SINET5 and GÉANT:
Connecting Japan and Europe Together

Steve Cotter

Chief Executive Officer

GÉANT

SINET5 Launch Ceremony

25 May 2016

Topics to be covered

- GÉANT in Europe
- GÉANT in the World
- Japan-Europe Users
- Global Networking
- GÉANT supporting SINET
- Conclusion

GÉANT in Europe

GÉANT

- Formed out of merger of DANTE and TERENA in 2014

- Based in Amsterdam (GÉANT Association) and Cambridge (GEANT Limited)

- 92 staff – 21 nationalities

- Not for profit, revenues ~40M Euro (~45M USD)/year

- Owned by the European NRENs and partly funded by the European Commission

- Associate members include:
  - ICT companies
  - Major research infrastructures and projects.

GÉANT Association Membership

NATIONAL MEMBERS
1 per country

REPRESENTATIVE MEMBER
NORDUnet*

ASSOCIATES
ADVA Optical Networking
Alcatel-Lucent
CERN
Ciena Corporation
Cisco Systems
Coriant GmbH
*CSC (FI)
*DeIC (DK)
ECI Telecom GmbH
EMBL
ESA
Google UK Ltd
Huawei Technologies
Level 3 Communications
*RHnet (IS)
*SUNET (SE)
Tata Communications
Telefónica
*UNINETT (NO)

ICELAND*
NORWAY*   SWEDEN*   FINLAND*
ESTONIA EENet / HITSA
LATVIA SigmaNet
DENMARK*   LITHUANIA LITNET
IRELAND HEAnet   BELARUS UIIP NASB
UNITED KINGDOM Janet   NETHERLANDS SURFnet   POLAND PCSS
GERMANY DFN
BELGIUM Belnet
LUXEMBOURG RESTENA   CZECH REPUBLIC CESNET
SLOVAKIA SANET
AUSTRIA ACOnet   MOLDOVA RENAM
FRANCE RENATER   SWITZERLAND SWITCH   HUNGARY HUNGARNET
SLOVENIA   ROMANIA RoEduNet
CROATIA CARNet   SERBIA University of Belgrade
MONTENEGRO MREN   BULGARIA BREN
ITALY GARR   ALBANIA ANA   MACEDONIA MARNet
PORTUGAL FCCN   SPAIN RED.ES   ARMENIA ASNET-AM   AZERBAIJAN ANAS
GREECE GRNET   TURKEY ULAKBIM
MALTA University of Malta   CYPRUS Cynet
ISRAEL IUCC

GÉANT Network & Services
e-Infrastructure for Europe

500Gbps super-channels

1,000+ terabytes of data across network per day

50,000 km network infrastructure on 44 routes

Widely diversified footprint
- Serves 50 million users
- 10,000 institutions
- 41 countries in Europe and beyond

GÉANT offers more than just a high-performance network:

- Test beds and SDN development
- Security (TRANSITS training, TF-CSIRT, Certificate Service)
- Performance tools & expertise
- Federated Trust & identity (eduGAIN) and mobility (eduROAM)
- Cloud services marketplace
- Real time communications and media management

GÉANT in the World

Africa Connect 2

www.africaconnect2.net

Pan-African connectivity project

3 regional clusters and partners:
- **Eastern & southern Africa (UbuntuNet Alliance)**
- **West & Central Africa (WACREN)**
- **North Africa (ASREN)**

3.5 years (up to end of 2018)

€20 EU co-funding (75%)

www.tein.a...

...apconnect.eu

...fic since 200...

...e EU's

...up to 20...

...anaged by

...ec...ed

...T and partner networks enabling user collaboration across the globe

May 2016

EUMED connect 3

www.eumedconnect3.net

...&E network for Mediterranean since 2004

3rd phase (up to end 2016)

Lebanon & Jordan connected, Palestine eligible

North African countries joined AfricaConnect2 in 2015

€3.3m EU co-funding (36%)

New phase under discussion with EC

...geant.org

...stan,

Japan-Europe users

Network traffic
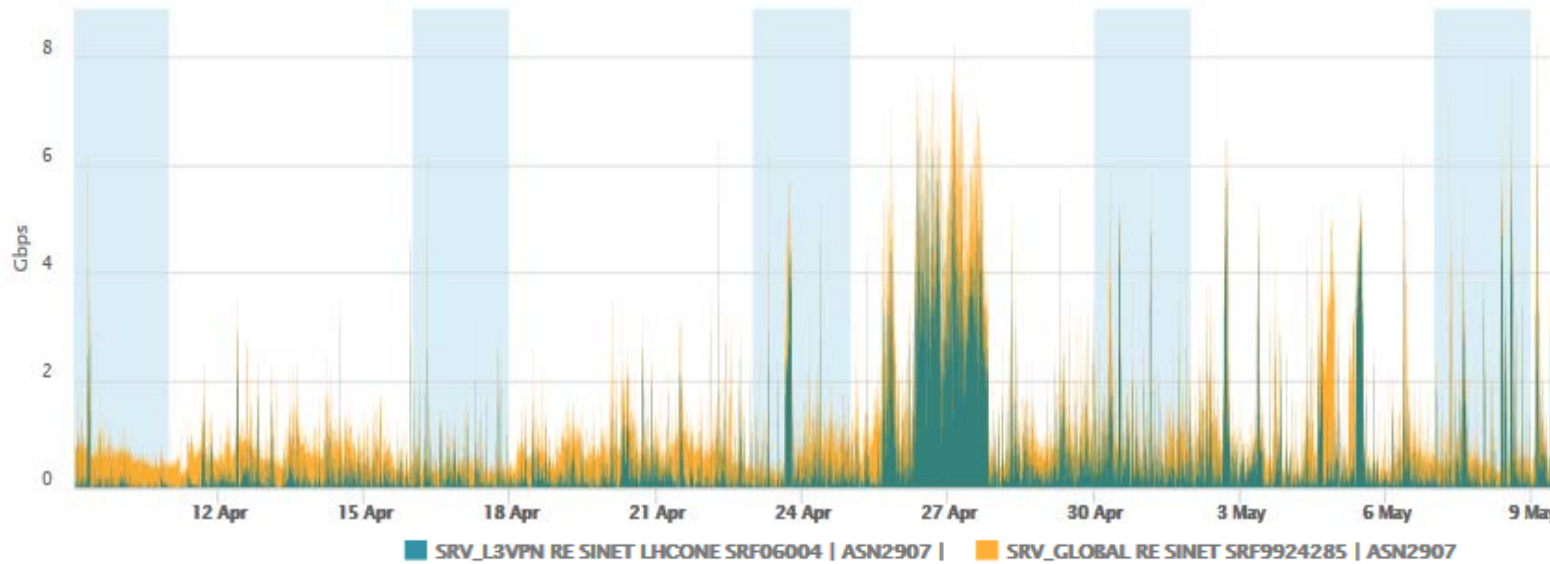
Japan -> Europe
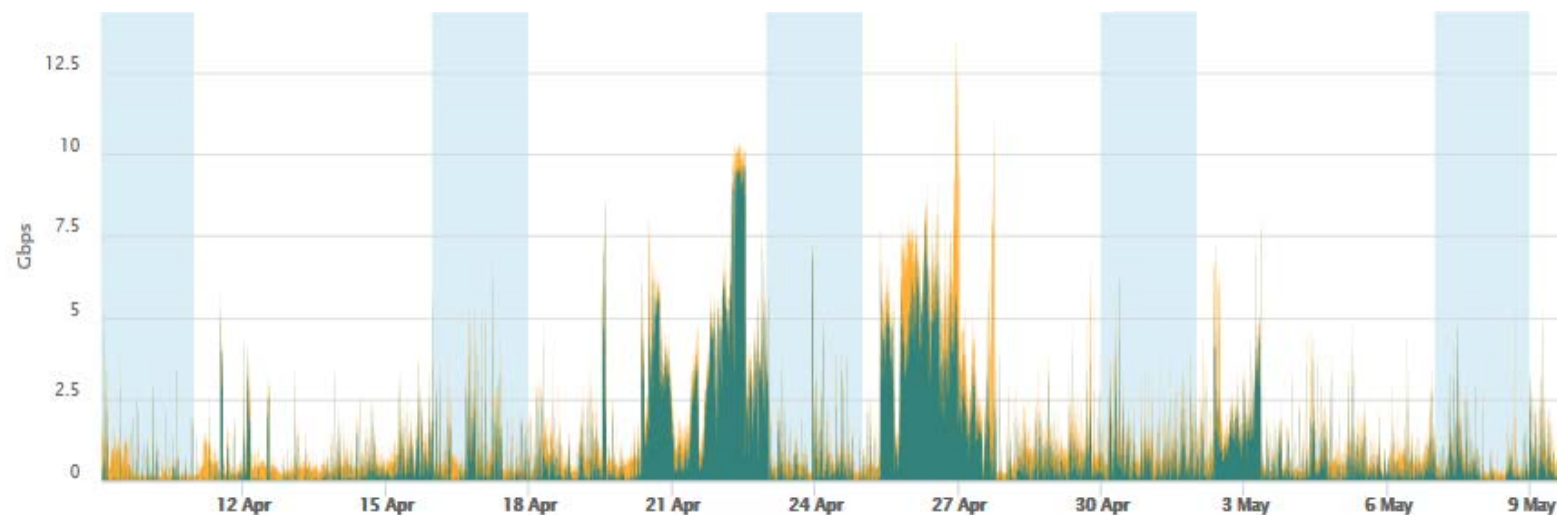
Europe -> Japan

Data movement *(last month)*

About 41,700 hours of 4K ULTRAHD

Top talkers *(Japan)*

Organisation	Total TBytes
University of Tokyo	681
SINET AS2907	85
KEK	72
JAXA	26
RIKEN	6
Nagoya University	5
Kyushu University	4
Kyoto University	3
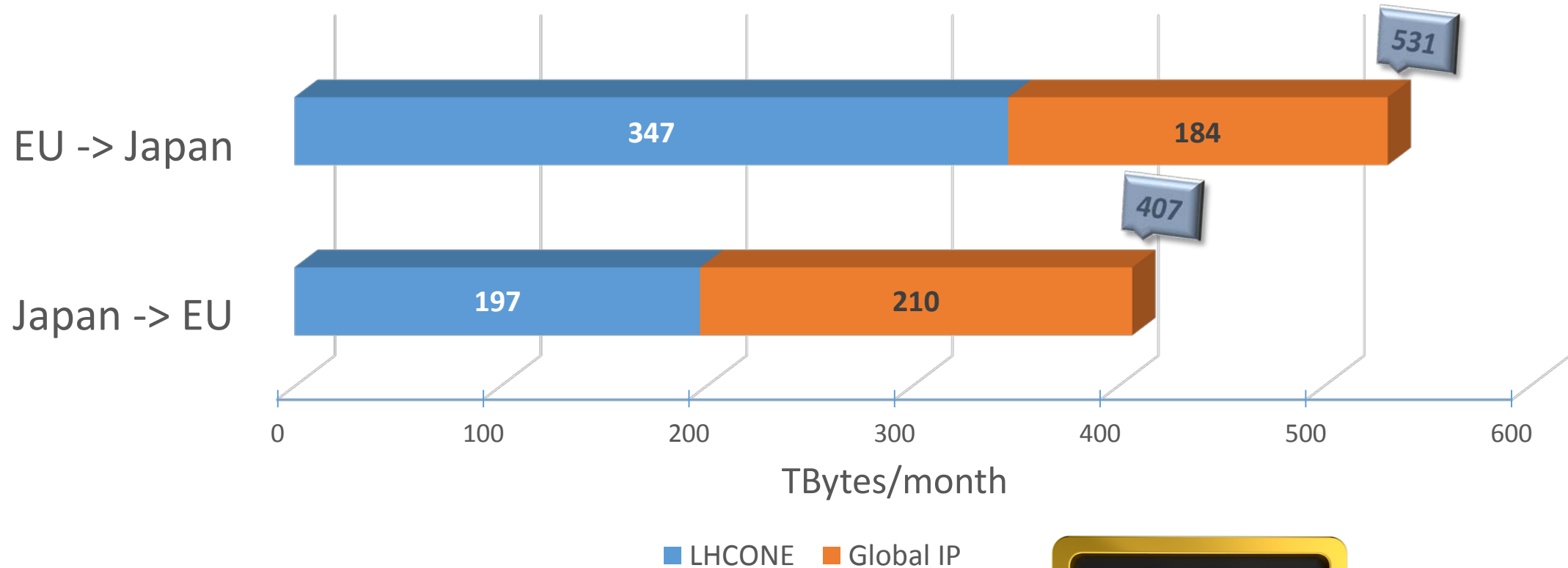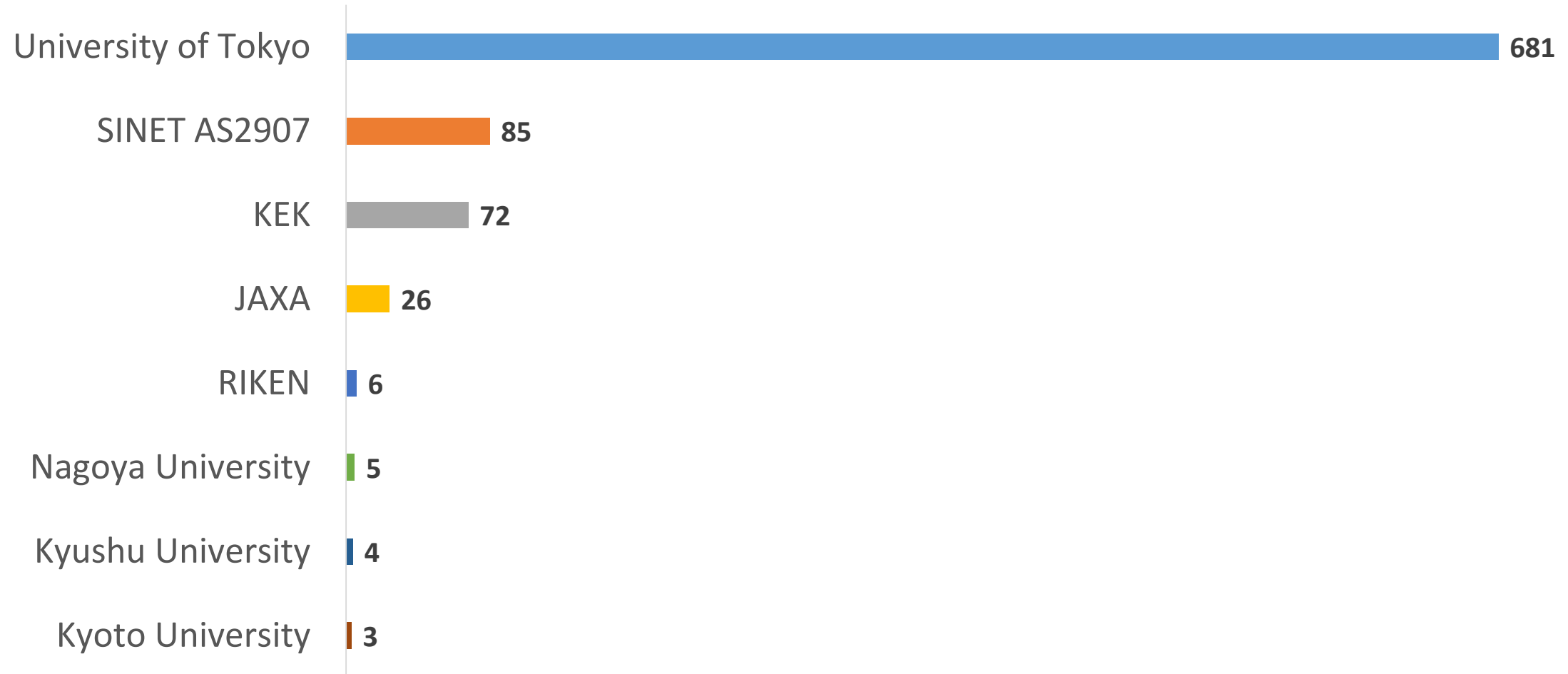
Total TBytes (ingress+egress) - last month

Top talkers *(Europe)*

JISC	121
KIT	112
GARR	80
CERN	74
DFN	62
IN2P3	58
CESNet	57
DESY	41
Renater	27
Toile Informatique GREnobloise	24
IFAE	20
SURFnet	18
Arnes	16
CEA	15
NorduNet	11
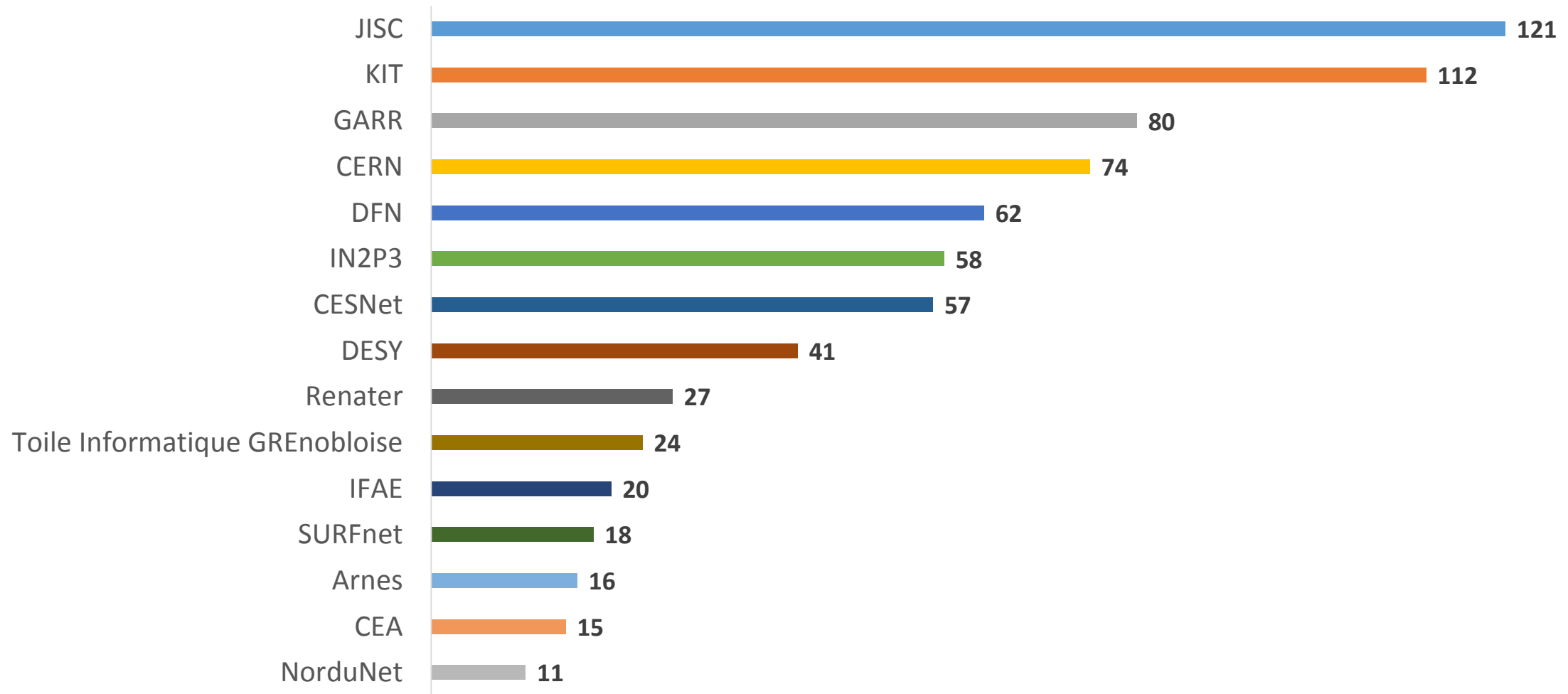
Total TBytes (ingress+egress) - last month

Support to the HEP community

- **LHC**
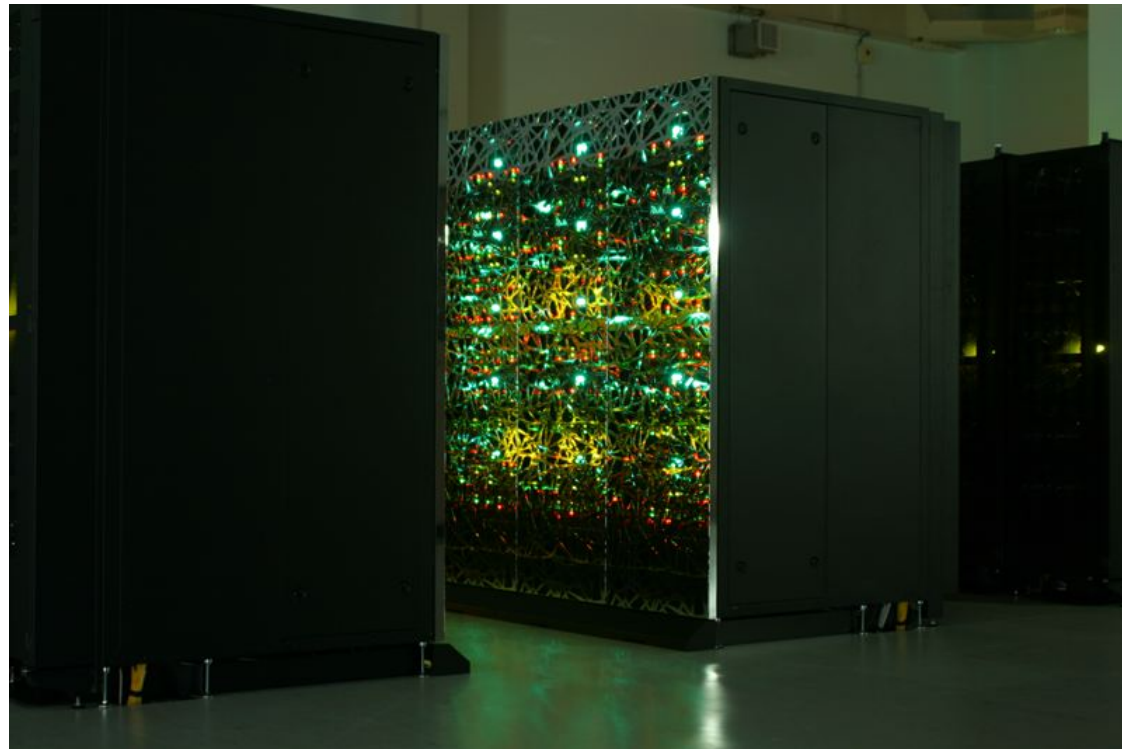 - Tokyo-LCG2 (Tier2) for ATLAS experiment at ICEPP
  - Connected to LHCONE
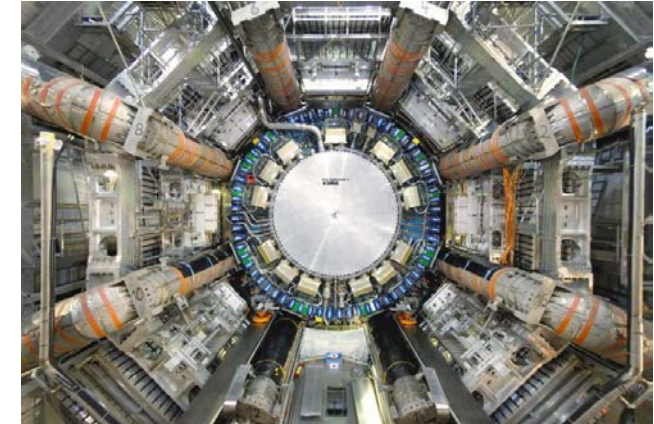
- **BELLE II**
  - KEK connection to LHCONE underway
 - perfSONAR monitoring infrastructure
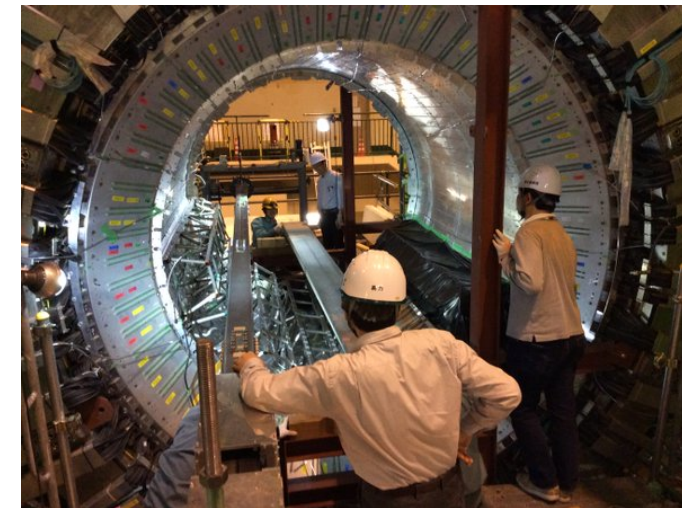
ITER – fusion research

- 10Gbps connection between Rokkasho (HELIOS supercomputer) and the nuclear facility in Cadarache (France) via Tokyo-London link (previously via North America)

Earth observation

- Collaboration between European Space Operations Centre (ESOC) and Japan Aerospace Exploration Agency (JAXA)

- Joint mission control for Hayabusa2 and BepiColombo satellites

- GÉANT assisted with setting up redundant and diverse circuits from ESOC to JAXA sites (from Darmstadt, Germany to Yokohama)

eVLBI
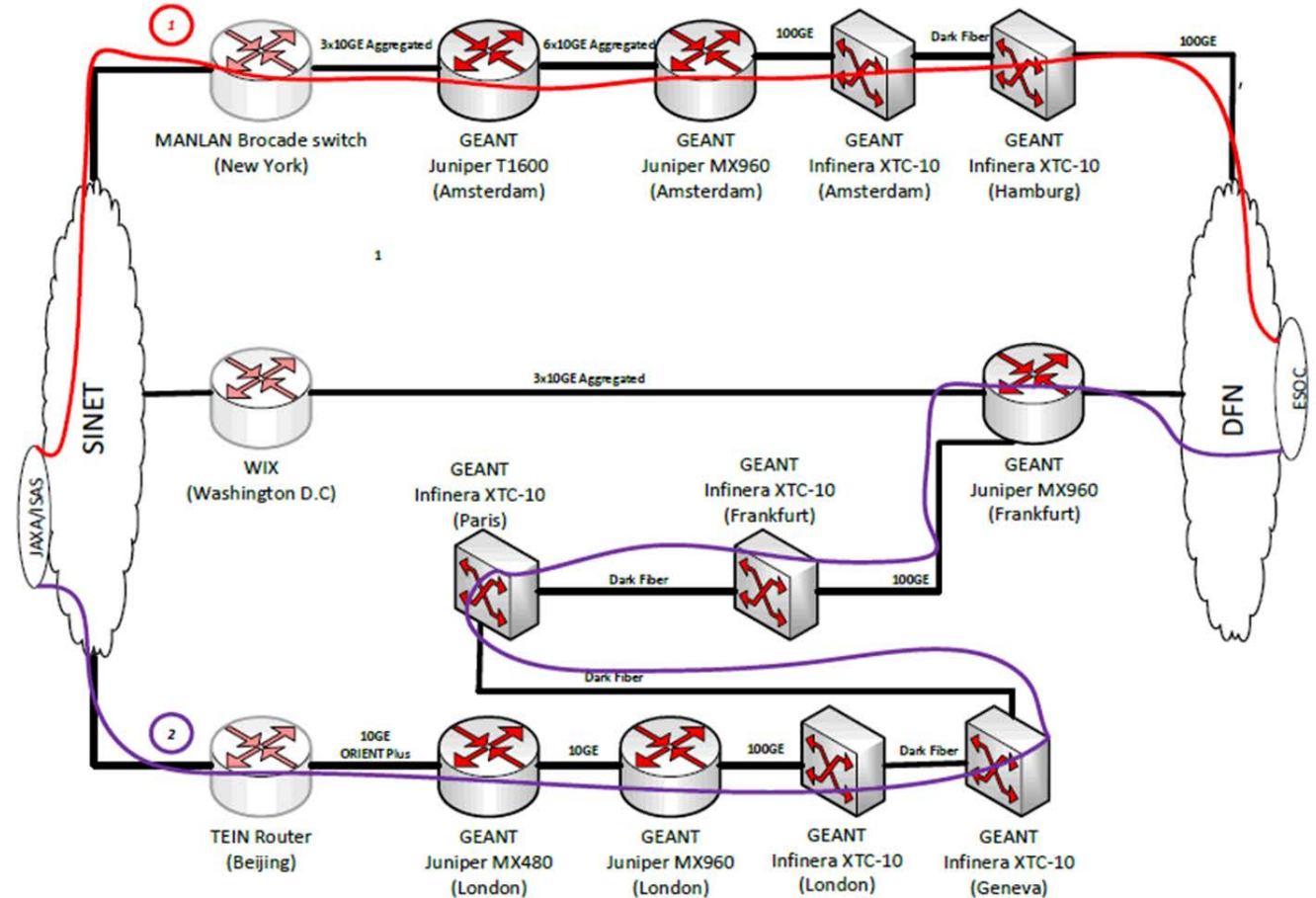
The World's Main VLBI Stations

Future possible EU-Japan collaborations

- **Life sciences**
  - **Genomics database** distribution
    - National Institute of Genetics (Mishima) – collaboration with EBI/EMBL
  - **Pan-cancer initiative**
    - IMSUT/RIKEN – collaboration with DKFZ (Germany)
- **Physics**
  - **ITER**
    - JT60SA (Naka)
    - ITER->DEMO roadmap
  - **T2K/HyperK/KAGRA** (Kamioka) – large European presence in the collaboration
  - **International Linear Collider (ILC)**– LHC scale international collaboration
- **Earth observation**
  - **JEM-EUSO** – large international collaborations
  - **Hinode (ISAS/JAXA)** – ESA and STFC (UK) are involved
  - **CEReS** (Chiba)
  - **EISCAT** (Nagoya) – Nordic European countries involved

Global Network Directions

Global R&E Network CEO Forum

- No global R&E Network coordination existed prior to September 2012
- Global R&E Network CEO Forum formed
- 'G20' style, participants from all world regions including Japan
- Strategic dialogue & expert Working Groups:
  - Network
  - Middleware
  - Upper-layer advanced services
- "Global Network Architecture – A well-defined, inclusive, global architecture for, and a roadmap towards, interconnecting the Research and Education Networks on a global scale, taking into account input from the large science & education projects"

Principles for a 'Global Network Architecture' (GNA)

- A reference architecture, not a network
  - Based on interconnected rings and open exchange points
- Goal is to collaboratively procure and build a global R&E infrastructure
- It is a new paradigm for intercontinental R&E networking based on federation, co-operation, co-ordination

- - - Pilot
— Ring 1
— Ring 2
— Ring 3
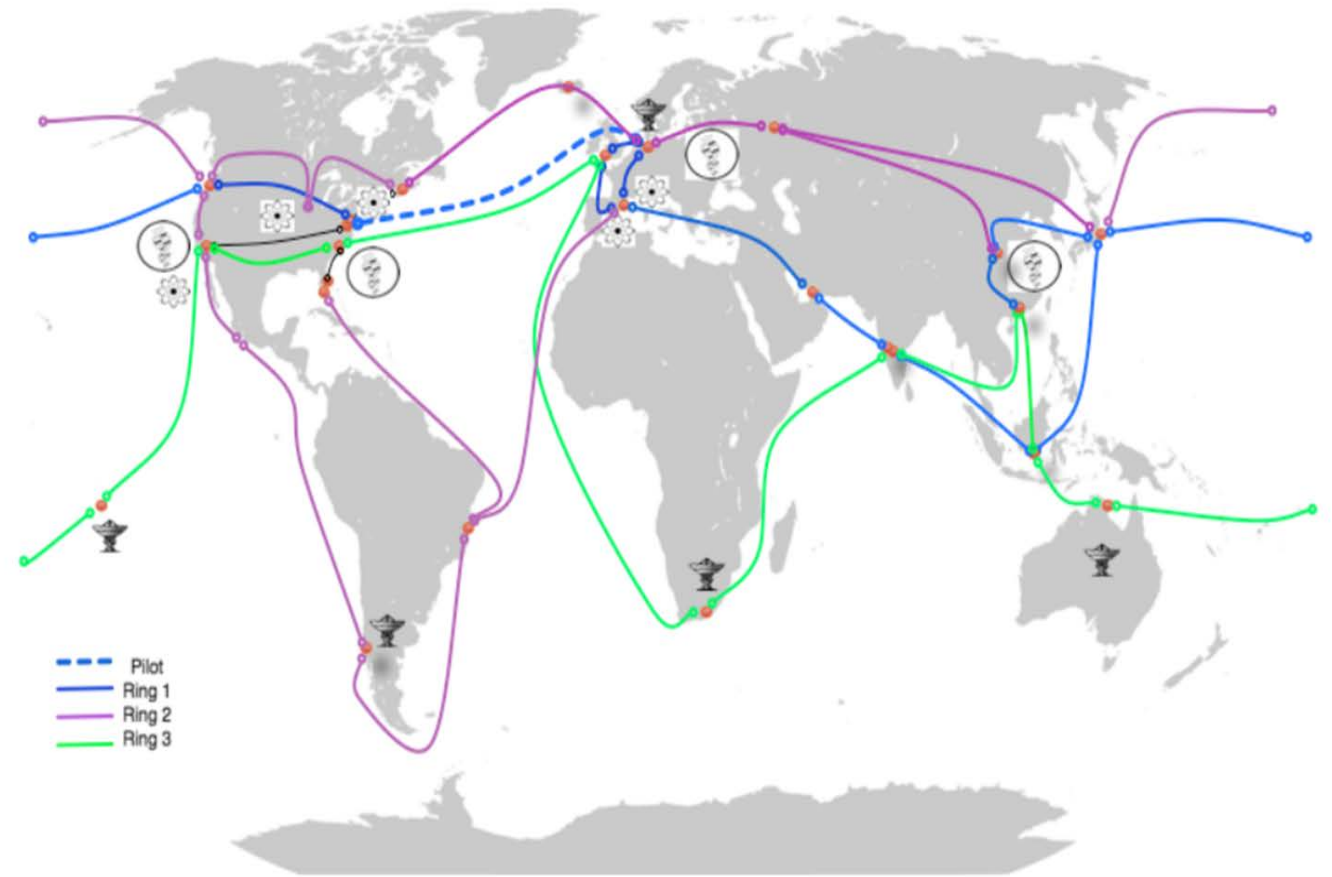
Future (artist's impression)

Possible Network Technology Collaborations

Network Service Interface (NSI)

- NSI provides dynamic network connections that transit R&E networks.

- GÉANT has an NSI dynamic service and is a partner in the GLIF AutoGOLE.

- We hope an NSI connection with SINET5 can lead to closer collaboration.

Software Defined Networking (SDN)

- GÉANT is working closely with ON.Lab to extend the ONOS controller.

- We are also working closely with CORSA to develop a pipeline to support L2 and L3 services.

- We have a plan to progressively roll this out in the GÉANT backbone starting in the next 12 months.

http://dashboard.lab.uvalight.net/cpm
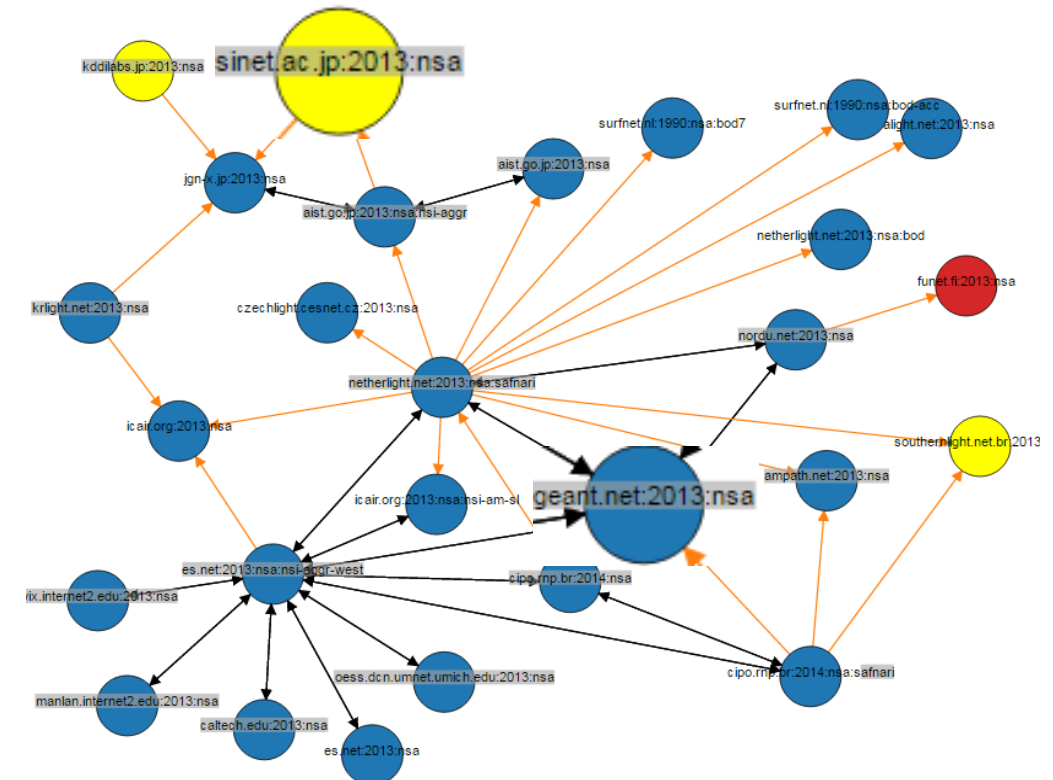
GÉANT supporting SINET

Welcoming SINET to the new GÉANT London data centre (Slough)

- State of the art data centre

- SINET rack and equipment fully operational

- GÉANT proud to be hosting SINET!

- Excellent co-operation between GÉANT and SINET teams

Conclusions

- GÉANT values NII/SINET as a long-standing and strategic partner.

- Exciting opportunities for further collaborations between Europe and Japan powered by our connectivity.

- The new SINET5 capacity to Europe marks the next stage of our co-operation, GÉANT is honoured to support.

- GÉANT looks forward to its successful service and future upgrades. EU/Japan traffic growth will need 100Gbps before too long.

- GÉANT congratulates NII on the SINET5 launch…..

Congratulations!

Thank you

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www.geant.org