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# NORDUFiber Status March 2007

**Tony Breach, Optical Network Manager**

**13. marts 2007**



# Index

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Organisation Diagram

Background and Objectives

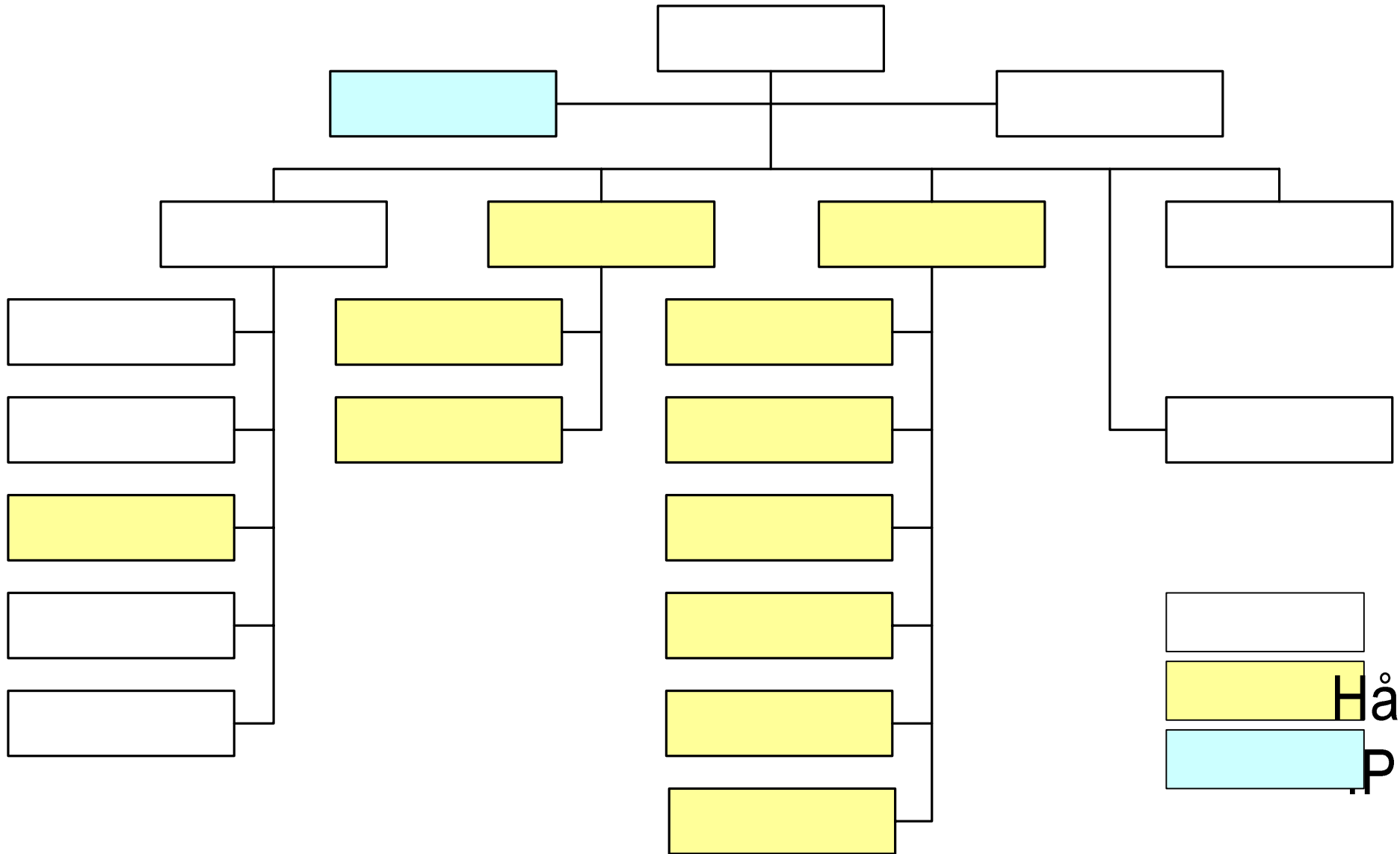
NORDUFiber Suppliers

NORDUFiber

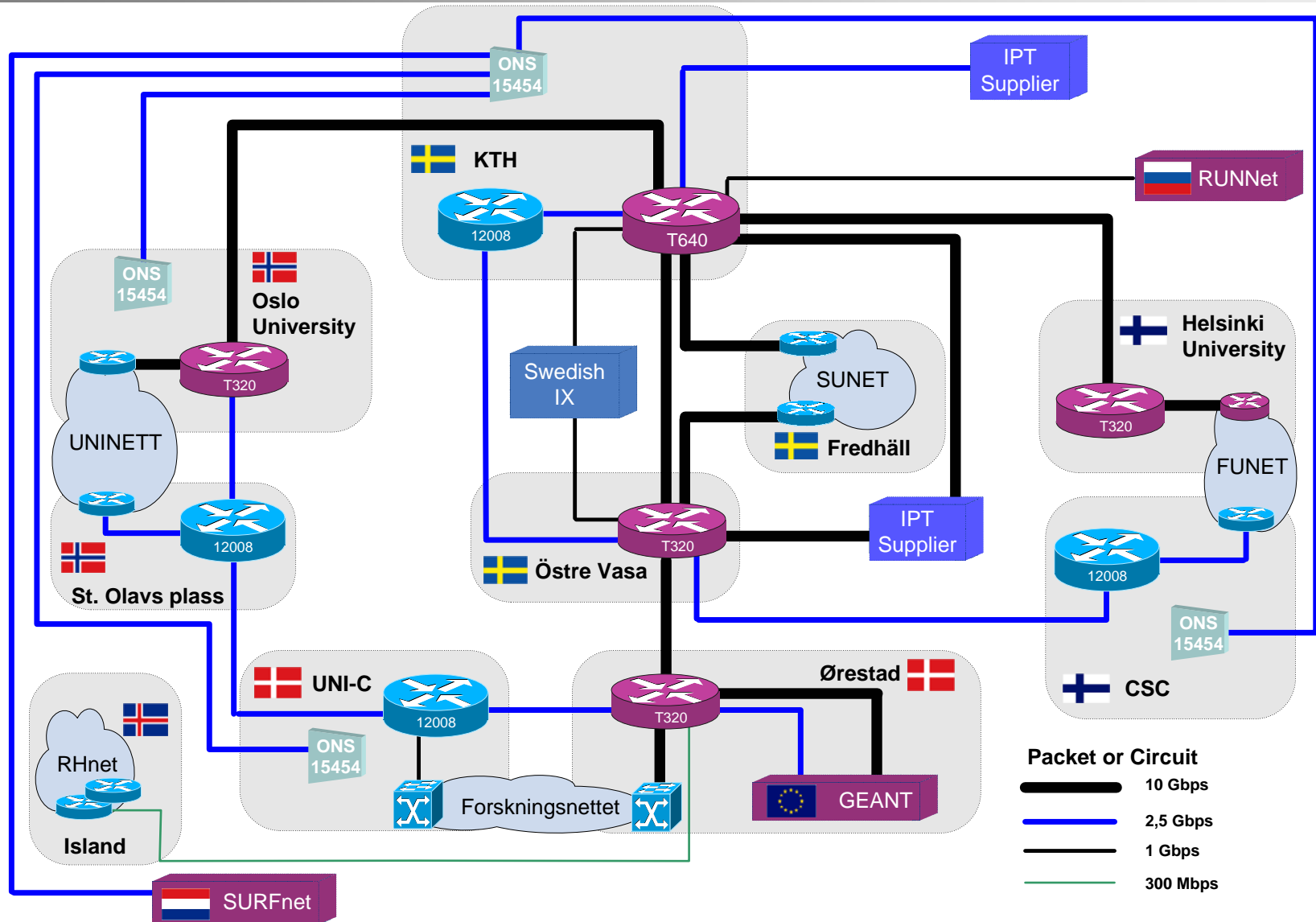
Network Services

Connectivity to World

# Organisation Diagram



# NORDUnet - Current Leased Line Network



# NORDUFiber Background and Objectives

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- Move from a Leased Line to a Dark Fiber infrastructure
- Accommodate the future demands for capacity
  - High-speed Internet
  - Lambda circuits
  - Private light path services
- Deployment of an Distributed Optical Exchange
  - Stockholm, Copenhagen, Helsinki and Oslo
- Equipment - Cutting edge technology
  - LH/ULH DWDM
    - Channel count above 64x 10G
    - 40G ready
  - Multi Service Transport Platform – Optical Exchange
    - Handel Circuit and Packet based traffic
    - Targeting User Controlled Provisioning
- Fulfill these requirements without a budget increase



# NORDUFiber Suppliers

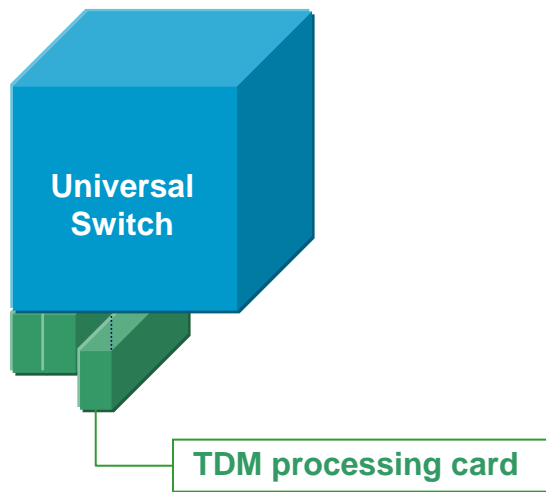
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- The Dark Fibre Network has been provided by
  - **Telenor**
    - Scandinavian Ring
    - Finland Link
  - **Global Crossing**
    - Southern Cross
- The Equipment has been provided by
  - **Alcatel-Lucent**
    - 1626 Light Manager
    - 1850 Transport Service Switch

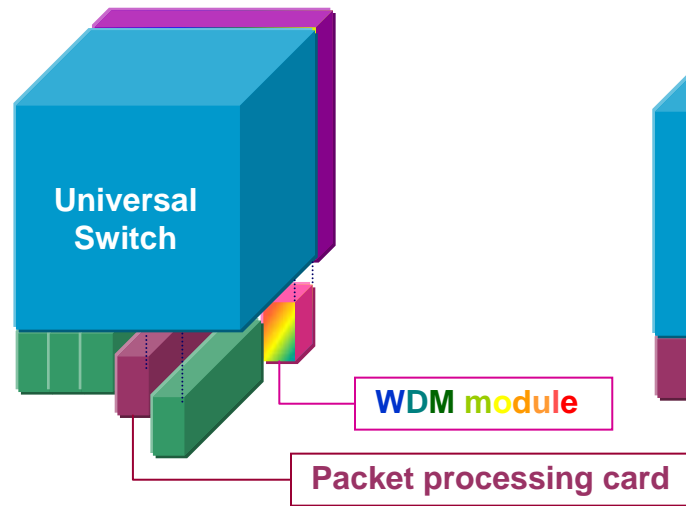
# Optical Exchange/Northern Light – 1850 TSS

Single platform addressing any transport need now and in a near future

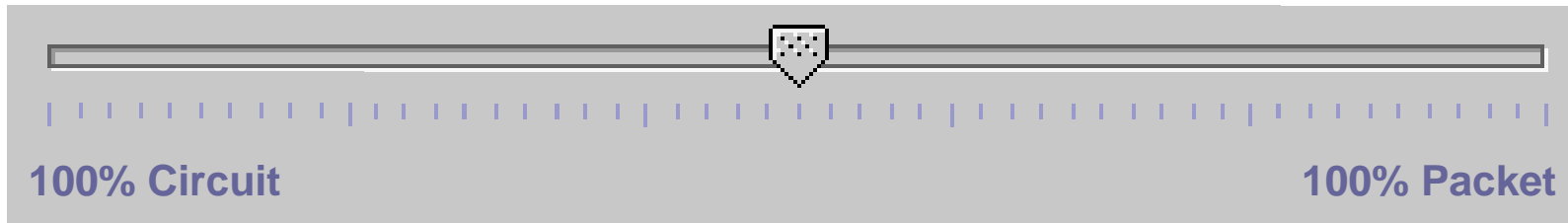
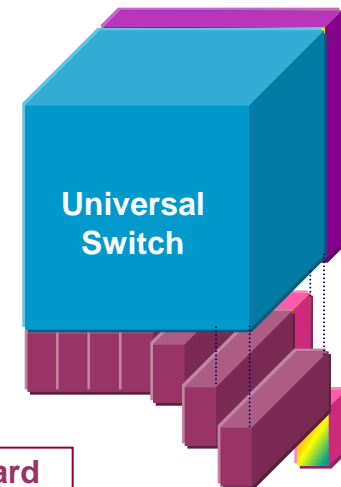
SONET/SDH model



MSPP model



Carrier Ethernet transport model



Accommodates any traffix mix of circuits, packets and lambdas

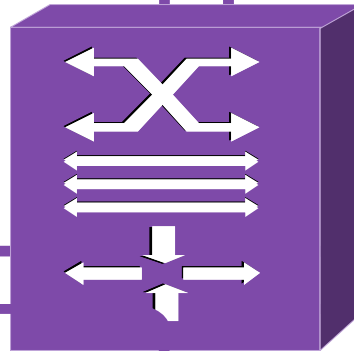
# Optical Exchange – High level Features

## SDH/Sonet

- STM-1, 4, 16 & 64
- Cross-Connection
- Termination
- ETH Mapping over SDH
- Complete Scope of SDH/Sonet Features

## Ethernet

- 10GE LAN/WAN - Optical
- GE - Optical
- 10/100/1000 - Electrical
- ETH Traffic Classification
- Complete Scope of Ethernet Features



## CWDM

- Terminal, Hub, OADM Ring
- Stacked C-WDM Rings

## MSPP

- CLI, SNMP and TL1
- 2007 GMPLS feature set

**1850 TSS-320**

# 1626 Light Manager: Day one Release

- Multi-reach Platform
  - LH/ULH up to 88 channels
  - Add/drop 88 channels
  - 50 GHz filter grid
- Long Haul
  - Fully Reconfigurable OADM
- Automatic system alignment
- All interfaces are tuneable over the complete C-band
  - 10G transponder
    - STM-64
    - 10GbE WAN & LAN
  - 4x 2.5G transparent concentrator
  - 40G transponder
  - 4x 10G concentrator
- Embedded Optical Protection
- Raman Amplification



- UNIQUE System
- Same modules for OADM and ILA
  - Shelf
  - Amplifier

# 1626 Light Manager Tuneable-OADM: 2007

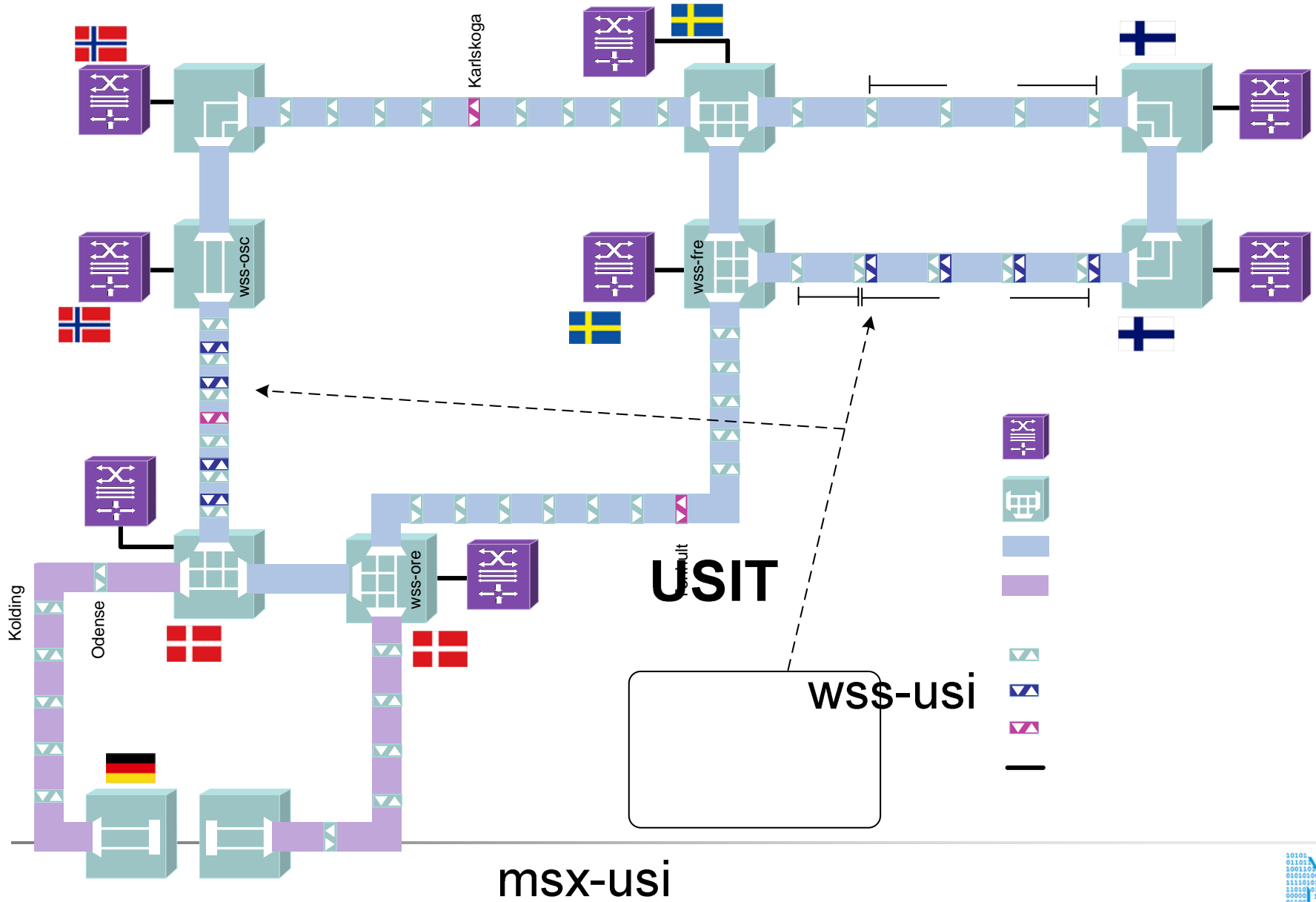
- Wavelength Selective Switches
  - LH/ULH up to 88 channels
  - Add/Drop 64 channels
- Enhanced functionality
  - Tuneable filters
  - Any mix of 50 and 100 GHz filters
- Long Haul:
  - Fully Tuneable OADM
- Fully C band tunable interfaces over any interface
  - 10 G Universal Transponder
    - STM-64
    - 10GE WAN & LAN
  - 40G transponder
    - PSBT (50 GHz - SH)
    - DPSK (100 GHz – LH/ULH)



GMPLS

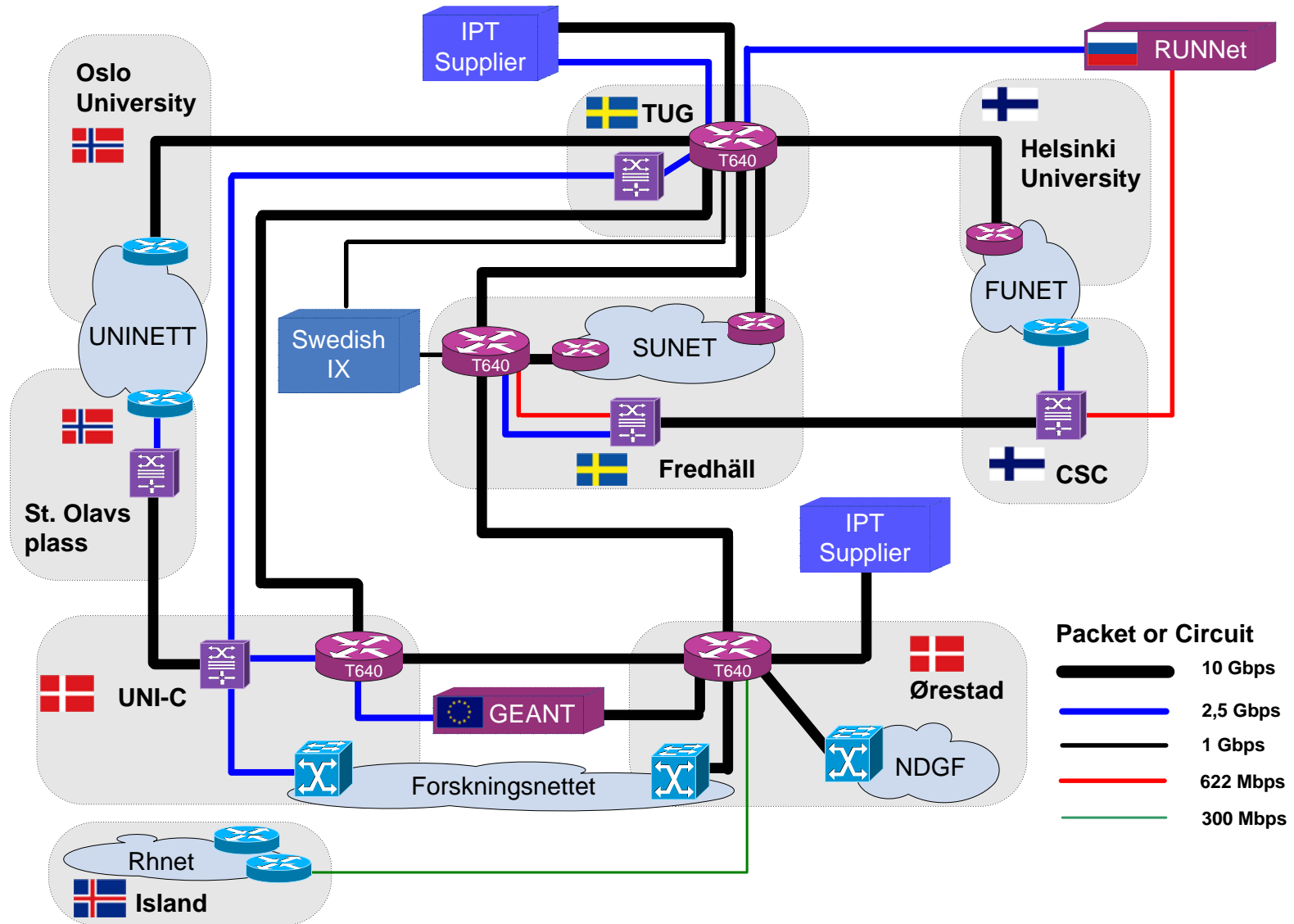
WSS 1:9

# NORDUFiber



```
10101 11110
01101 10101
10010 10010
010100100001
11110101010001
11010010101010
00000 101010
01100 01100
```

# NORDUnet IP Based on NorduFiber



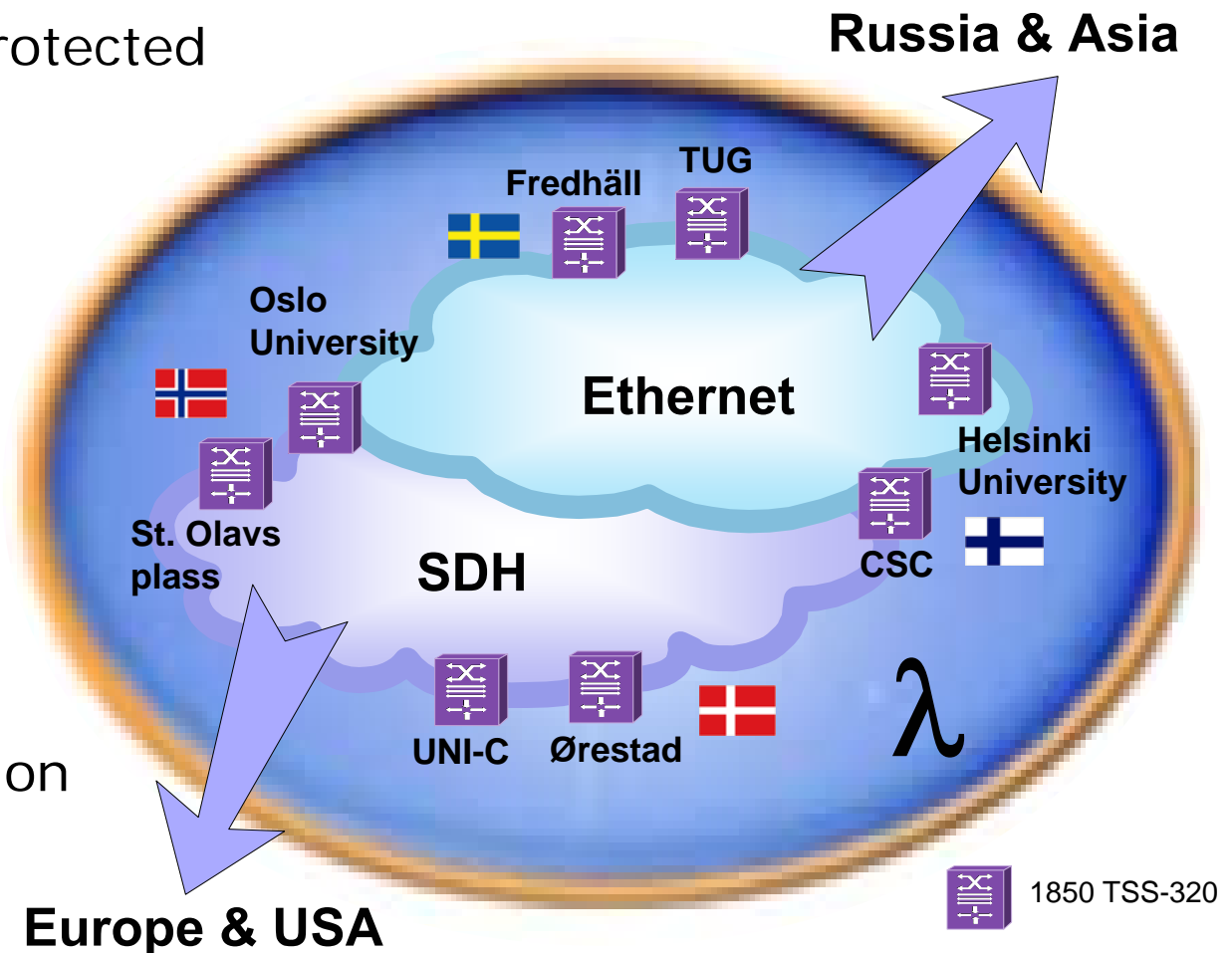
# Northern Light – Optical Exchange

## Services

- Protected & Unprotected
- Over subscribed
- VLAN
- P2P
- P2M

## Application

- Northern Light
- NGDF
- GLORIAD
- SDH Concatenation



# Network Services to be Offered

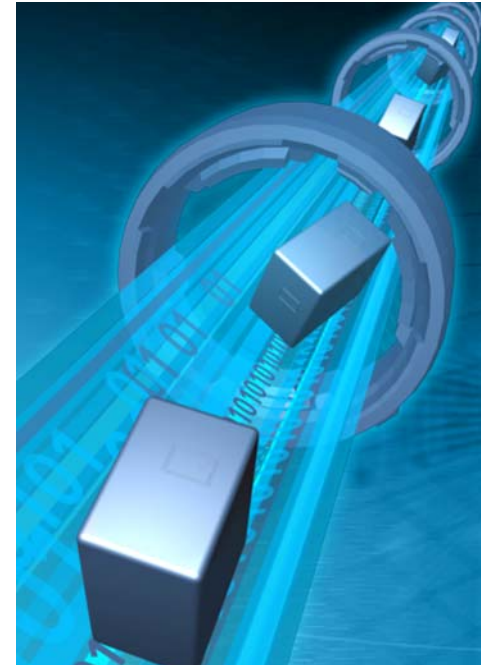
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## Interfaces type:

- STM-256
- STM-64
- STM-16
- STM-4
- STM-1
- 10GE (LAN/Wan)
- 1GE
- RAW (unframed) OTU1, OTU2 and OTU3

## Service characteristics:

- IP
- P2P
- P2M
- Protected, Unprotected, Over subscribed
- VLAN/VPN solutions
- Root name server (I-root)



# Network Operation Centre - NOC



**Stockholm  
Primary  
NOC**

**Copenhagen  
Secondary  
NOC**

# Connectivity to Europe, USA, Russia and Asia

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## Europe

- Ørestaden
  - Interconnection to GEANT2
    - GE, 10GE WAN/LAN, STM-64



## Europe and USA

- Hamburg Wendenstrasse – Main POP
  - Interconnection to SURFnet – Nether Light
    - STM-1 to STM-64, GE, 10GE (LAN/Wan)
    - OTU1, OTU2 and OTU3

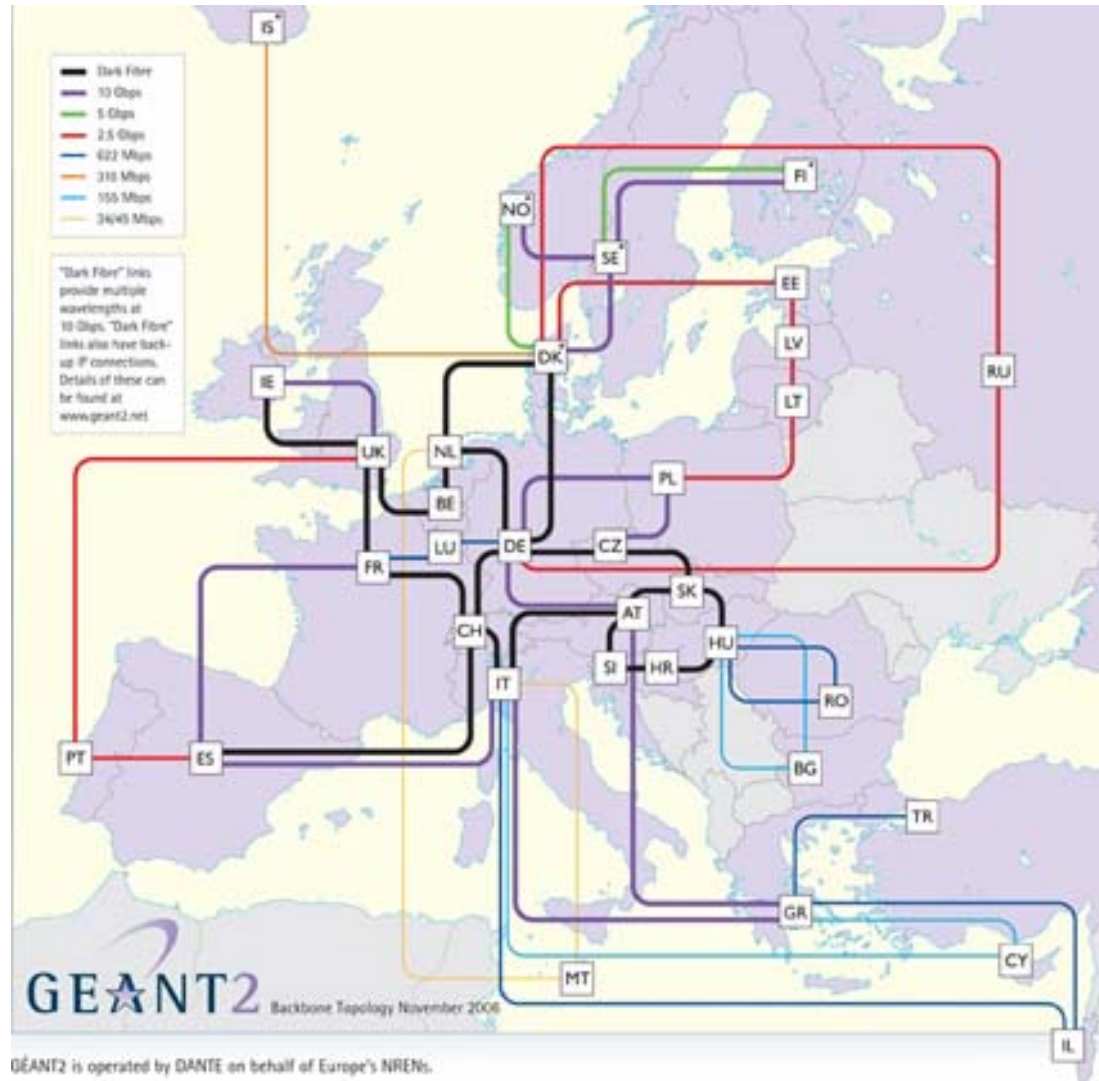


## Russia and Asia

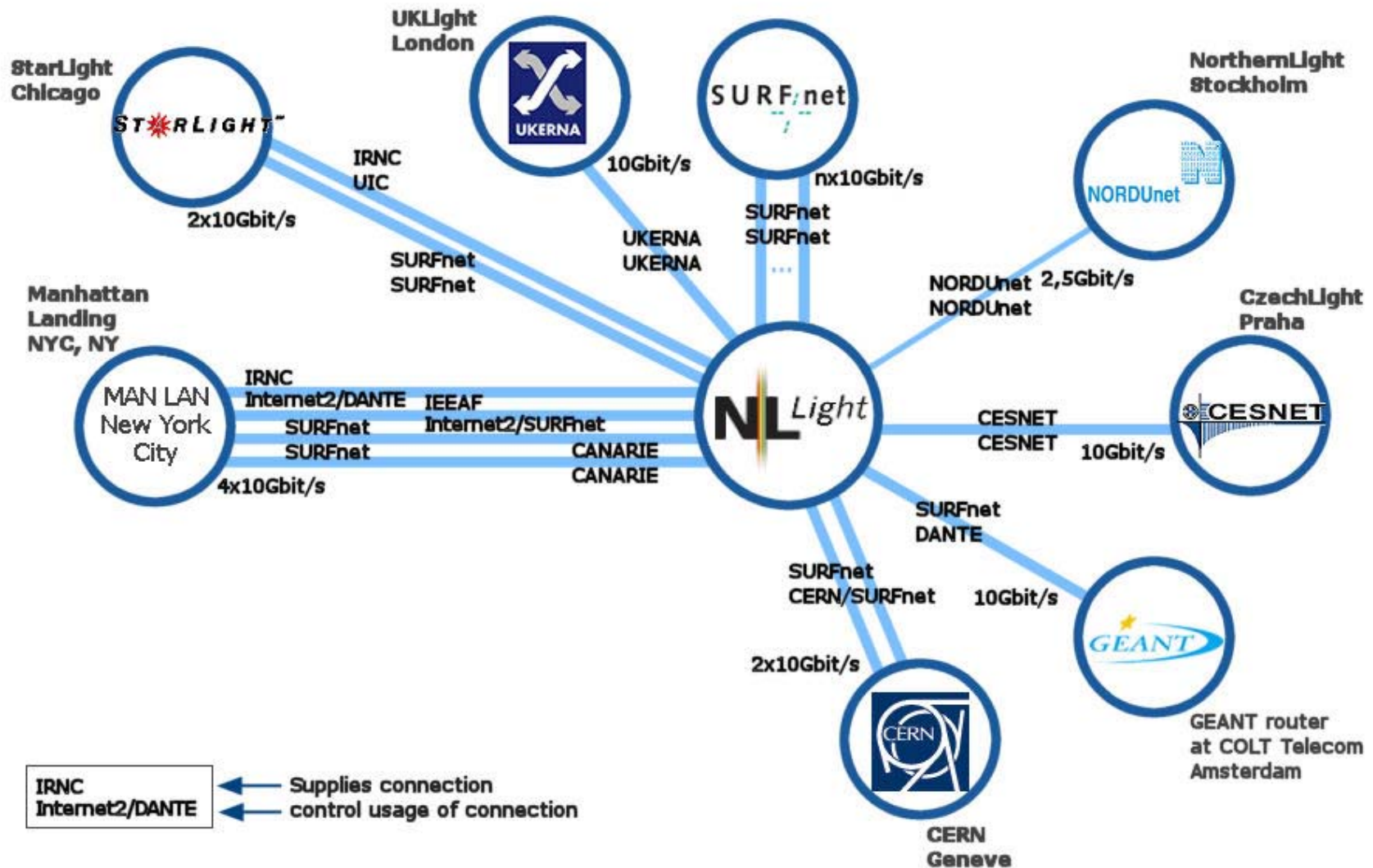
- Helsinki and Stockholm interconnection to RUNNet
  - GE and STM-4



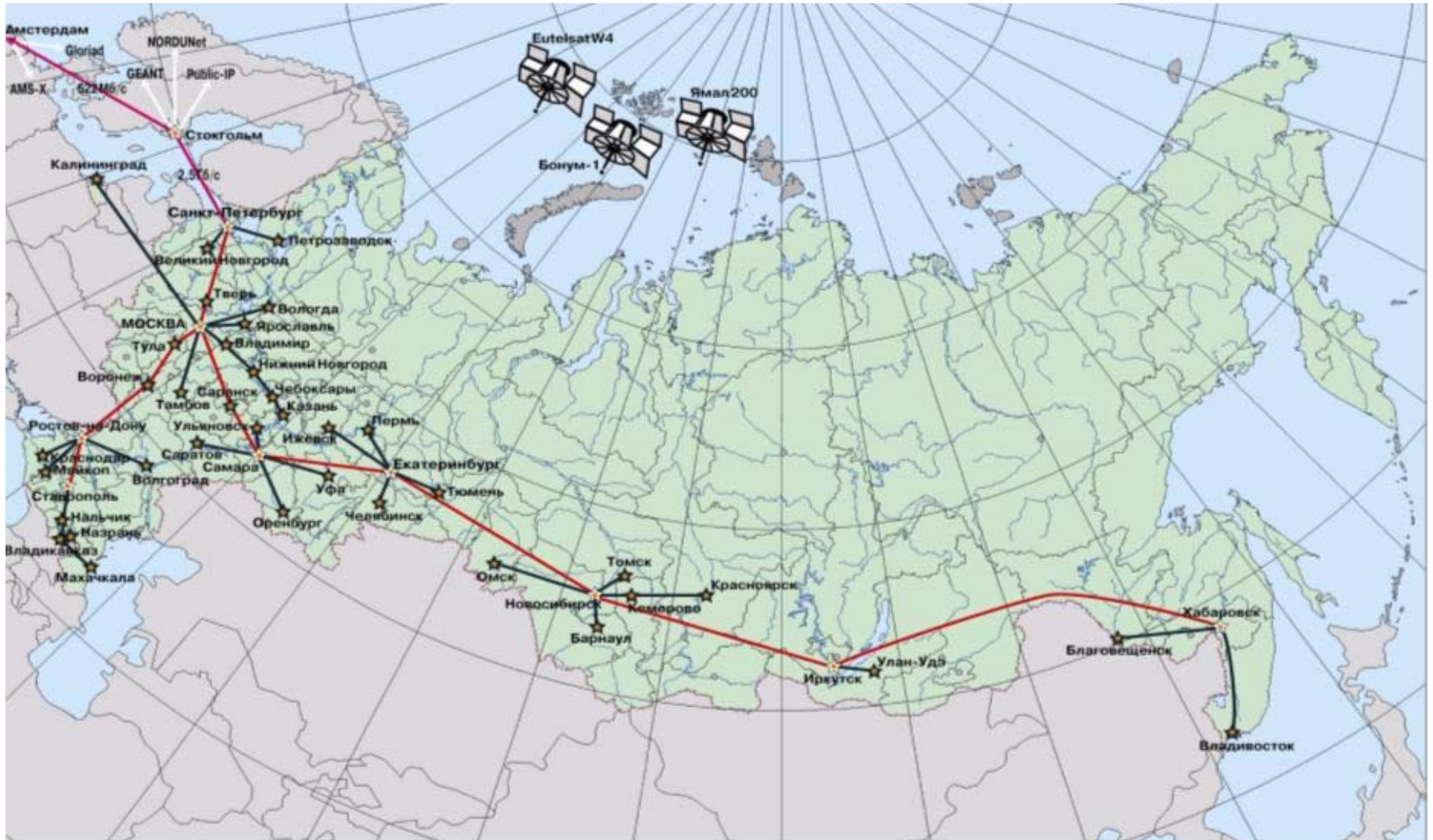
# GEANT2



# SURFnet and Nether Light



# RUNNet



# Time Line - NORDUFiber

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- Scandinavian Ring – end March 2007
- Finland Link – end March 2007
- Southern Cross – mid May 2007
  
- Project on track

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# End Of Presentation

## Questions...

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10101 11110  
01101 10101  
10010 10010  
01010010001  
111101010001  
11010 01010  
00000 101010  
01100 01101