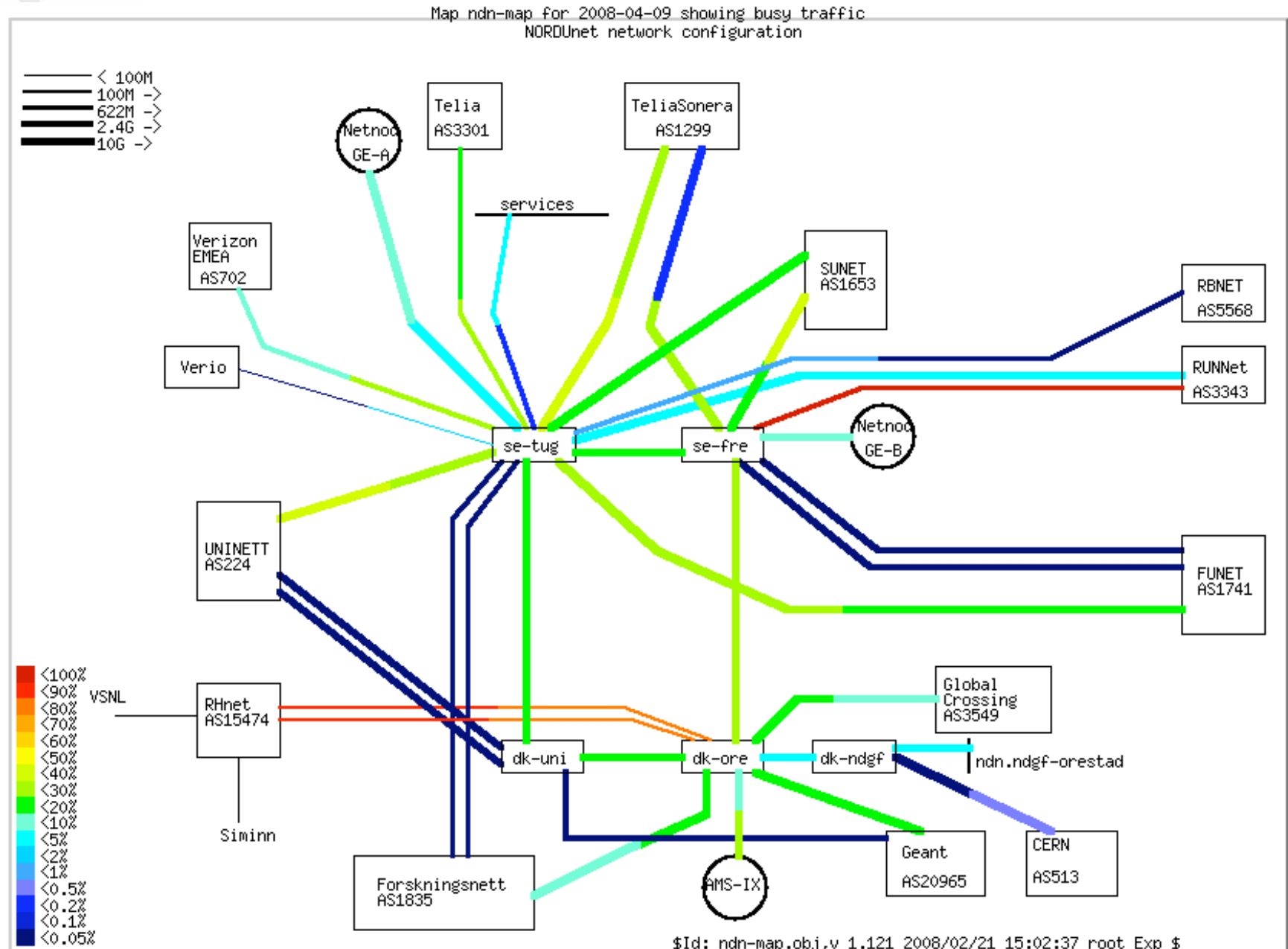
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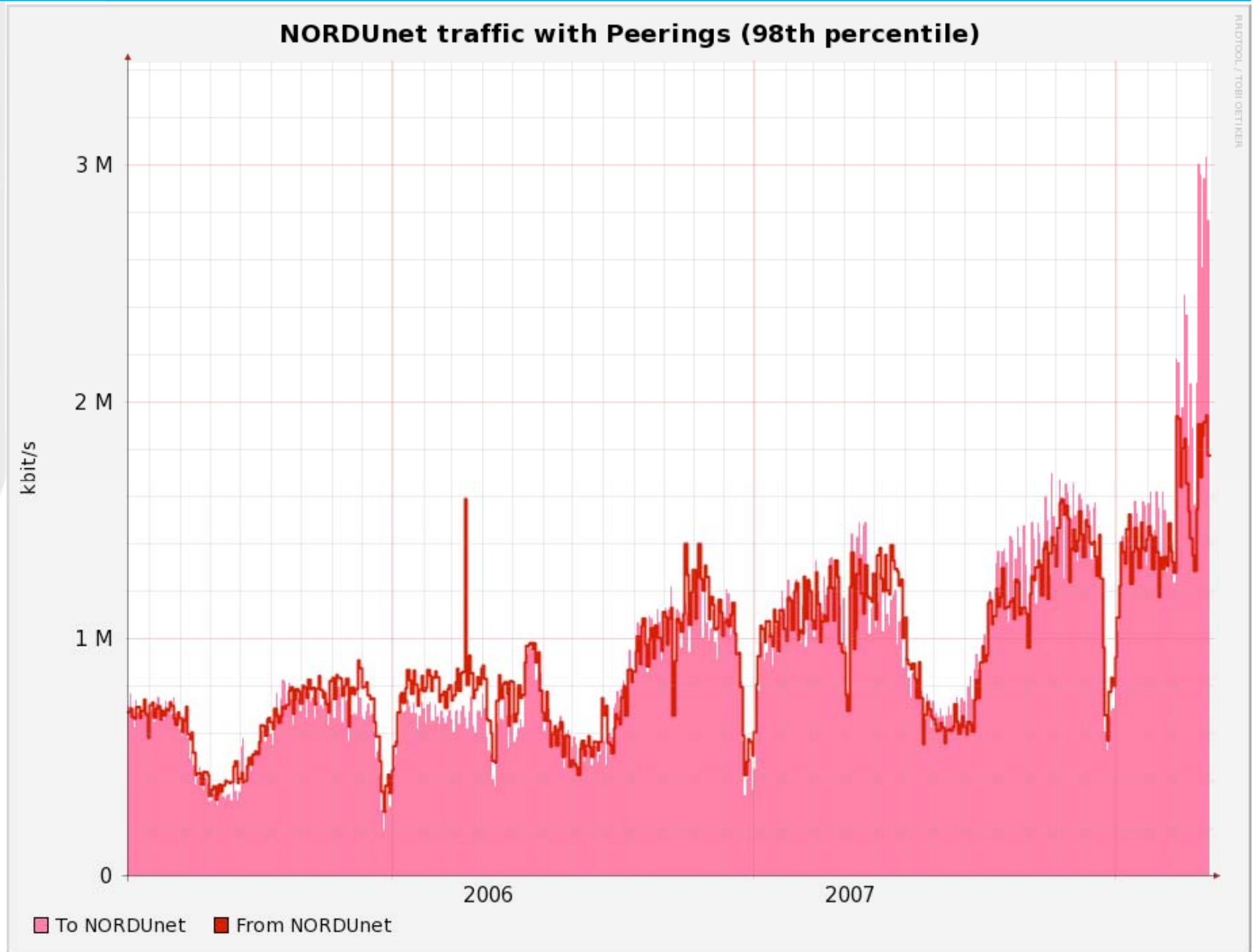
NORDUnet traffic with Peerings (98th percentile)
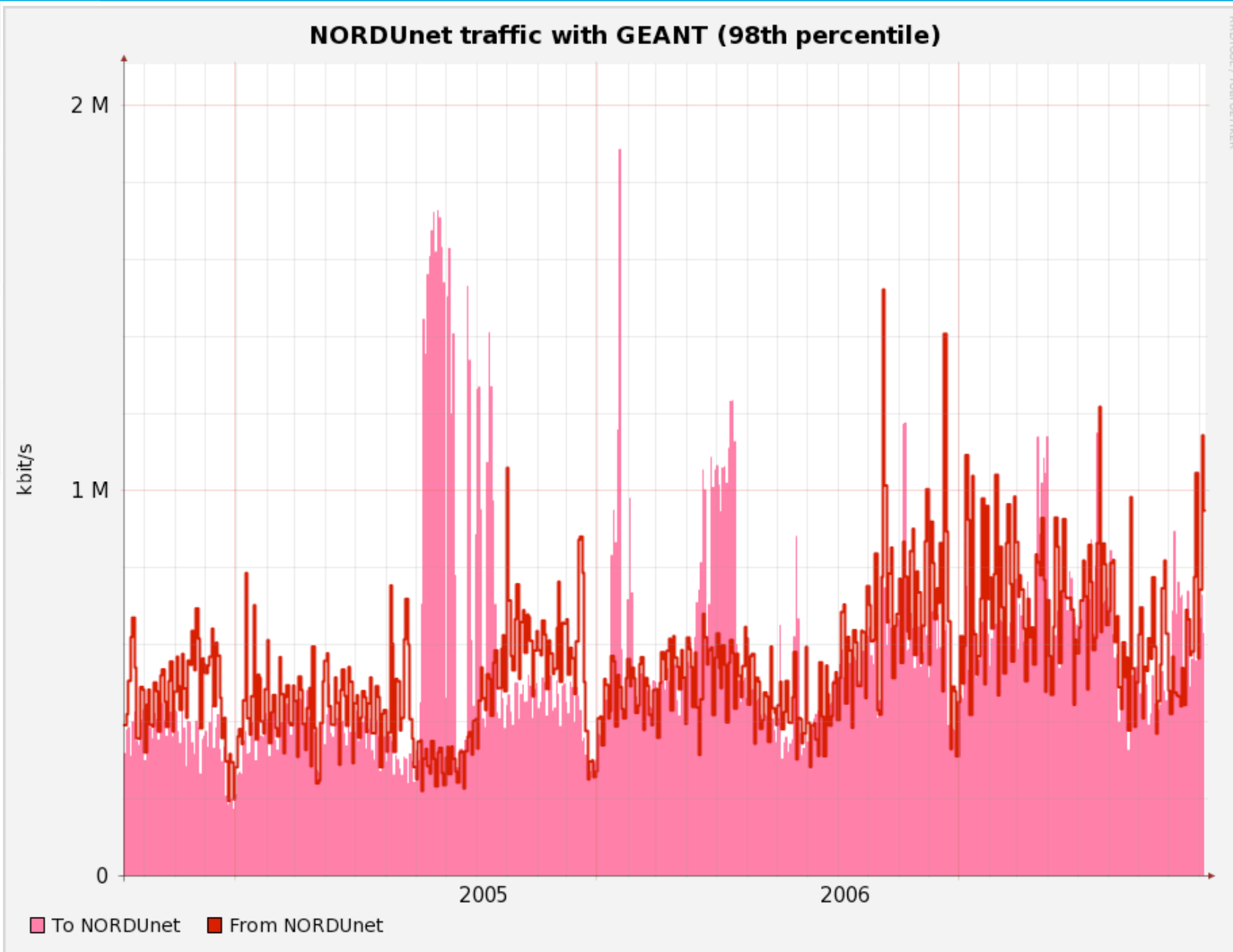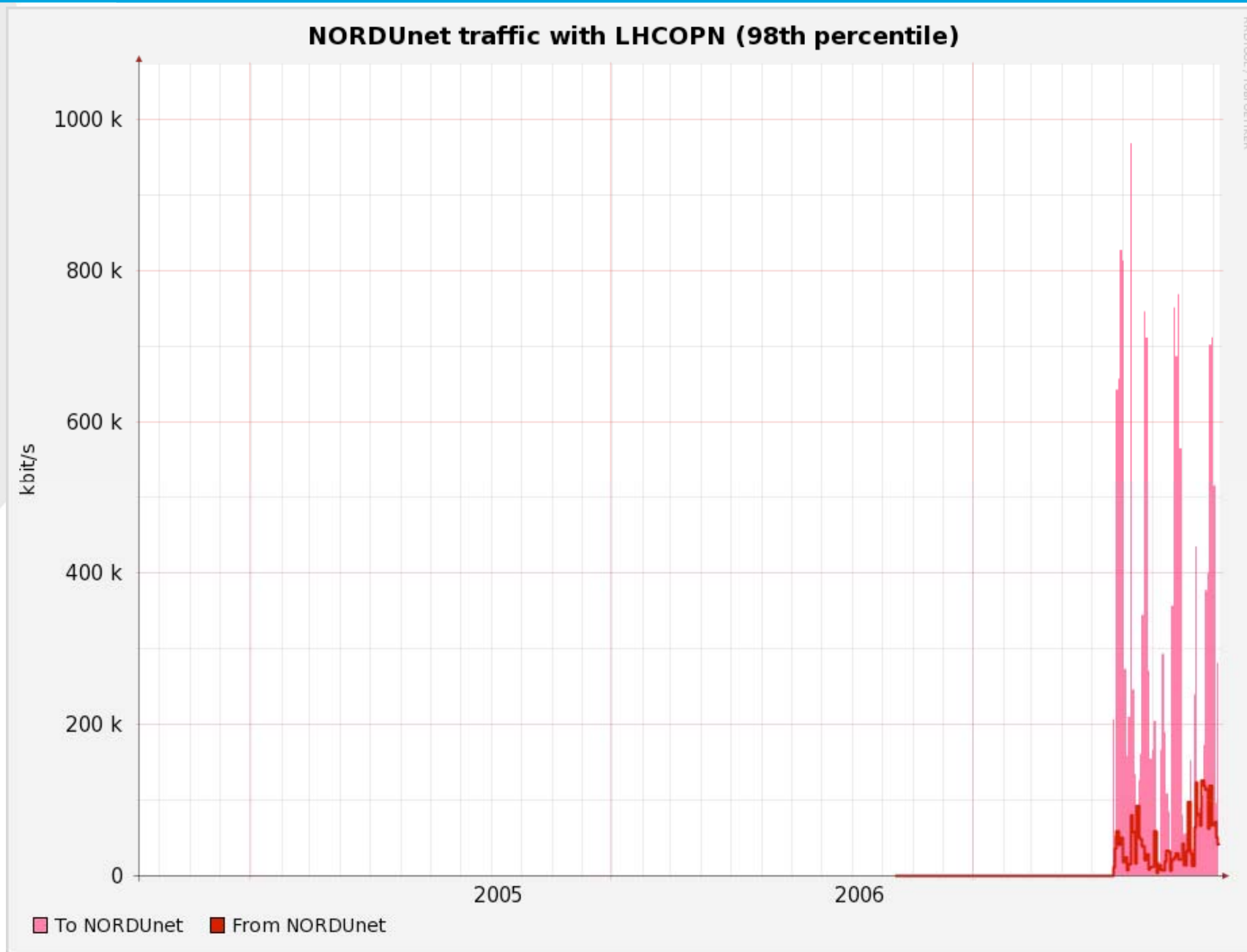
Active Users

- ## Nordic Tier-1 for CERN LHC (permanent)
  - established: 10 GE Copenhagen - CERN
  - planned: 10 GE Copenhagen -> Amsterdam, Oslo, Stockholm, Helsinki
- ## DEISA (permanent)
  - established: 10GE Helsinki – Frankfurt
- ## RBnet – Russian Network Transit (Permanent)
  - Established: 10GE Stockholm-Amsterdam
- ## RUNnet – Russian Network Connectivity
  - Established: 10GE Helsinki
- ## GLORIAD (Permanent)
  - Established: 10GE Amsterdam-Stockholm

Nordic Astronomy OPN (for e-VLBI & LOFAR, permanent)

immediate requirement:

- 4 Gbps Onsala - Jodrell Bank (UK)

additional need:

- 1 GE Onsala – Jive
- 1 GE Helsinki – Jive
- 4 Gbps Helsinki – Onsala
- 4 Gbps Helsinki - Jodrell Bank
- 3 Gbps Onsala - Dutch LOFAR site
- Work is in progress on creating an integrated OPN for Nordic astronomy that can encompass all.

Trondheim - Seoul medical imaging

- requirement: 1 Gbps Trondheim - Seoul

Stockholm - Seattle HDTV video conferencing

- requirement: 1 x 1 GE Stockholm - Seattle

Umeå – Amsterdam – 40 Gbit trial

- Requirement: 1xAlien Lambda Stockholm-Amsterdam

GEANT Lambda – Copenhagen Helsinki

- Requirement: 10GB Lambda for GEANT2 Connectivity to Russia

➢ Serve the Nordic NRENS
- o Nail down the Icelandic Connectivity Upgrade
- o The Upgrading Optical Backbone to VSS.
- o Build out Peering connections.
- o Passing the 10 Gbit/sec interface barrier.
- o Testing 40 Gbit/Sec technology.
- o Testing 100 Gbit/sec technology.
- o Integrated management of routers and optical system
- o Cross Platform management
- o OPN Support
- o Build out Portal / WIKI
- o Launch IPTV
- o ...

➢ Coordinate NORDIC NREN Development
- o Nordic Projects
- o GEANT Projects
- o Nordic Community Build

➢ eInfrastructure Services
- o Nordunet3
- o NDGF
- o ...

➢ International Dimension
- o Facilitating and Coordinating Local-Global-Local contacts and project opportunities.
- o GEANT 3 Project Planning
- o Global Projects

International Research Initiatives is focusing on:

◆ Being the main driving force in expanding the International Research Collaboration between the Nordic Countries and global key Research Initiatives and evangelizing the achievements of the Nordic NREN Community and the benefit of working with NORDIC Scientists.

◆ Working with global partners facilitating potential projects, contacts and research initiatives to the Nordic NREN community within:

- eInfrastucture
- Global Network integration and Network Provisioning Research
- GRID
- AAI
- eScience
- Astronomy
- High Energy Physics
- Environmental Research

NORDUnet Q2 2008

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                    ┌─────────────────────────────────────────┐
                    │             René Buch                   │
                    │               CEO                       │
                    │ Global Strategy & Political Representaiton│
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   ┌──────────────────────────────────┐   ┌──────────────────────────────────┐
   │          Susanne Reidel          │   │        Thomas Hyllested          │
   │        Senior Accountant         │   │     Service & Contract Manger    │
   │  Finance Reporting & Project Support │   │     Project & Contract Support   │
   └──────────────────────────────────┘   └──────────────────────────────────┘
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Lars Fischer	Jerry Sobieski	TBH	External Projects hosted by NORDUnet
CTO	Director (From May 1sts 2008)	Chief Network Operating Office	
Interntional Reserach Initiatives	International Reserach Initiatives	NUNOC	
Nordic & Europe	Americas & Asia Pac.	Operation and Technical Community Build	

	Stefan Liström	Project Coordinator
	NUNOC	Nordunet3
	Level 1 Manager	

	Per Nihlen	Project Coordinator
	IP Network manager	NDGF
	Level 2 IP Support	

	Tony Breach
	Optical network Manager
	Level 2 Optical Support

http://www.nordu.net/ndnweb/the_nordunet_team.html

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