GÉANT

status and plans

Vincenzo Capone

LHCOPN-LHCONE meeting – Taipei (TW)

13-14 March 2016

Who is GÉANT?

- In 2014 DANTE and TERENA joined forces to become **GÉANT Association**
- Created Europe's leading collaboration on e-infrastructure and services for R&E
- Build upon > 20 years of experience in R&E networking
- ~100 staff in two locations: Cambridge & Amsterdam
- Owned by:
  - 36 National Members (European NRENs)
  - 1 Representative Member (NORDUnet) on behalf of 5 Nordic NRENs
  - Associate members: commercial organisations, multi-national research infrastructures and projects
- More than just a network

One Ethos: **Networks. Services. People.**

Current members

GÉANT Association Membership

NATIONAL MEMBERS
1 per country

REPRESENTATIVE MEMBER
*NORDUnet**

ASSOCIATES

ADVA Optical Networking

Alcatel-Lucent

Ciena Corporation

Cisco Systems

Coriant GmbH

*CSC (Finland)

CERN

*DeIC (Denmark)

ECI Telecom GmbH

EMBL

ESA

Google UK Ltd

Huawei Technologies

Level 3 Communications

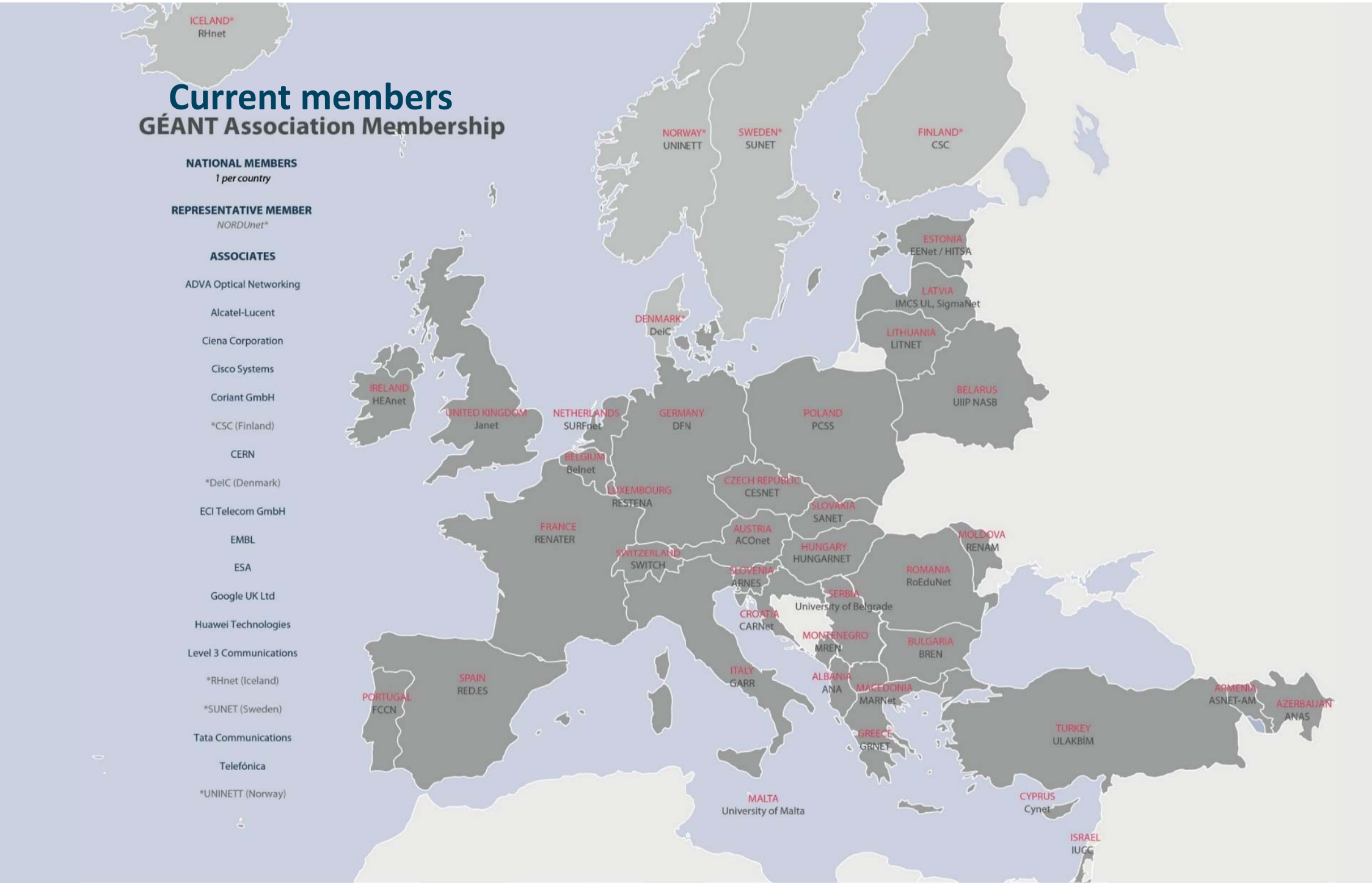
*RHnet (Iceland)

*SUNET (Sweden)

Tata Communications

Telefónica

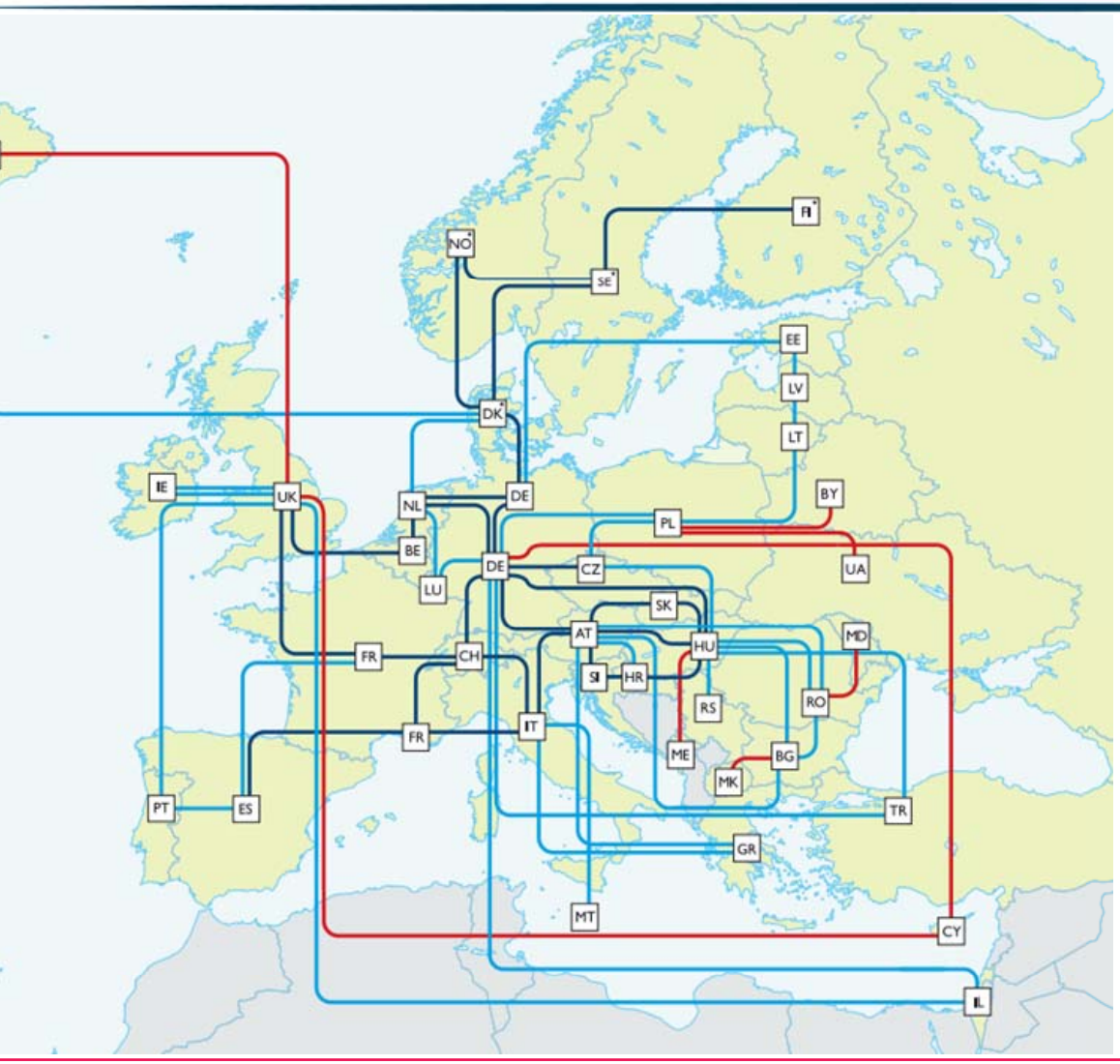
*UNINETT (Norway)



ÉANT - Networks

- Manages research & education networking projects
- Procures, builds and operates large-scale, advanced international high-speed networks
  - GÉANT (Europe)
  - EUMEDCONNECT (Mediterranean)
  - AfricaConnect (Africa)
  - CAREN (Central Asia)
  - EAPConnect (Eastern Partnership Countries)
- Supports and assists other regional projects
  - ORIENTplus (Europe-China collaboration)
  - TEIN*CC (Asia-Pacific)
  - RedCLARA (Latin America)
  - CKLN (Caribbean)

he GÉANT Pan-European Network infrastructure



- Widely diversified footprint
  - Serves 50M users
  - 10,000 institutions
  - 40 European countries
- Operates at speeds up to 500Gbps
- 50,000km network infrastructure on 44 route
- ~2,000 terabytes of data transferred across network per day
- 100% average monthly IP service availability

lobal connectivity

- GÉANT network is connected to all con
- Interconnecting >100 countries globall

ÉANT – Asia-Pacific connectivity

TEIN*CC

- 10G Singapore-London
- 2.5G (update to 10G in a few weeks) Mumbai-Madrid (Mumbai-Singapore already upgraded to 10G)

ORIENT+

- 10G Beijing-London (10 years China-EU agreement)

SINET5 (Japan)

- 2x10G Tokyo-London (low-latency land route – funded by NII)
- 10G backup route via North America

TIFR (India)

- 10G peering via CERNLight

NKN (India)

- *2x10G expected in 2016*

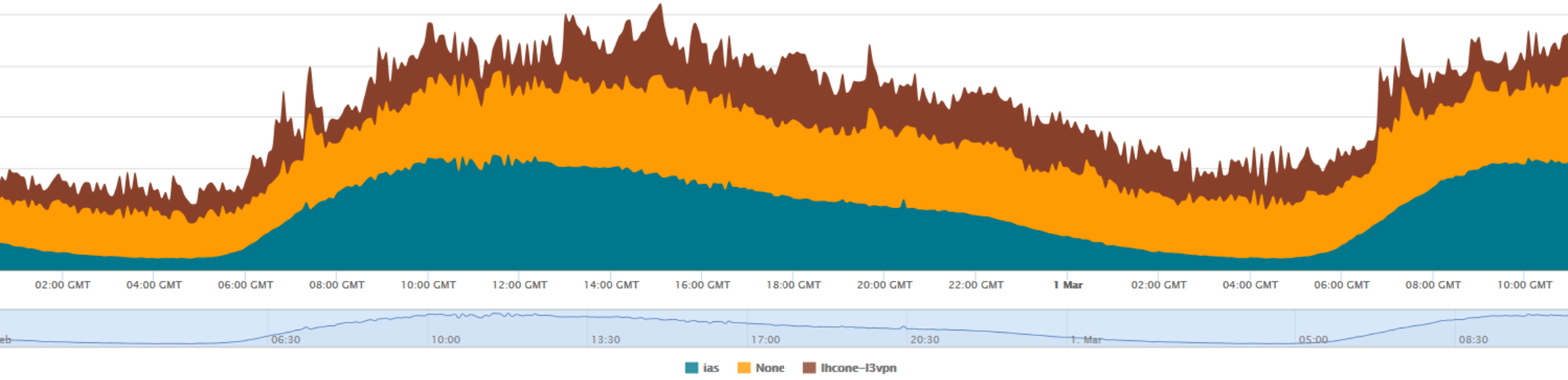
raffic facts

1.9 Pbytes of unique data per day (including weekends in the averaging) without considering lambdas

693 Pbytes of unique data (inbound counting only) switched per year

Peak of over 300Gbps on busy days, average of 180Gbps

LHCONE traffic accounts for slightly less than 1/3 of the overall IP average traffic, with a similar amount on IAS and slightly higher on the Global R&E table



ervices

Connectivity & network management

- Standard IP, up to multiple 100Gbps
- MD-VPNs (L2 and L3)
- Point-to-point circuits
- Wavelengths 10 -100Gbps
- Open Exchange for global & commercial collaborations 1, 10, 100Gbps
- Networking Testbeds
- International and Commercial Peerings
- Firewall on-demand

End to end Performance

- perfSONAR – *Real-time, multi-domain performance monitoring*
- eduPERT – *Performance troubleshooting*

Trust, Identity and Security

- eduGAIN – *Secure access, single sign-on*
- Eduroam – *Seamless Wi-Fi access for research and education around the world*

One Stop Shop

- Consultancy
- International co-ordination
- Bespoke solutions

perfSONAR
PART OF THE GÉANT SERVICES PORTFOLIO

eduGAIN

eduroam

Summer 2016:
Cloud services –GÉANT as community broker

upport for International Users

- **Dedicated User Support Team**
  - to ensure users gain full benefit from the GÉANT infrastructure and services
- **Single point-of-contact**
  - for international collaborations and organisations
- Providing a **one-stop-shop**
  - to analyse, implement and manage international networking needs
- **Policy and technical consultancy**
  - for public and commercial organisations wishing to connect to GÉANT
- **User's voice within GÉANT**
  - International User Advisor Committee, NREN feedback, Surveys, Conferences, Focus Groups….

he One-stop-shop concept

Work closely with Users, NRENs, other e-Infrastructures and GÉANT subject experts

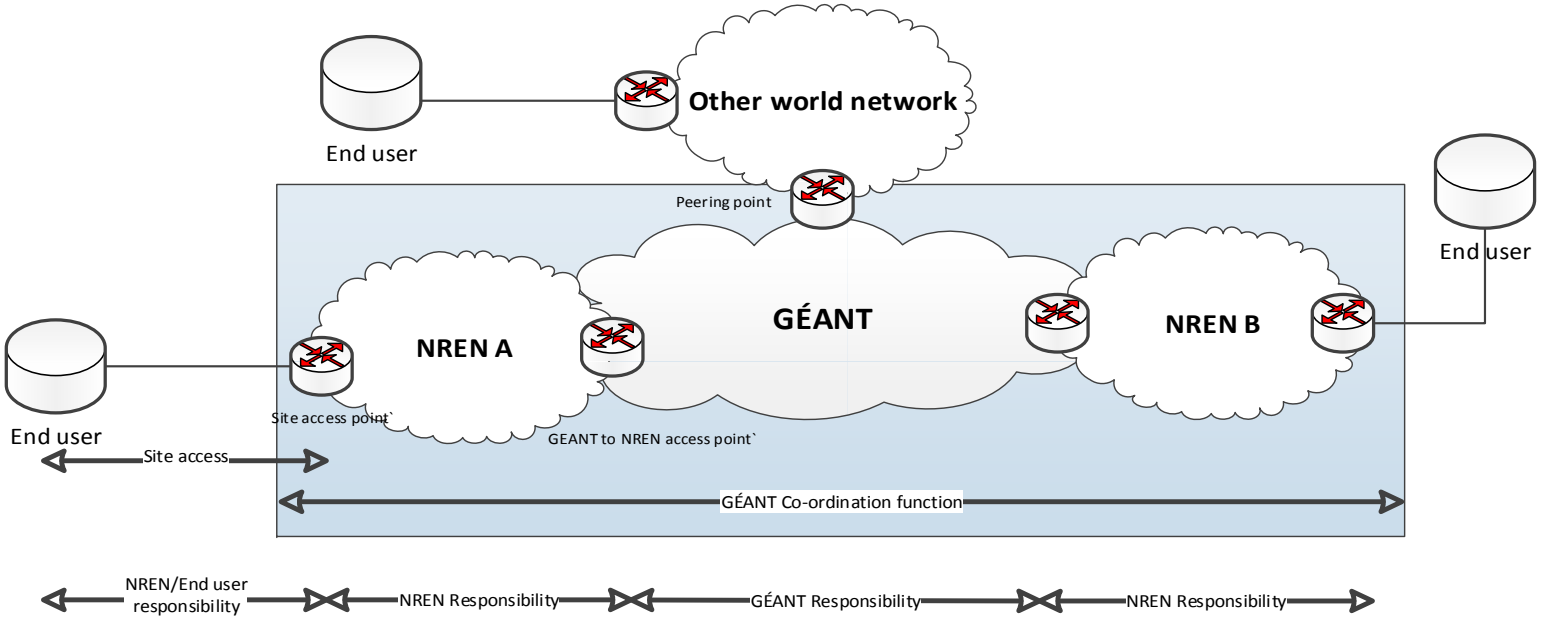
Discuss and understand user requirements

Develop a consolidated and consistent solution for all involved sites:

technical/administrative/financial/contractual

Ensure seamless service implementation and operation through full project lifecycle management

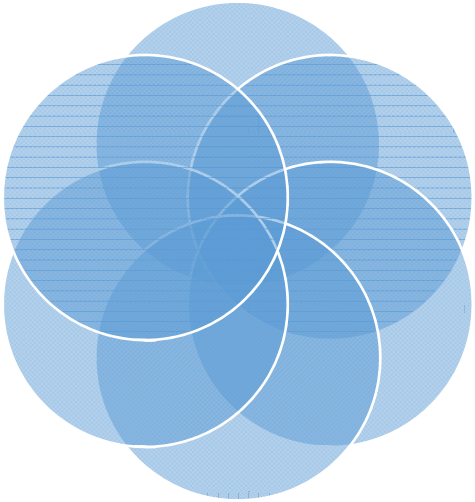
Respect for the NRENs administrative boundaries→ GÉANT connects networks, not end-sites



ser we work with

Social Sciences, Arts and Humanities

High-Energy Physics and Astronomy



Earth Sciences and Observations

Life Sciences

Future Internet Projects

E-Infrastructures

GÉANT – Asia-Pacific scientific collaborations

A few examples

hysics community

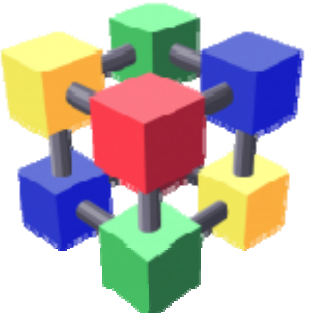
Connectivity to WLCG sites for LHC and BELLE II

~15 WLCG sites in the Asia-Pacific area + KEK (BELLE 2 T0)

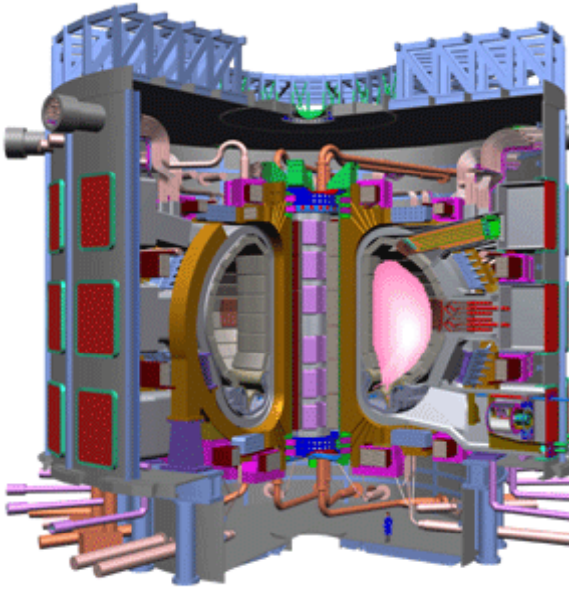
Increasing support to the LHCONE connectivity

ITER

- HELIOS (Rokkasho - JP) supercomputing facility
- 10G circuit to GÉANT/RENATER (Cadarache)
  - migrated on the new 100G PAR-NY



ITER



EUMETSAT

GÉANT

EUMETSAT is the **European operational satellite agency** for monitoring weather, climate and the environment.

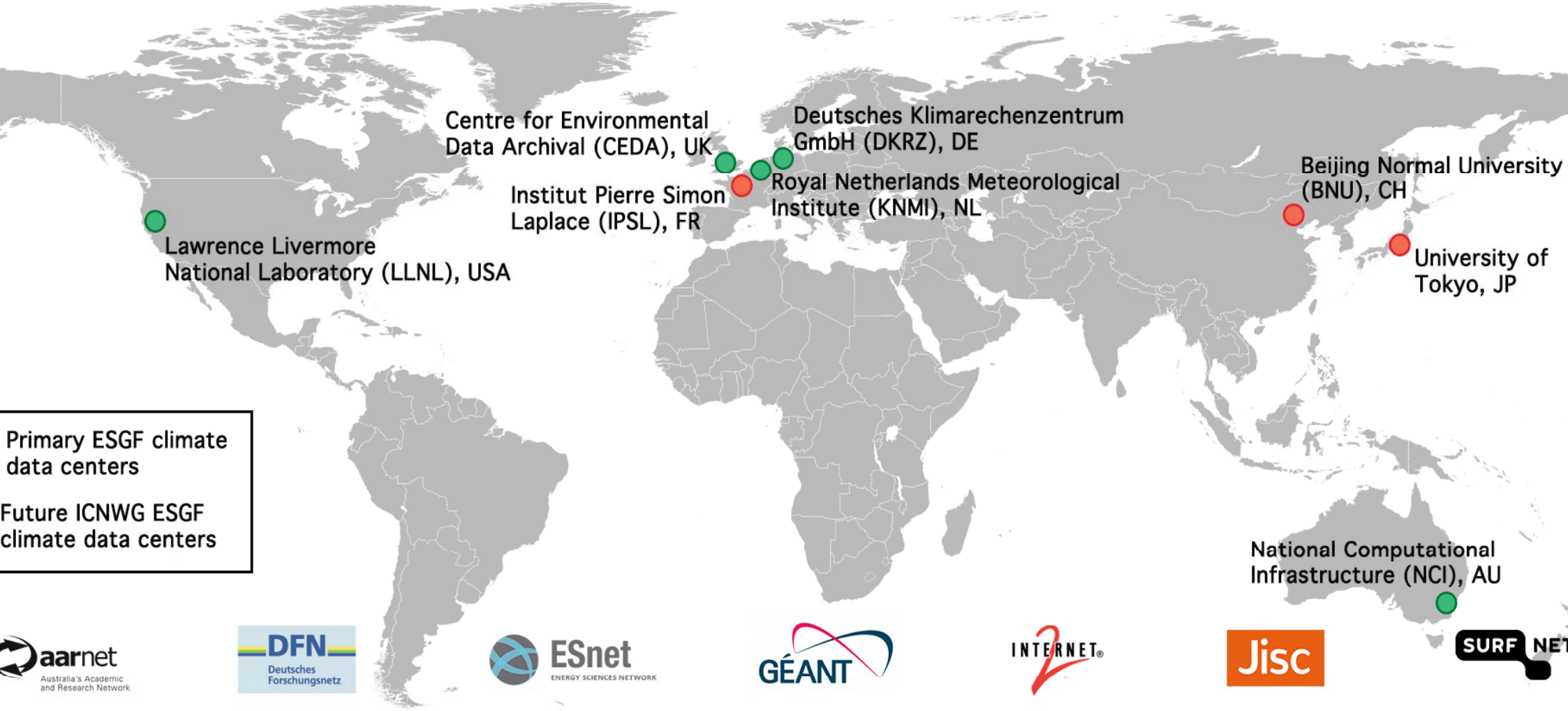
Operate a system of meteorological satellites that observe the atmosphere and ocean and land surfaces – **24 hours a day, 365 days a year**.

This data is supplied to the **National Meteorological Services** of the organisation's Member and Cooperating States in Europe, as well as other users worldwide (USA, Korea, Africa).

EUMETCast Terrestrial data distribution using **IP multicast** from EUMETSAT HQ in Germany

- **Europe** - using GÉANT and the NRENs networks (30+ countries)
- **United States** – using GEANT & Internet2
- **ASIA** – using GÉANT , TEIN, KOREN (Korea), AARnet (Australia)
    - Preparing to work with China (CSTnet) and India

nternational network for Climate Science



uture Internet projects

SmartFIRE, Fed4FIRE

Interconnecting network testbeds for advanced research

New protocol and technology for wired and wireless networking

Collaboration with KOREN and KREONET

- Point-to-point L2 connections between Europe and Korean institutions

AXA-ESOC joint mission control

JAXA (Japanese Space Agency) and ESOC (European Space Agency Control Centre) to provide mutual backup to for mission control

ESOC's BepiColombo (Mars landing) and JAXA's Hayabusa2 (asteroid exploration) missions

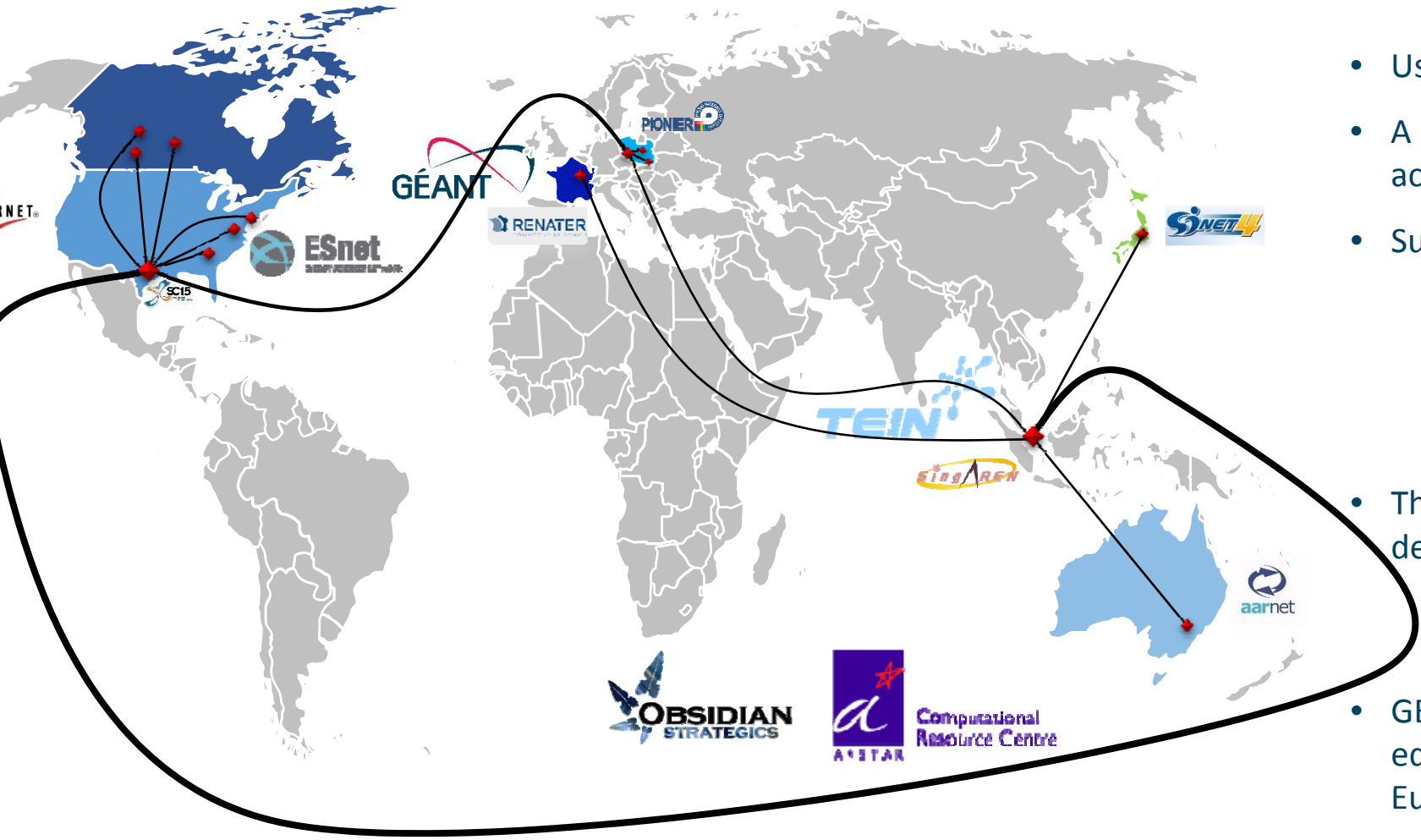
- Replaced existing expensive commercial ISDN connections

QoS parameters specified in terms of loss, RTT, throughput to support VOIP and mission control applications

Two paths (using GÉANT point to point service):

- West: Europe-US-Japan
- East: Europe-China-Japan

nfiniCortex



- Use of InfiniBand on the WAN
- A “Galaxy of Supercomputers” scat across the world
- Successful demos:
  - Supercomputing Frontiers (March
  - TNC15
  - ISC 2015 (June ‘15)
  - SC15
- The SC15 demo has used some nev deployed GÉANT international links
  - 100G Paris-NY (30G from Poznan
  - TEIN London-Singapore direct 10
- GÉANT will host some InfiniBand equipment in the London PoP for a Europan InfiniCortex infrastructure

GÉANT
Networks • Services • People

TNC16 – Building the Internet of People

12-16 June 2016
Prague, Czech Republic

Register online until 3 June, also for the (free!) extra events!

Call for Participation, round 2 is open:
Submit posters and lightning talks!
Deadline: 15 April, midnight CEST

http://tnc16.geant.org

Thank you

Questions?

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