# NORDUnet & The Baltic Ring

## René Buch

### CEO

# NORDUnet

**Nordic Infrastructure for Research & Education**
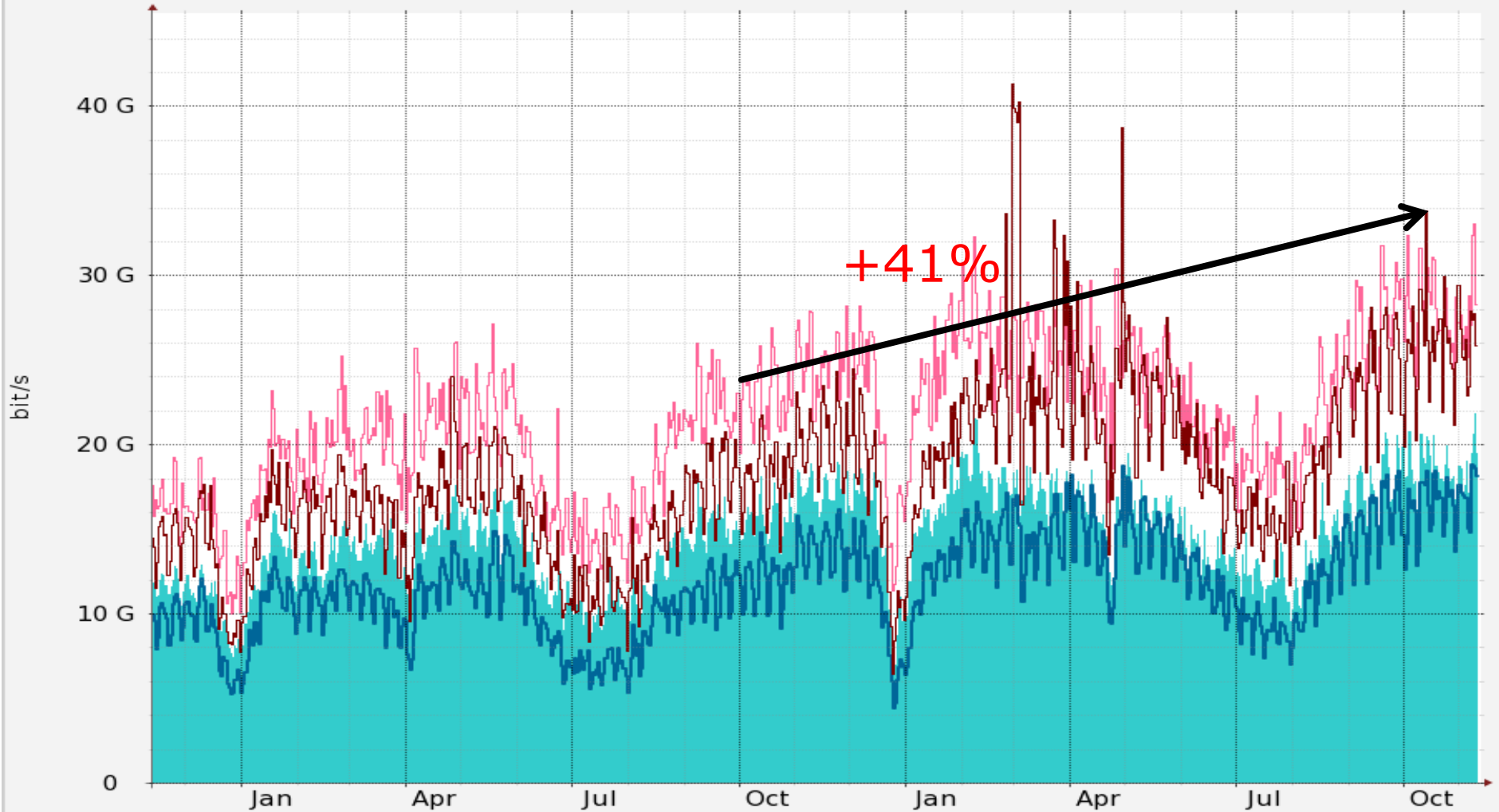
- The NORDUnet Network
- The NREN Challenges
  - NORDUnet 2020 Paper
  - The Geant Expert Group Report
- The Baltic Ring Project
  - The 5th Freedom
  - The Baltic Network Project
  - The BRAIN Project

# The Network

# NORDUnet
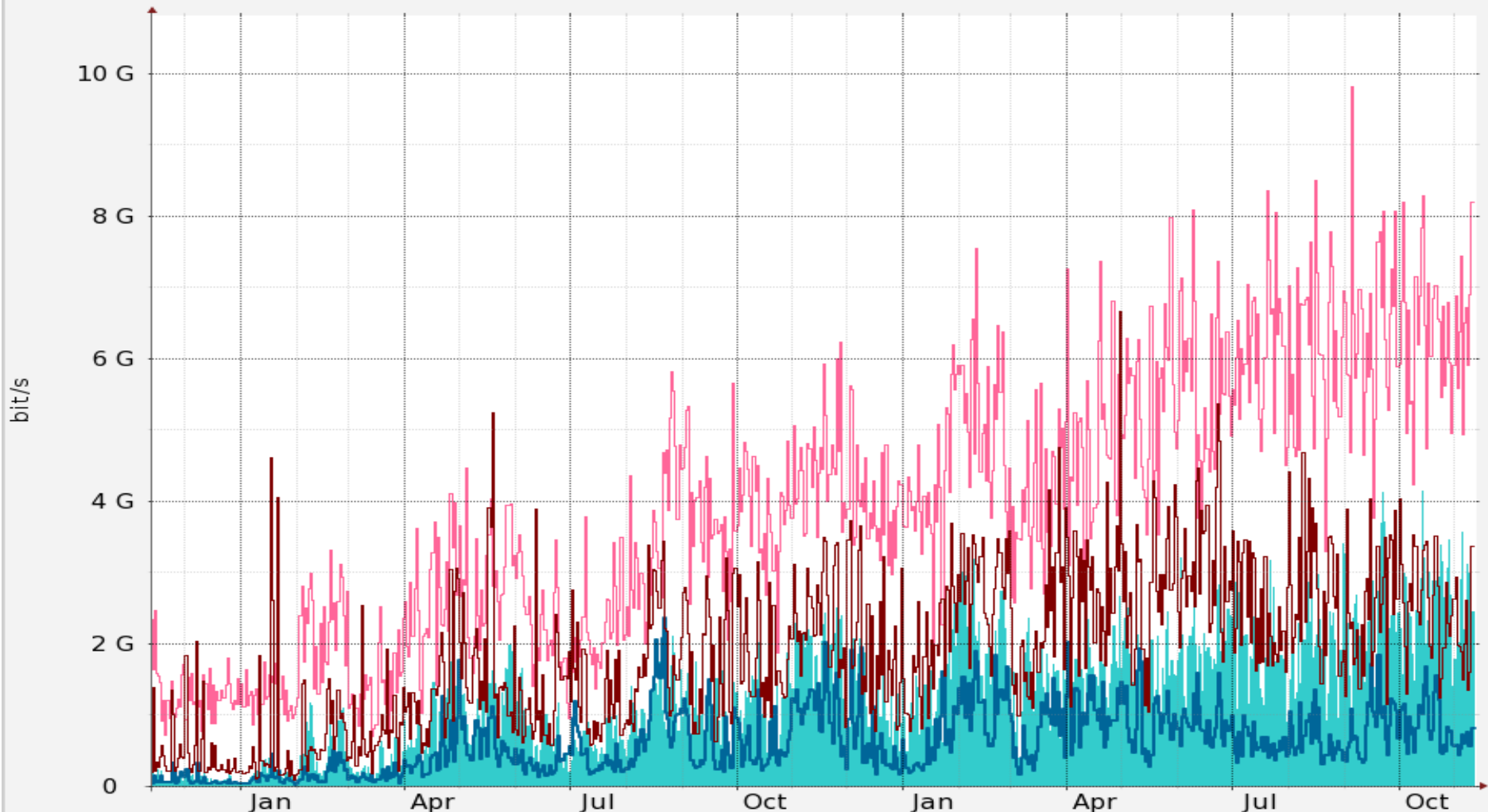**Nordic Infrastructure for Research & Education**

## Some Numbers ... Nordic NRENs

**NORDUnet traffic with Customers**

RRDTOOL / TOBI OETIKER

+41%

| | | | | | |
|---|---|---|---|---|---|
| ▉ Avg In | Avg: | 14.57G | Max: | 21.80G | Last: | 19.50G |
| ▉ Avg Out | Avg: | 11.81G | Max: | 18.82G | Last: | 18.15G |
| ▉ Max In | Avg: | 21.61G | Max: | 33.09G | Last: | 28.30G |
| ▉ Max Out | Avg: | 18.38G | Max: | 41.35G | Last: | 25.88G |

Each averaged data point is averaged over 24 hours   Each max data point is 5min max in 24 hours interval
Direction is as seen from NORDUnet

Updated 01:00 Fri 11 Nov 2011

# NORDUnet
Nordic Infrastructure for Research & Education

# Some Numbers … NDGF

## NORDUnet traffic with NDGF

| | | | | | | |
|---|---|---|---|---|---|---|
| ▬ Avg In | Avg: | 1.32G | Max: | 4.13G | Last: | 2.45G |
| ▬ Avg Out | Avg: | 612.35M | Max: | 2.36G | Last: | 817.99M |
| ▬ Max In | Avg: | 3.87G | Max: | 9.82G | Last: | 8.19G |
| ▬ Max Out | Avg: | 1.88G | Max: | 6.66G | Last: | 3.36G |

Each averaged data point is averaged over 24 hours   Each max data point is 5min max in 24 hours interval
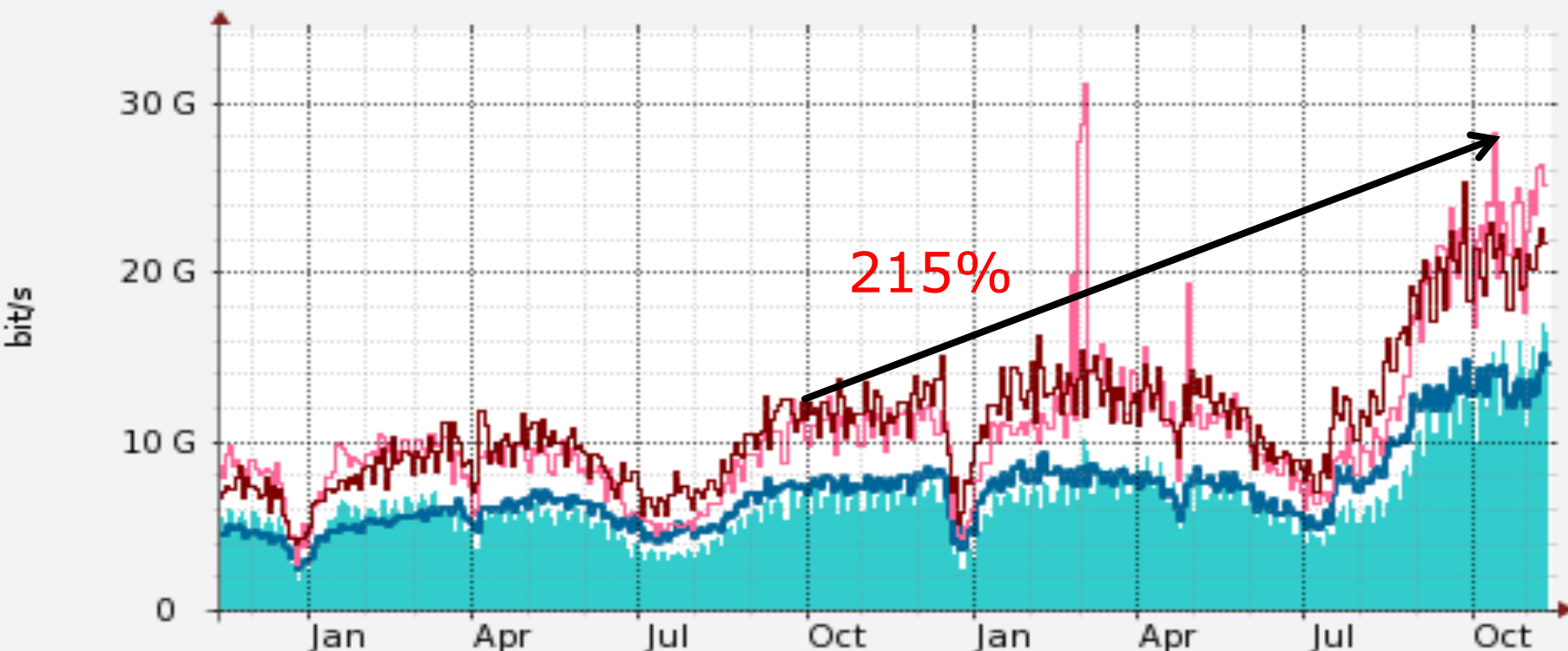Direction is as seen from NORDUnet

Updated 01:00 Fri 11 Nov 2011

# Some Numbers ... GN3

NORDUnet — Nordic Infrastructure for Research & Education

# NORDUnet
Nordic Infrastructure for Research & Education

# Some Numbers ... Peering



NORDUnet traffic with Peers

RRDTOOL / TOBI OETIKER

bit/s

215%
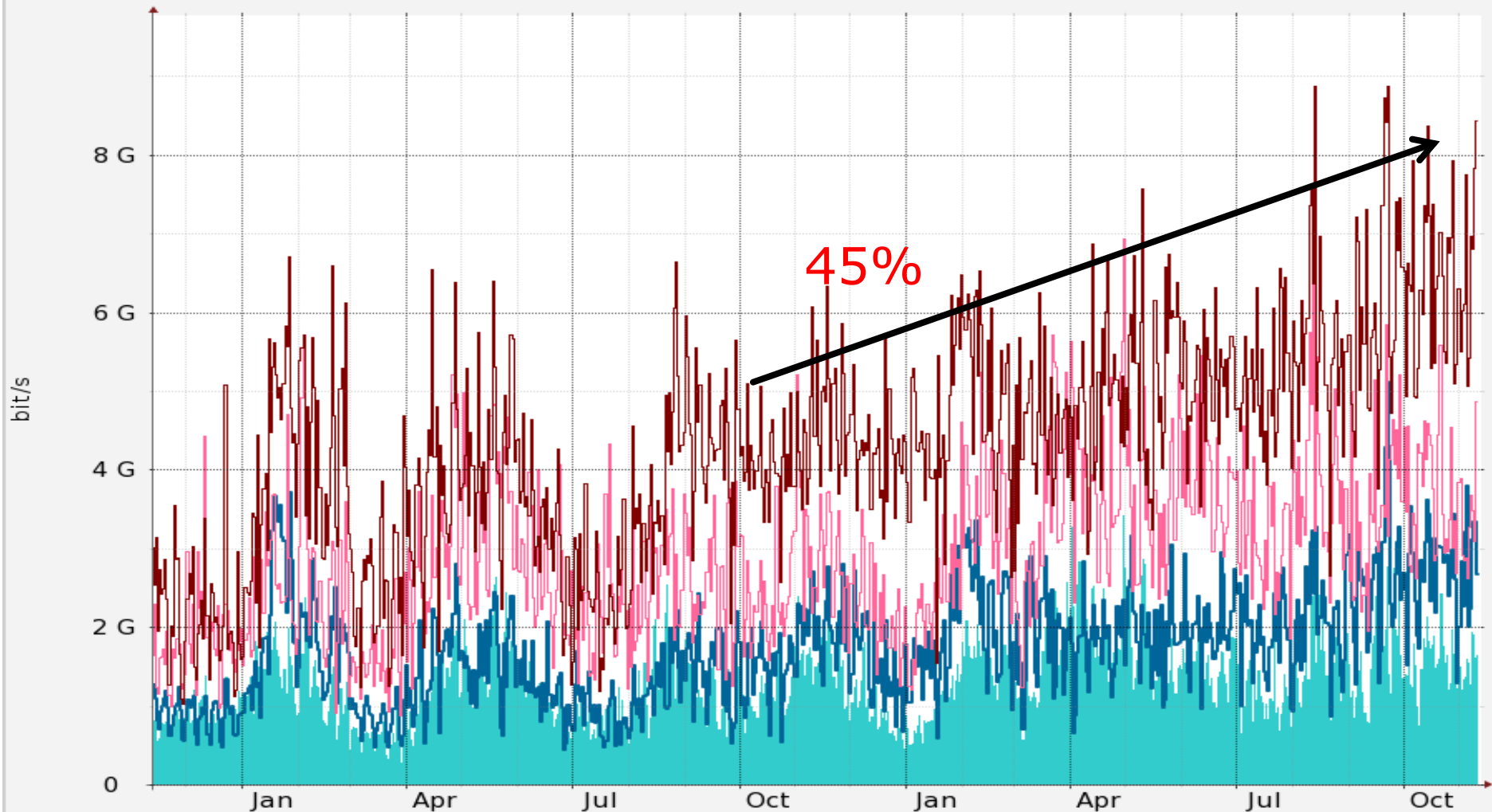
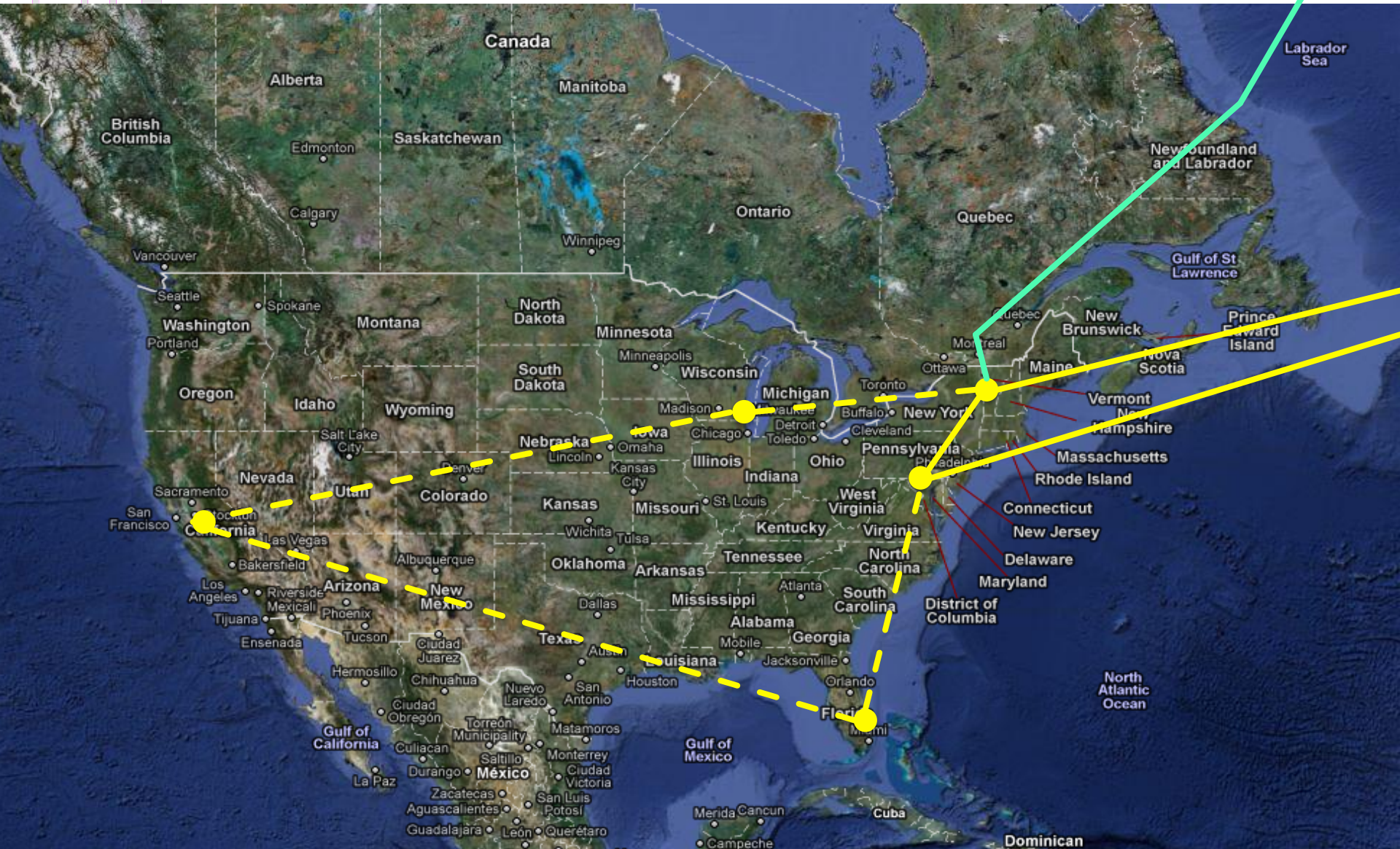|  | | Avg: | Max: | Last: |
|---|---|---|---|---|
| ▢ Avg In | Avg: | 6.53G | 16.95G | 16.37G |
| ▢ Avg Out | Avg: | 7.06G | 15.15G | 14.62G |
| ▢ Max In | Avg: | 10.85G | 31.14G | 25.20G |
| ▢ Max Out | Avg: | 11.21G | 25.33G | 21.82G |

Each averaged data point is averaged over 24 hours
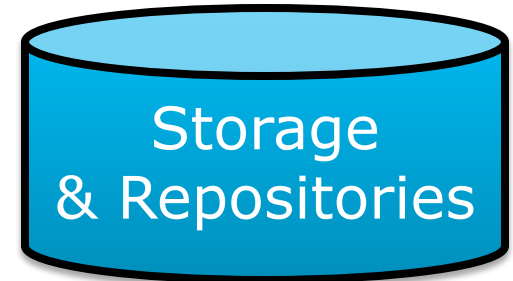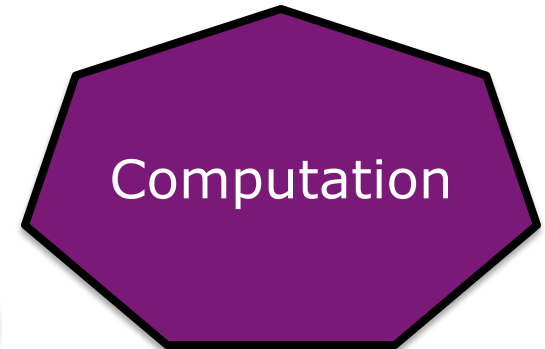Each max data point is 5min max in 24 hours interval
Direction is as seen from NORDUnet

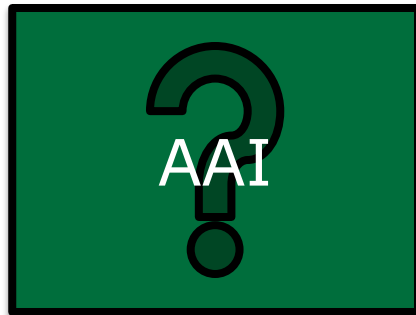Updated 01:00 Sat 12 Nov 2011

IP Transit

GEANT

# NORDUnet Services

Legend: G = green, B = blue, Y = yellow, g = grey

| | Reseach Network Connectivity | Global IP transit | OPN Lambda | Cross Border Fibre Coordination | Central NOC | End User NOC | GN3 Project Coordination | Project Hosting & Coordination | Software Development | AAI Community Serrvices | Equipment Hosting | Virtual Server Hosting | Network Media Transcoding & Distribution | Adobe Connect | VCONF MCU Service | WEB based Vconf Service | Telepresence Gateway Service | EU project Coordination | File Sharing Service | Spam Filtering Service | Community Communication | Commercial Cloud Services |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **2005** | | | | | | | | | | | | | | | | | | | | | | |
| **FORSKNINGSNETTET** | G | G | | | | | | | | | | | | | | | | | | | | |
| **FUNET** | G | G | | | | | | | | | | | | | | | | | | | | |
| **Rhnet** | G | G | | | | | | | | | | | | | | | | | | | | |
| **SUNET** | G | G | | | | | | | | | | | | | | | | | | | | |
| **UNINETT** | G | G | | | | | | | | | | | | | | | | | | | | |
| **WAYF** | | | | | | | | | | | | | | | | | | | | | | |
| **NDGF** | | | | | | | | | | | | | | | | | | | | | | |
| **GEANT 3** | | | | | | | | | | | | | | | | | | | | | | |
| **RUNNET** | | | | | | | | | | | | | | | | | | | | | | |
| **NCM** | | | | | | | | | | | | | | | | | | | | | | |
| **NORDUnet** | | | | | | | | | | | | | | | | | | | | | | |
| **2011** | | | | | | | | | | | | | | | | | | | | | | |
| **FORSKNINGSNETTET** | G | G | | | | | G | | | G | | | | | G | G | | | | | G | |
| **FUNET** | G | G | G | B | | | G | | | G | G | | | | G | G | | | | | G | |
| **Rhnet** | G | G | | | | | G | | | G | | | | | G | G | | | | | G | |
| **SUNET** | G | G | G | G | G | | G | | G | G | G | G | G | | G | G | | | G | G | G | B |
| **UNINETT** | G | G | G | G | G | | G | | G | G | G | | | | G | G | | | | | | |
| **WAYF** | | | | | G | | | | | G | | | G | | | | | | | | | |
| **NDGF** | G | | G | | G | | | Y | Y | | | | | | | | | | | | | |
| **GEANT 3** | | | | | | | | | | | | | | G | | | | | | | | |
| **RUNNET** | | G | | | | | | | G | | G | | | | | | | | | | | |
| **NCM** | | | | | | | | G | | | g | | | | G | G | | | | | | |
| **NORDUnet** | G | G | | | G | | G | G | G | G | G | G | G | | G | G | | G | | | G | |

# The Challenges

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Instruments

AAI

Network

Computation

Storage
& Repositories

# The NREN towards 2020
# A inspiration paper from NORDUnet

# http://www.nordu.net

**NORDUnet**
Nordic Infrastructure for Research & Education

1. *Globalization*
2. *Organization of e-Infrastructure*
3. *Short term ad hoc collaborative projects*
4. *Geographically scattered data sources.*
5. *Increasing amount of managed data*
6. *New groups of users with little technology knowledge*
7. *Mobility*
8. *Social networking*
9. *e-Education*
10. *Cloud Integration*
11. *Security and Data Ownership*
12. *Software Development & IPR*
13. *Network Media distribution*
14. *Public - Private Partnerships*
15. *Green IT & the Environment*

# **The NREN towards 2020**

With the 15 Challenges it is clear that the NRENs must evolve to meet the constituency requirements by focusing on providing layered service offerings enabling new opportunities for the users.

Therefore it is our opinion that NRENs towards 2020 must assume an approach that encompass the following concepts:

## 1 The NREN as a Global Network Service Provider

**Federation • Open Exchanges • Virtualization • Mobility • Regional Collaboration • CBF.**

## 2 The NREN as a Community Service Provider

**Global identity management • e-Campus services • VCONF & Web based collaboration tools • Network attached media distribution • Cloud Services • Social networking**

## 3 The NREN as the e-Science enabler

**Enable, Educate & Evangelize the e-Science Plug.**

## 4 The NREN as the e-Education enabler

**Enable, Educate & Evangelize the e-Education Plug.**

## 5 The NREN's as an Innovative Framework Provider

**Provide and incubation environment that foster innovation of new ideas through removing any technology barrier.**

Inspiration from

**GÉANT 2020 as the
European Communications Commons**

**"Knowledge without borders"**

Available:
- On paper from the EC
- Digitally: http://www.nordu.net

Slides thanks to Dr. Žiga Turk, Chairman, GÉANT Expert Group

PROJECT EUROPE 2030

Challenges and Opportunities

A report to the European Council
by the Reflection Group
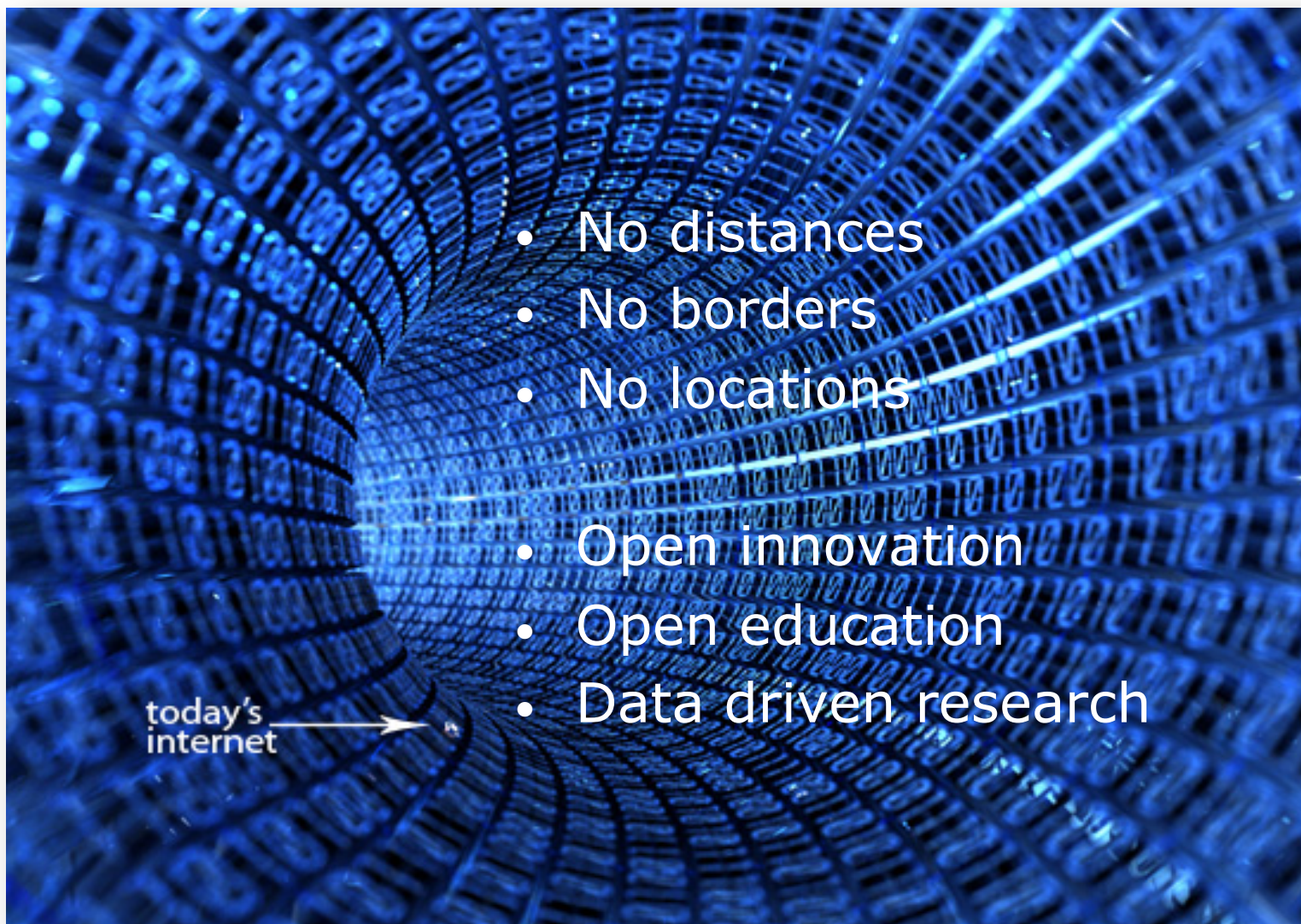on the Future of the EU 2030

- The future economy is the economy of talent
- Richard Florida:
  - "Human Talent is the Ultimate Economic Resource"
- Talent attracted by
  - tolerance,
  - technology
  - other talent

# Internet Changes Everything ...



- No distances
- No borders
- No locations

- Open innovation
- Open education
- Data driven research

today's internet →

- Post Industrial Society
  - From scarcity to abundance
- Climate Change
  - Energy Revolution,
  - Greening the Economy
- Demography
  - Greying the economy
- Globalization
  - West's monopoly on science is melting away

- To continue leading in the world and
  - Remain at the forefront of the scientific and social developments,
  - To achieve the Europe 2020 goals,
- Europe must step up its ambition and efforts to provide its talent with the best possible digital infrastructure.
- GÉANT2020 is our vision for the European networks achieving this.
- National governments and the European Institutions must see this as a vital policy goal.

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Knowledge without Borders

GÉANT 2020 as the European Communications Commons

Report of the GÉANT Expert Group
••• October 2011

European Commission
Information Society and Media

- "GÉANT 2020" is the European communications commons
- Where talent anywhere is able to collaborate with their peers around the world and
- To have instantaneous and unlimited access to any resource for knowledge creation, innovation and learning,
- Unconstrained by the barriers of the pre-digital world.

- Talent as ultimate economic resource
- Talent anywhere, talent from anywhere
  - "GÉANT 2020 is rooted in values of equality, solidarity and freedom which are held in high regard by Europeans".
- Globally around the world

"GÉANT 2020" is the European communications commons where talent anywhere is able to collaborate with their peers around the world and to have **instantaneous and unlimited access to any resource for knowledge creation, innovation and learning**, unconstrained by the barriers of the pre-digital world.

# GÉANT 2020 for knowledge creation, innovation and learning

- A common enabling infrastructure for European research and education
- A collaboration platform for knowledge communities
- An environment for knowledge creation, innovation and learning
- A transformative digital ecosystem

"GÉANT 2020" is the European communications commons where talent anywhere is able to collaborate with their peers around the world and to have **instantaneous and unlimited access to any resource for knowledge creation, innovation and learning**, unconstrained by the barriers of the pre-digital world.

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1. Support knowledge communities by providing world-class connectivity and services.
2. Support the growth of these communities, in both breadth and depth within Europe, and opening up to talent beyond Europe's borders ;
3. Push the state-of-the-art of the communications commons by constant innovation and by translating this innovation into a competitive European ICT sector;
4. Reorganize to cope with the constantly changing environment.

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# The Baltic Ring

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- Fifth freedom:
  - The free movement of knowledge

- A proposed addition to the Four Freedoms in European Union Law
  - Free movement of:
    - Goods,
    - Capital,
    - Services,
    - People.

- Knowledge Infrastructure for the Fifth freedom in the Baltic Sea Area



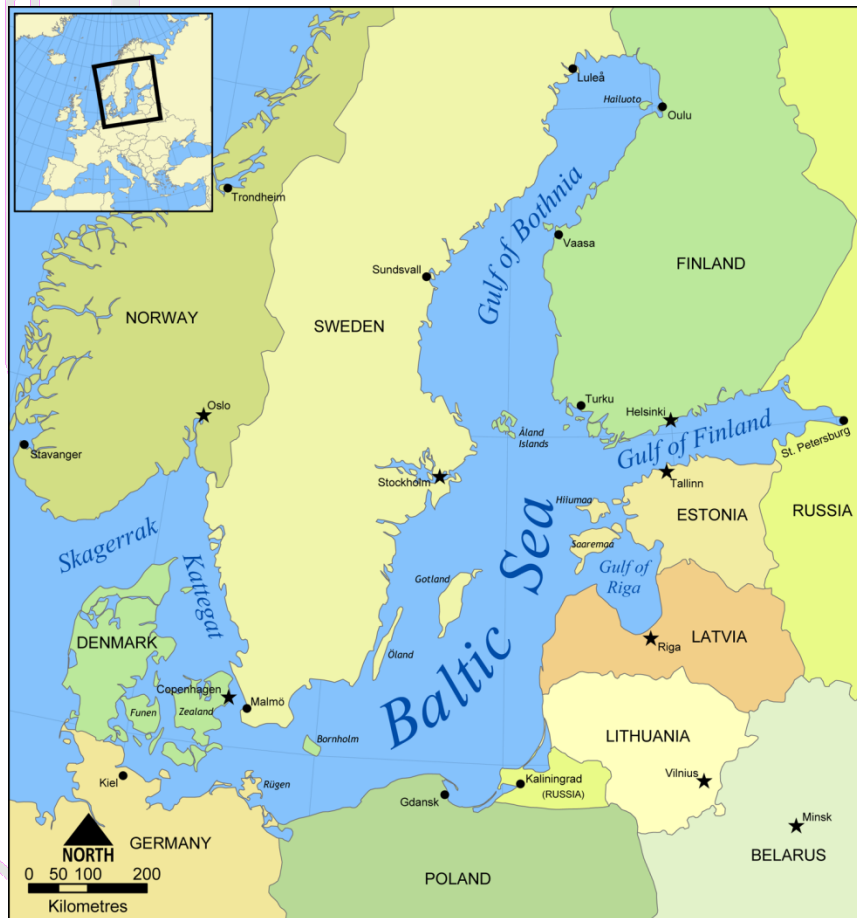- Feasibility study funded by the Nordic Council of Ministers
- Date of publication Feb 18th, 2010

http://www.norden.org/en/publications/publications/2010-516

# 6. Strategy proposal

…

The initial actions:

1. Establish a fiber ring network through the countries around the Baltic Sea

2. ..

3. …

# Baltic Sea Geography



Source: Norman Einstein, May 25th, 2006 (Wikipedia)

- 9 countries – 9 NRENs
- Max lenght 1600km
- Max width 193km
- Average depth 55m

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- The interconnection between the e-Science communities in the region
- Strenghtens the collaboration
- Strenghtens the role of the region in the European collaboration

Feasibility study

2009-2010

Definition

Design

Baltic Ring Project
2010-2011

Implementation

TBD 2011-?

Deployment

TBD 2012-?
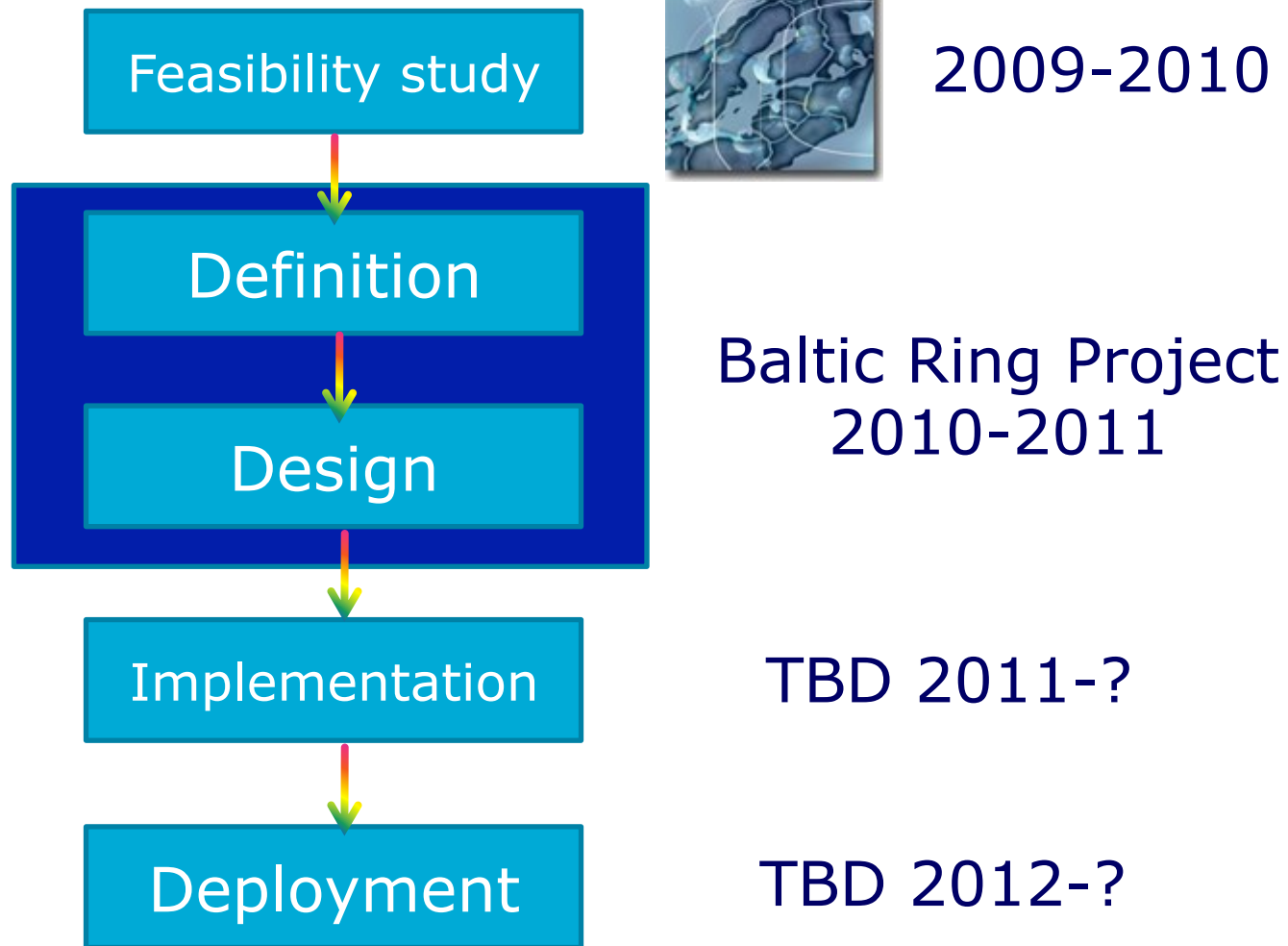
1. Provide a technical description of a federated Baltic Ring network

2. Provide a decision framework for partners willing to participate and collaborate

3. Provide sufficient information to the liaison organizations

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## A new federated network

- complete dark fibre footprint forming a ring
- DWDM infrastructure supporting 40 and 100 GBPS
- Provide at least one, preferably two flexible add-drop Points in each country
- The architectural design should support the possibility of transporting a wavelength without Optical-Electrical-Optical (OEO) regeneration from Helsinki to Hamburg

- Consortia
  - Partnership of member states
  - Collaboration of R&E networks in the Baltic Sea countries
- A limited, topical collaboration with a specific objective (delivering a Baltic Ring network)
- …but, at the same time a platform for further, expanding collaboration on e.g. eScience, eInfrastructure (cloud computing, …

- Deploy & Operate Baltic Ring regional infrastructure to:
  - *ensure* equal level of basic connectivity for Baltic Sea countries
  - *provide* high-quality, high-capacity, expandable international connectivity
  - *integrate* at network and service level with the GÉANT collaboration, offering network transport to the GÉANT network
  - *facilitate* Europe – Russia connectivity
  - *facilitate* regional eScience and eInfrastructure collaboration

- *Consortia on behalf of partners*
  - Project planning, Project Finances
  - Pursuing funding opportunities, agreements with funding bodies
  - Vendor relations, tendering
  - Deployment, Operation, Maintenance
- *Partners*
  - National connectivity, connecting to the Baltic Ring, national networks
  - National resources
  - Partner contributions to consortia
  - Funding for national networks and activities

- # **BRAIN**
  **Baltic Regional Academic Infrastructure Network**
- # The main partners of the project are
  - ## CSC
  - ## Eenet
  - ## Institute of Mathematics and Computer Science, University of Latvia (sigmanet).

- A project application has been sent to the "European Central Baltic INTERREG IV A Programme 2007-2012".

# NORDUnet & The Baltic Ring

## René Buch
**CEO**

# NORDUnet
**Nordic Infrastructure for Research & Education**