



GÉANT

status and plans

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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

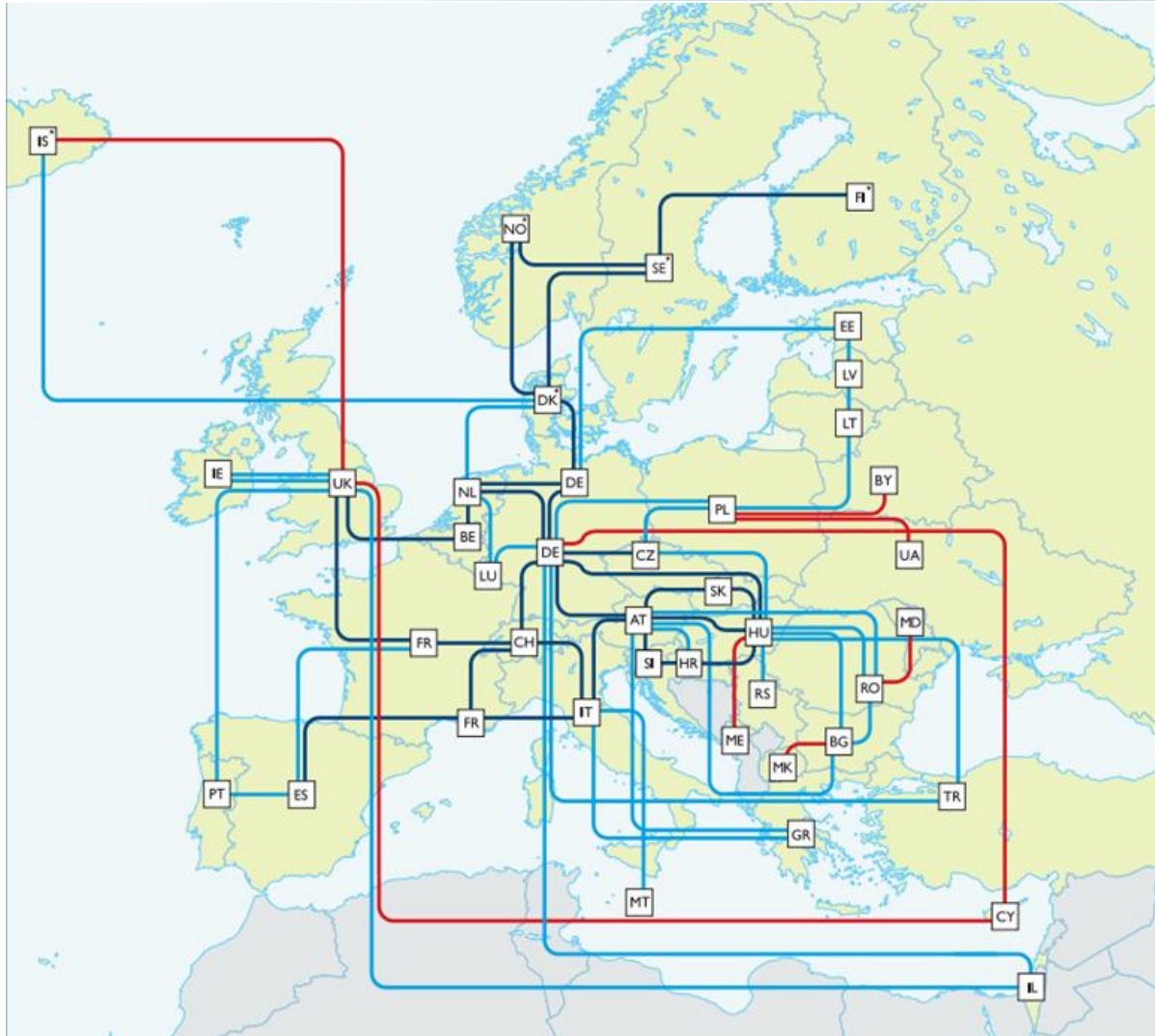
*UNINETT (Norway)



- 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)



The 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 routes
- ~2,000 terabytes of data transferred across network per day
- 100% average monthly IP service availability

Global connectivity

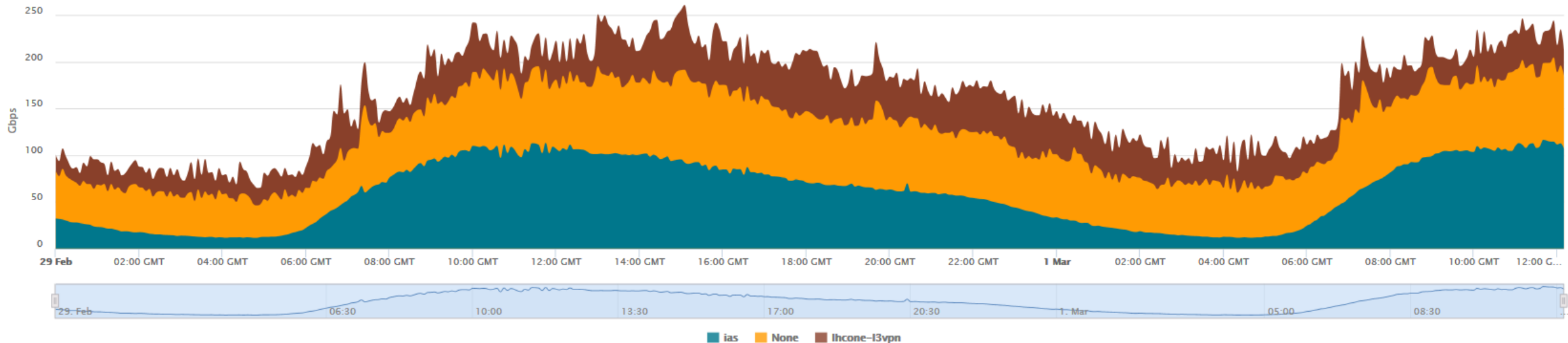


- GÉANT network is connected to all continents
- Interconnecting >100 countries globally

- 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*

Traffic 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



- **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



Summer 2016:
Cloud services –GÉANT as community broker

Support 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....



User we work with

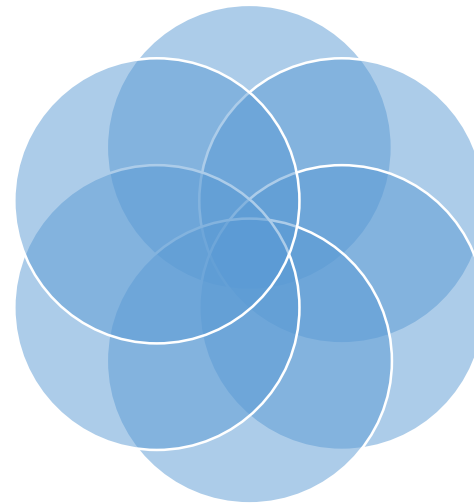


Social Sciences,
Arts and
Humanities



Life Sciences

High-Energy Physics
and Astronomy



Earth Sciences
and
Observations



Future Internet
Projects

E-Infrastructures

GÉANT – Asia-Pacific scientific collaborations

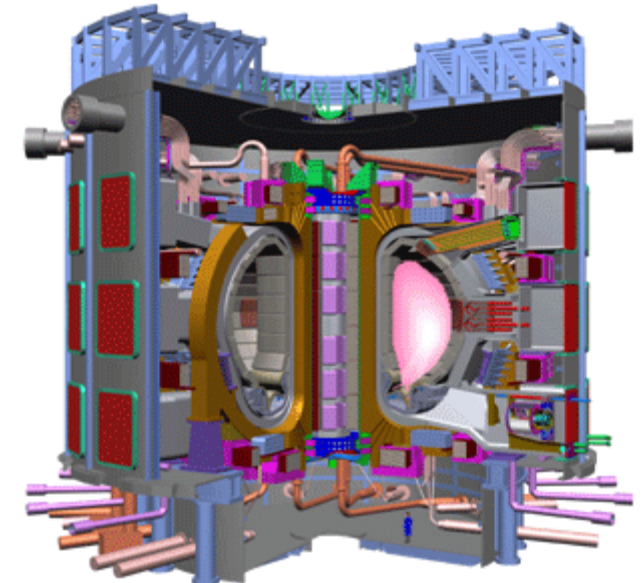
A few examples

- 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

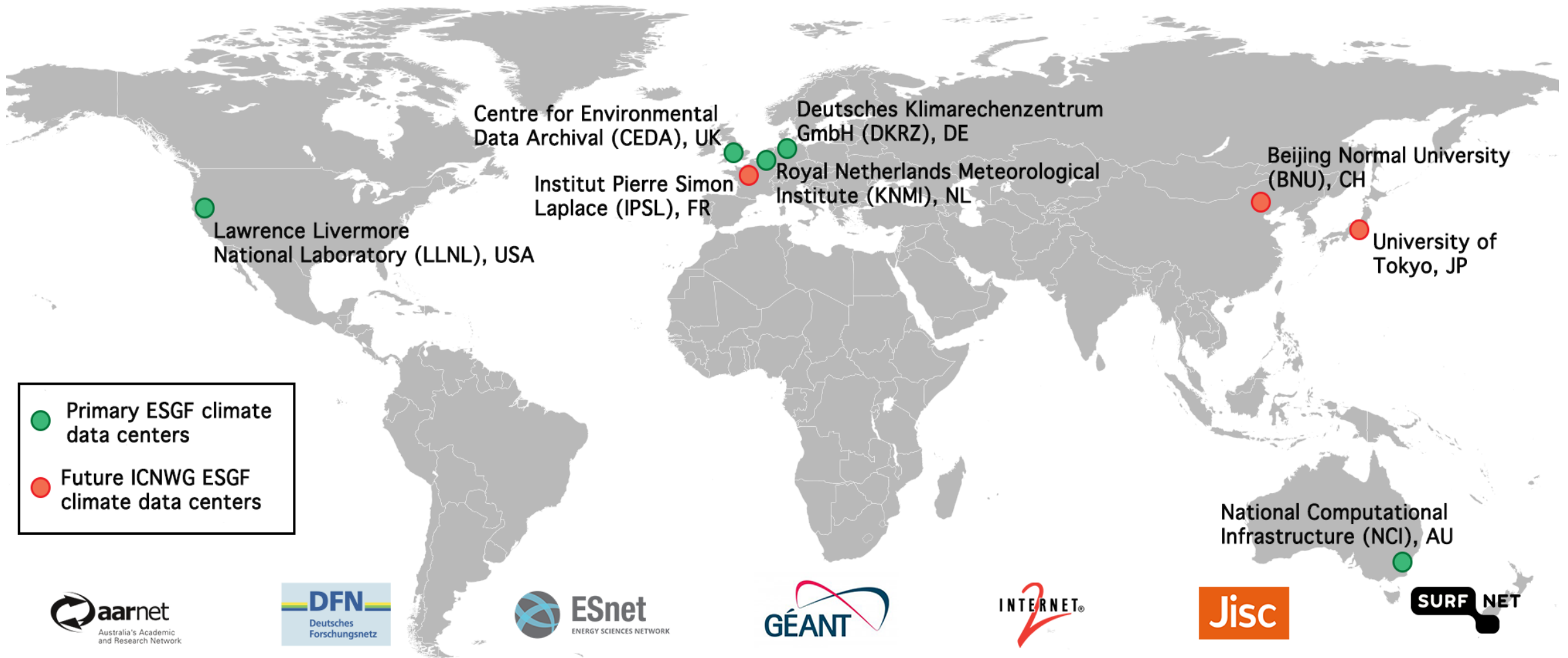


ITER



- EUMETSAT 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

International network for Climate Science



Future 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

JAXA-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



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



TNC16 – Building the Internet of People

12-16 June 2016

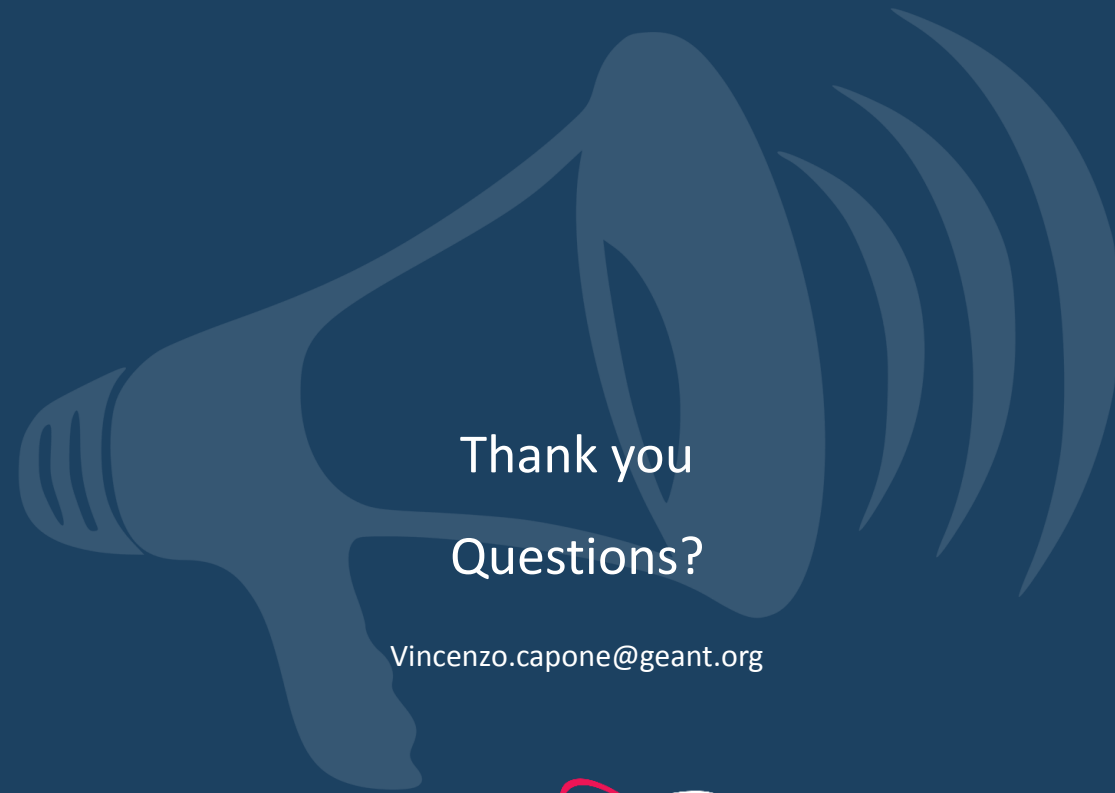
Prague, Czech Republic

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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www.geant.org



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