



# Network on French cloud

- Network in France
- Some statistics
- Some observations



# The “French” cloud

**T1 : IN2P3-CC**

**T2s : 14 sites**

- Annecy
- Clermont
- Grenoble
- Grif (3 sites)
- Lyon
- Marseille
- Beijing
- Romania x4
- **Tokyo**

**IN2P3-CC is primary source of data for the T2s**

**Organized data transfers managed by IN2P3-CC**

Data SIO, NOAA, U.S. Navy, NGA, GEBCO

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Image © 2012 TerraMetrics

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# The French sites



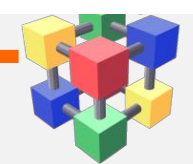
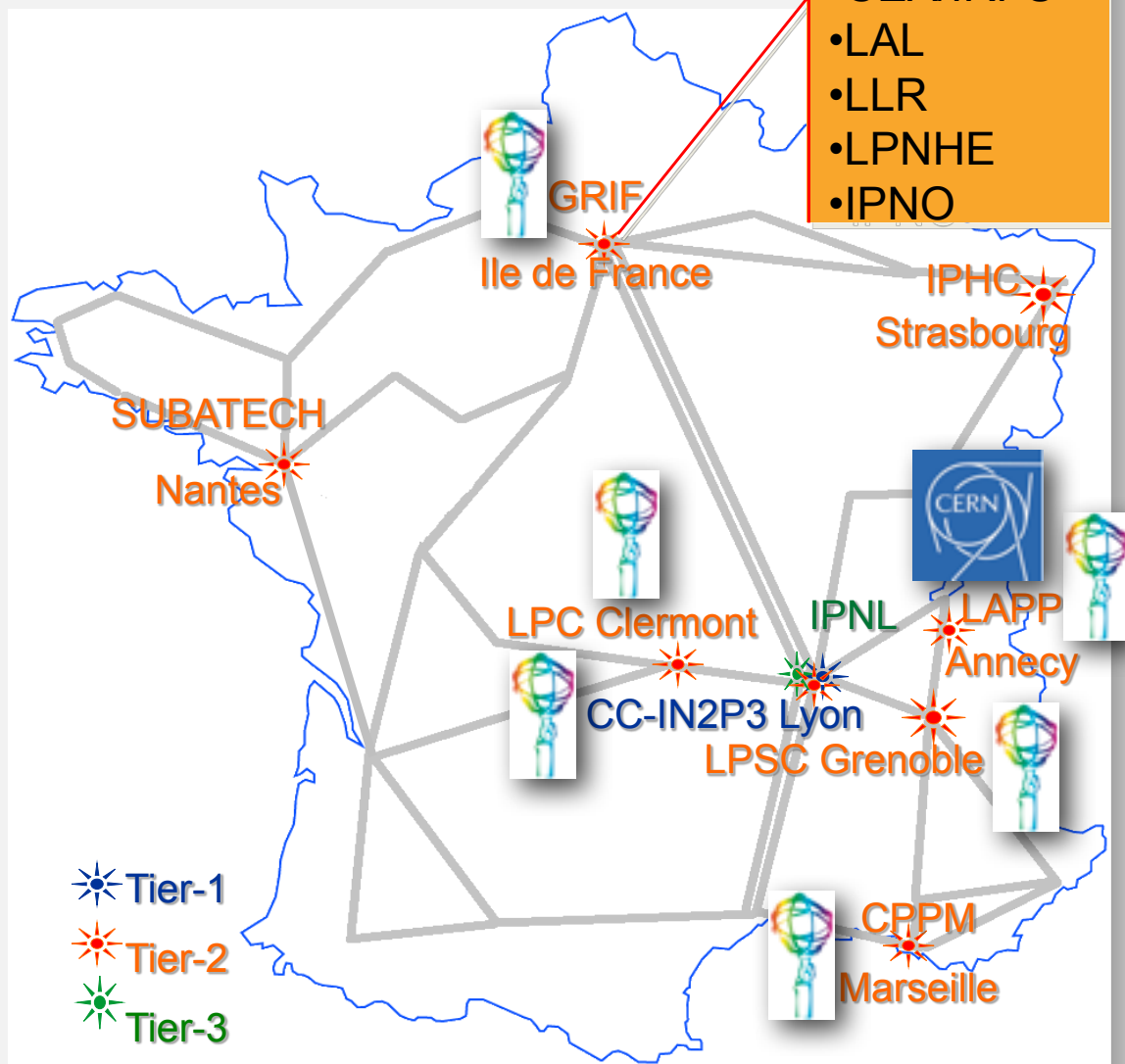
## LCG-France

<http://lcg.in2p3.fr>



- GRIF :
- CEA/IRFU
  - LAL
  - LLR
  - LPNHE
  - IPNO

- LCG-France is the French contribution to the WLCG international collaboration building the worldwide LHC computing grid
- Project was launched by the 2 main actors in HEP : CNRS /IN2P3 and CEA/Irfu acting as funding agencies
  - With CC-IN2P3 Computing Centre in Lyon and French laboratories
- targeting to cover ~ 10 % of total CPU needs of the four experiments and the associated required storage resources



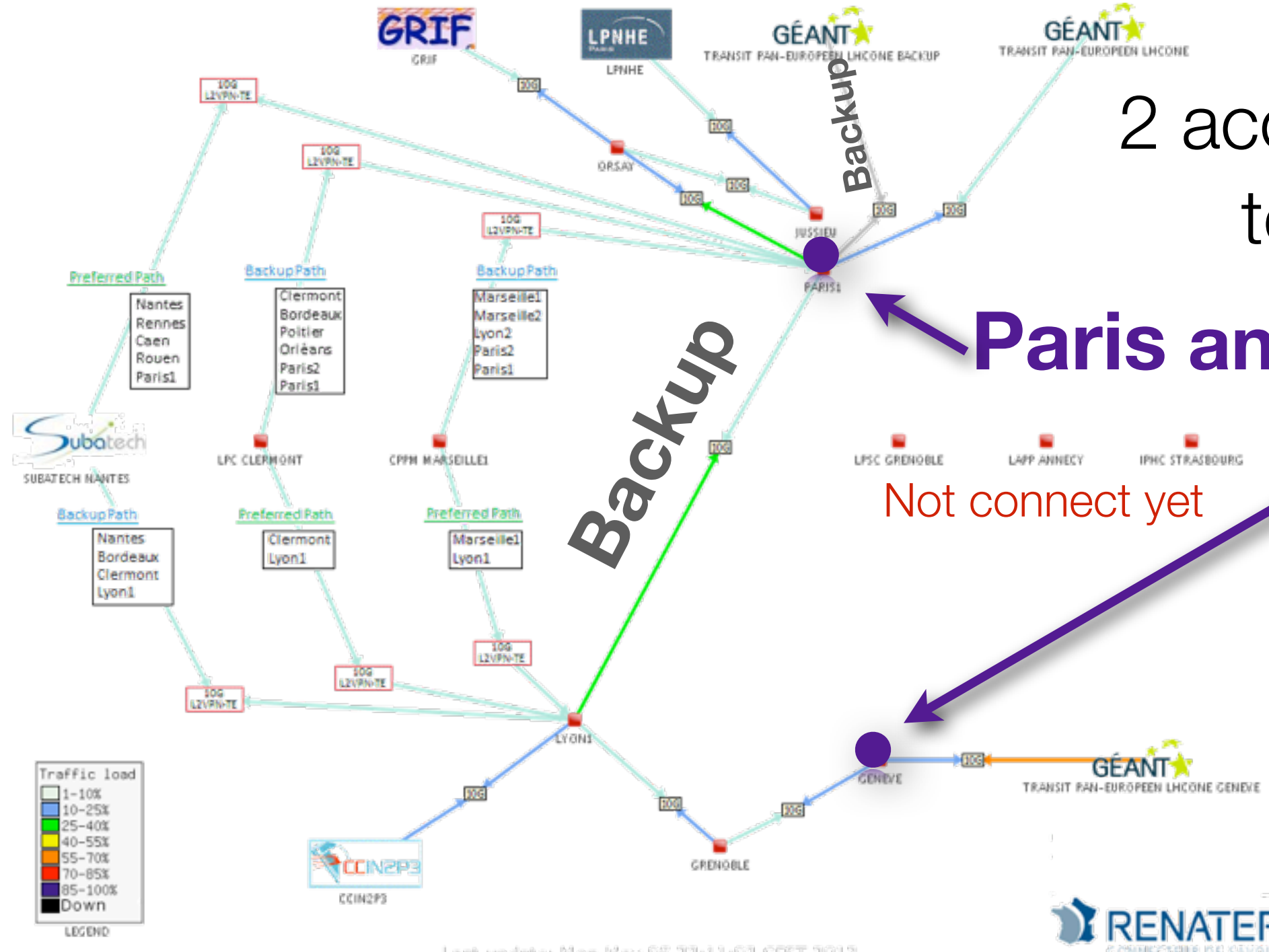
# LHCONE in France

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Plan is to connect **all** French Tier-2s to LHCONE  
Continuous and active support from French NREN : RENATER



# French LHCONE present status



2 access **points** to GÉANT

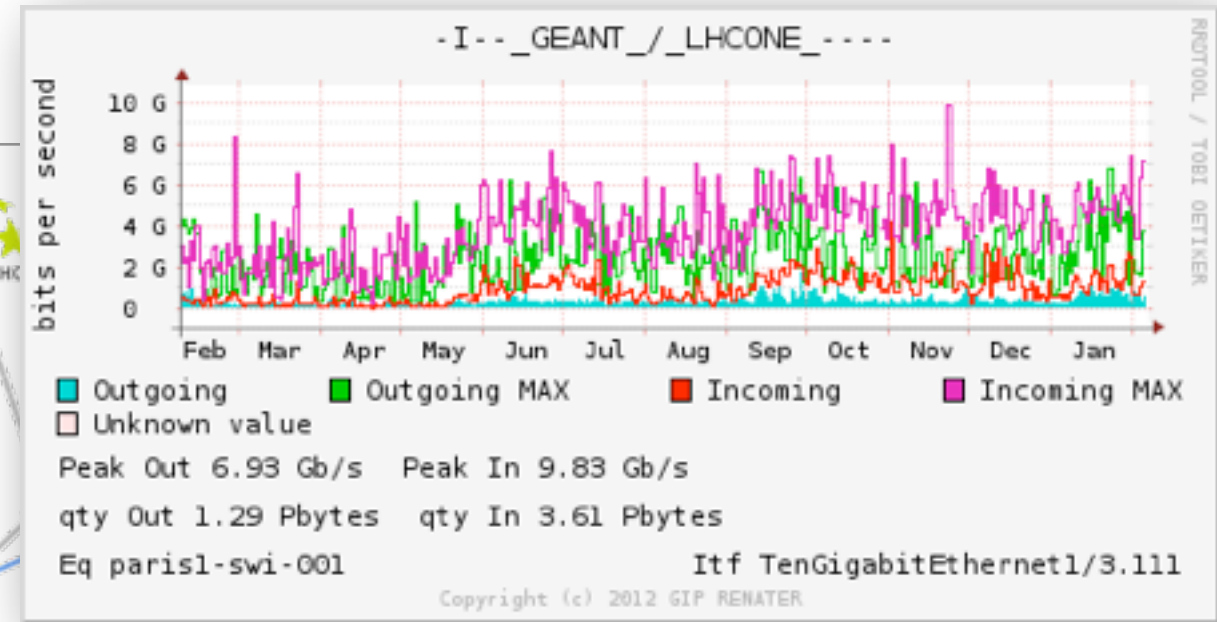
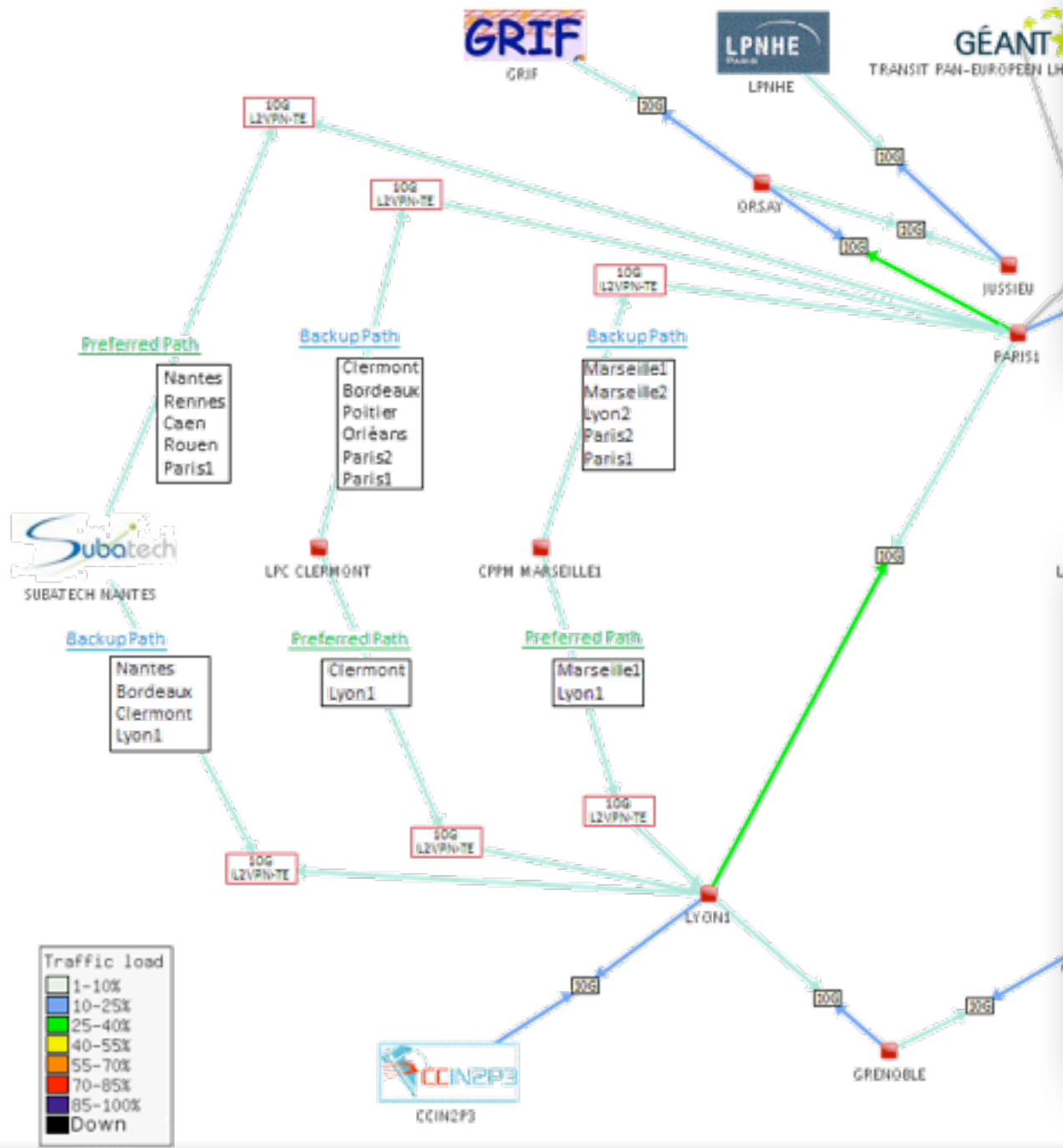
**Paris and Geneva**

Not connect yet

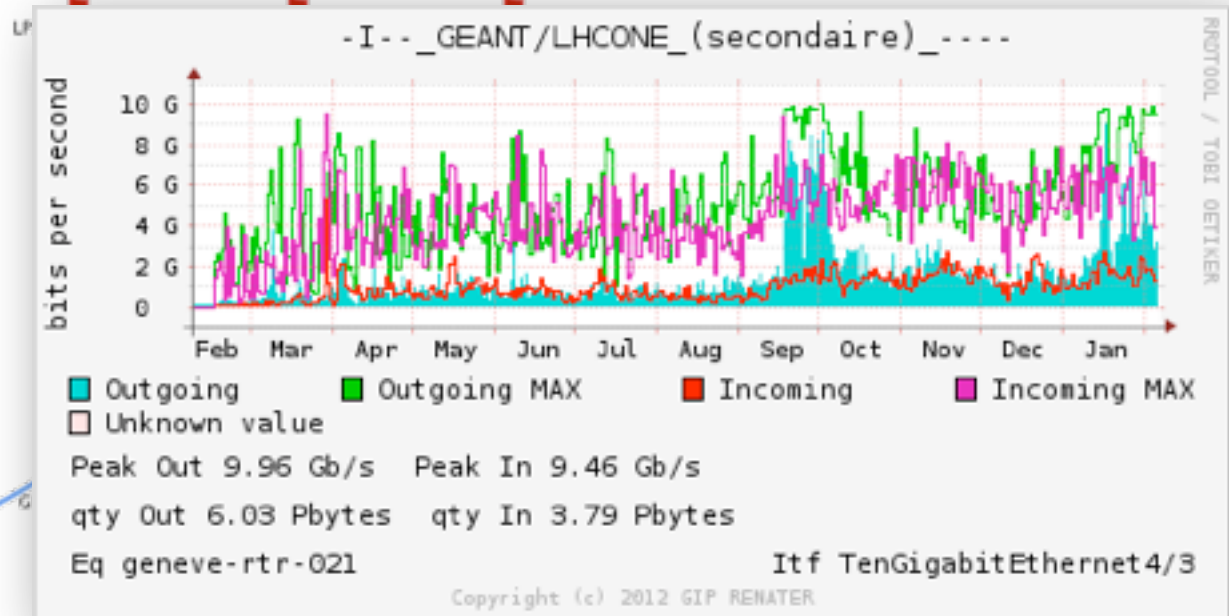
Last update: Mon May 06 22:11:02 CEST 2013



# French LHCONE



**Close to saturation...**

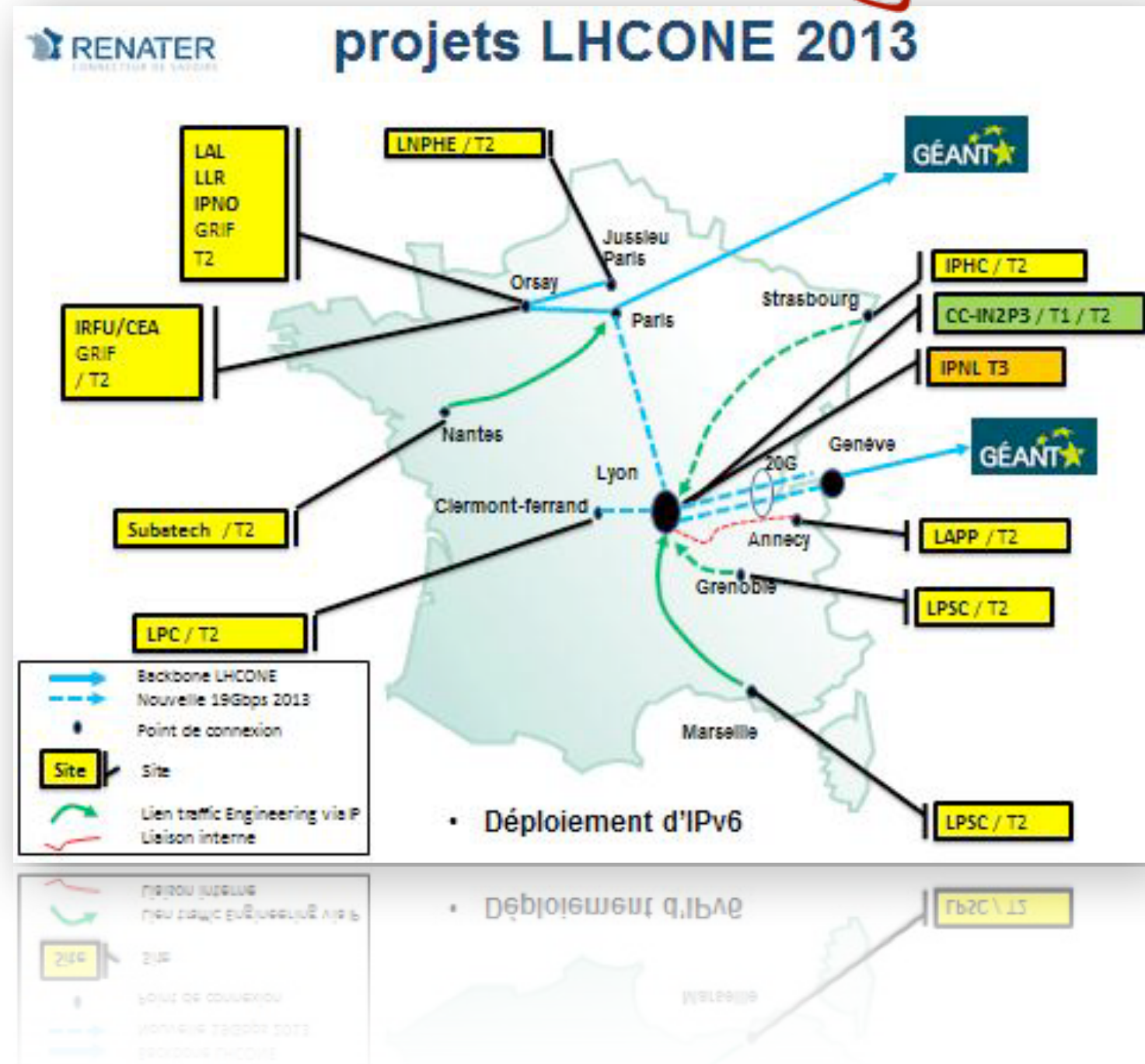


**Statistics for 2012 : OUT 6,1 Pbytes, IN 7,0 Pbytes, Max 17,6 Gbps**



# French LHCONE evolution planned in 2013

- LPSC, LAPP connected to LHCONE
- Ability to meet increased traffic, thanks to RENATER the French NREN
- Add new 10Gb/s lambda between Lyon and Paris
- Add new 10Gb/s lambda between Lyon and Geneva
- Add new 10Gb/s lambda between Lyon and Clermont
- Increase CCIN2P3 – LHCONE from 10 to 20Gb/s



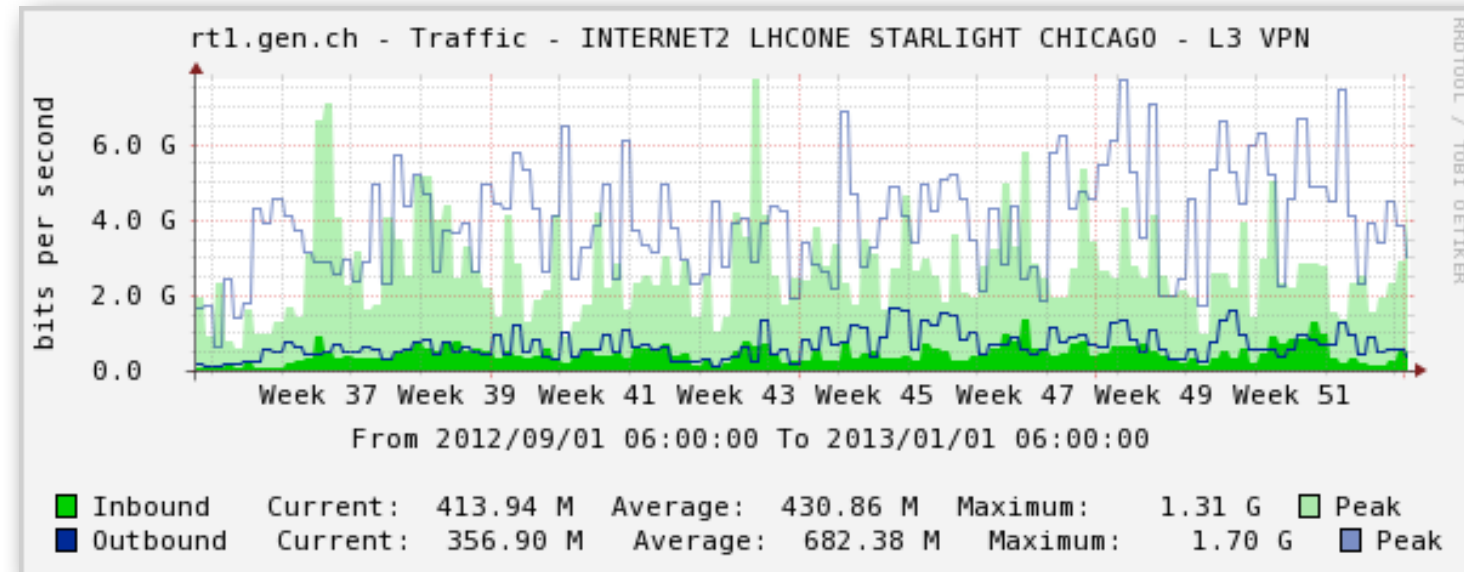
**By end of summer 2013, all ATLAS French T2s will be connected to LHCONE**

# RENATER investments in 2012/2013

- New LHCONE transatlantic link (together with GARR & DFN)

- F4E (Fusion for Energy: <http://fusionforenergy.europa.eu>) together with DFN

New 10G link between GEANT and Washington matching the SINET 10G link between Japan and Washington



## GÉANT paves data highway for nuclear fusion energy research

High-speed network essential link in search for clean, sustainable energy

Cambridge, UK | 9 April 2013

GÉANT, the world's leading high-speed research and education network managed and operated by DANTE in Cambridge, UK, will be providing data links to the International Fusion Energy Research Centre (IFERC), in Rokkasho, Japan.

IFERC hosts the Helios supercomputer, a system with a compute power exceeding 1 PFlops and attached to a storage capacity of 50 PB. The Helios supercomputer is provided and operated by the French Alternative Energies and Atomic Energy Commission (CEA), France and is a Fusion for Energy (F4E) resource.



Helios supercomputer. Bull copyright



# Network performance between France & Japan

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French T1 (IN2P3-CC) primary data server for Japan T2

# ATLAS Network performance accounting & monitoring

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- **Networking accounting :**

- **Organized** (FTS) file transfers : <http://dashb-atlas-data.cern.ch/ddm2/>, not for direct transfers by users (dq2-get)

- **ATLAS 'sonar' :**

- Calibrated file transfers by ATLAS Data Distribution system, from **storage to storage** : <http://bourricot.cern.ch/dq2/ftsmon/>
- > 1 GB file transfers used to monitor and validate T2Ds

- **perfSONAR (PS) :**

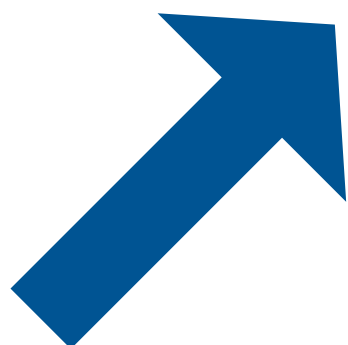
- **Network performance** (throughput, latency) : <http://perfsonar.racf.bnl.gov:8080/exda/>
- Located as close as possible to storage at site and with similar connection hardware



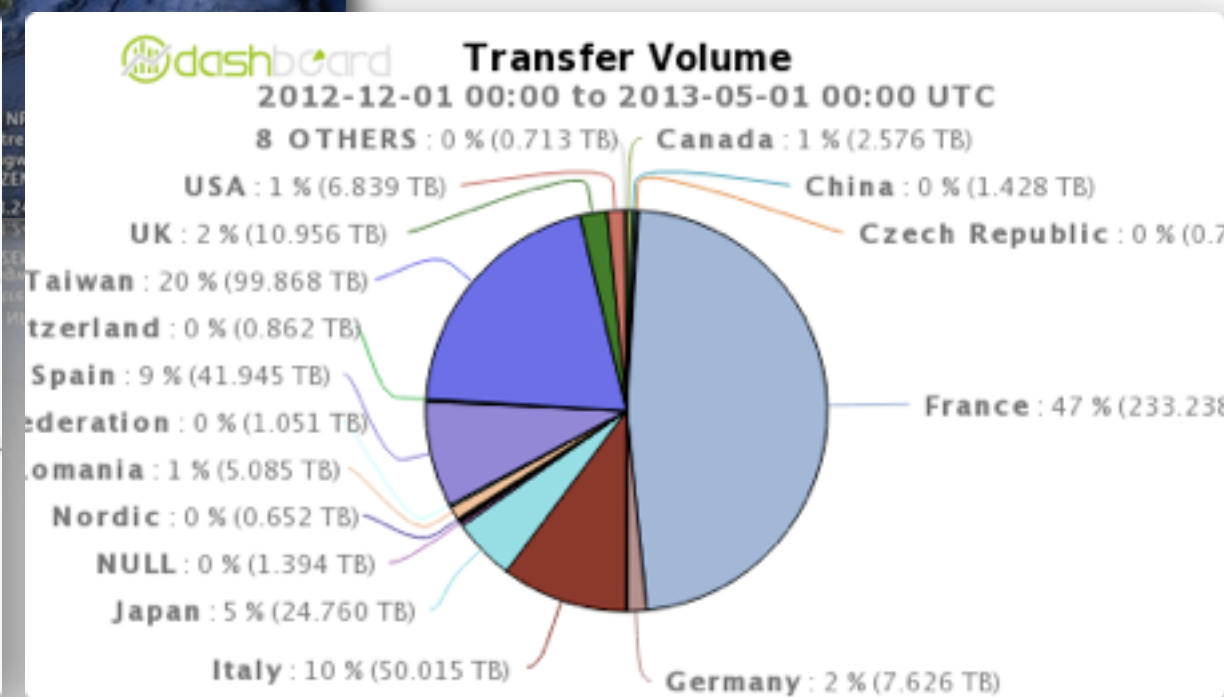
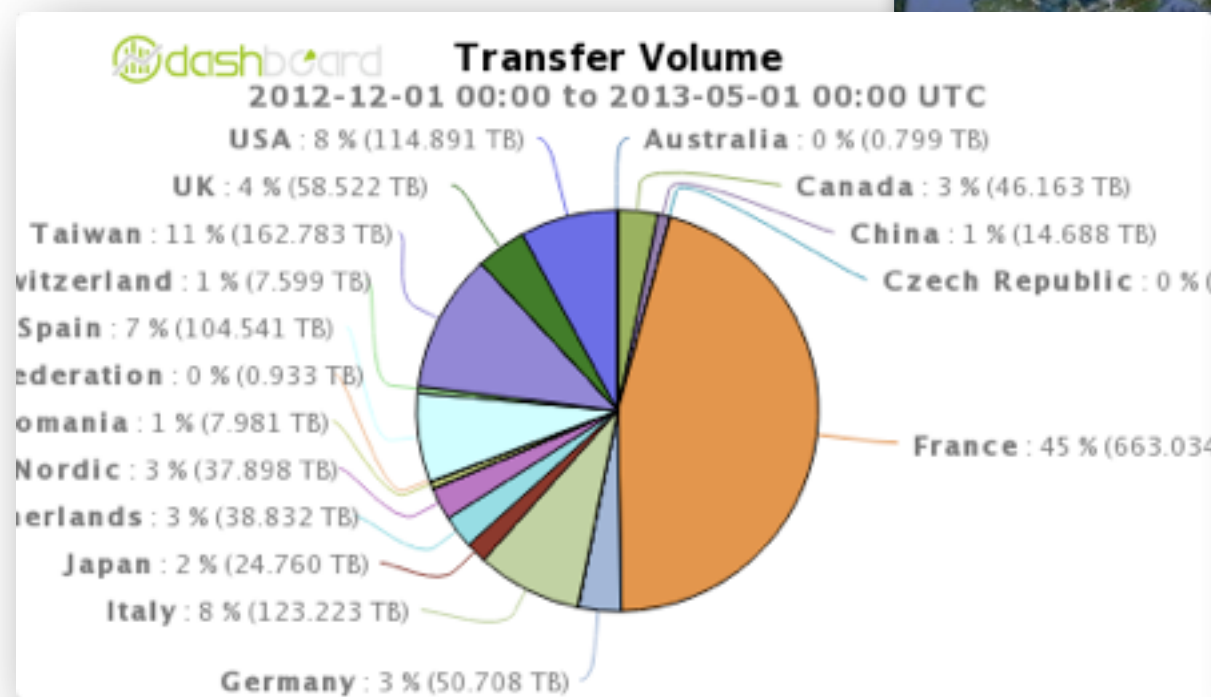
# Data transfer to/from Japan over last six months

## organized ATLAS data transfers

~75% from Europe



~70% to Europe

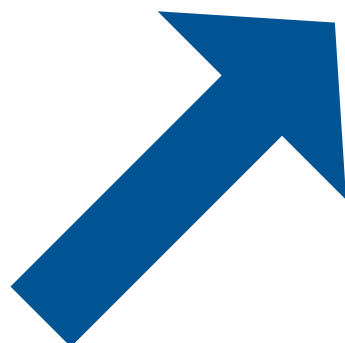


45% from France

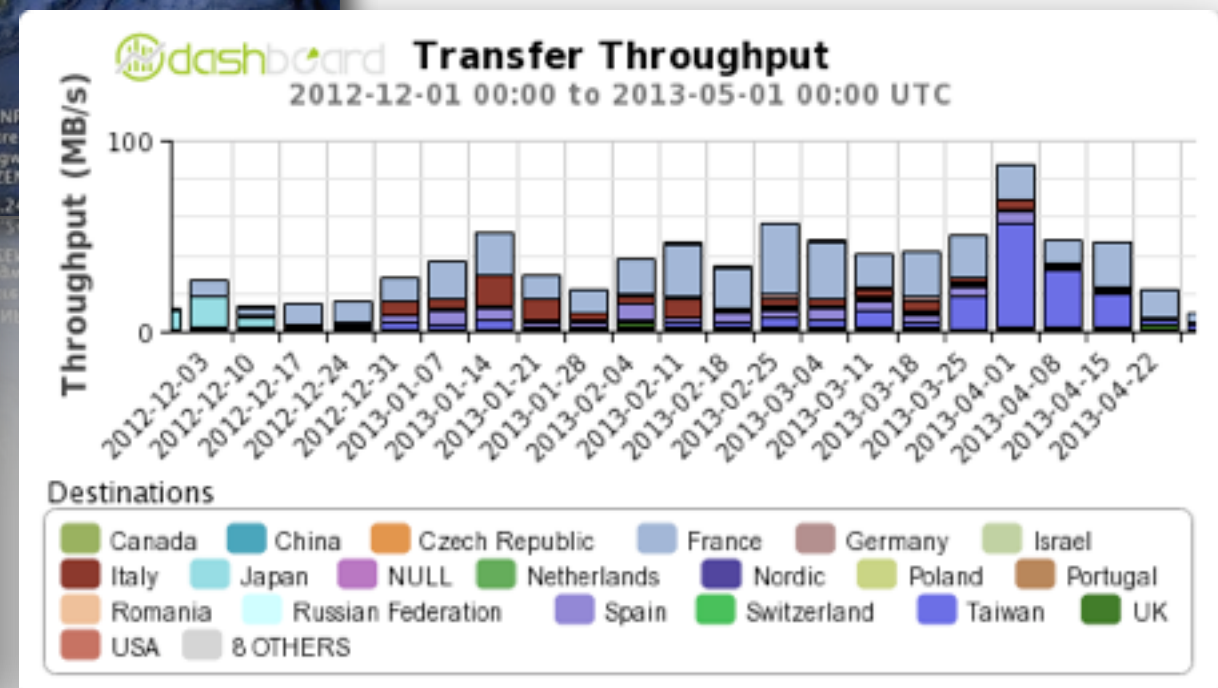
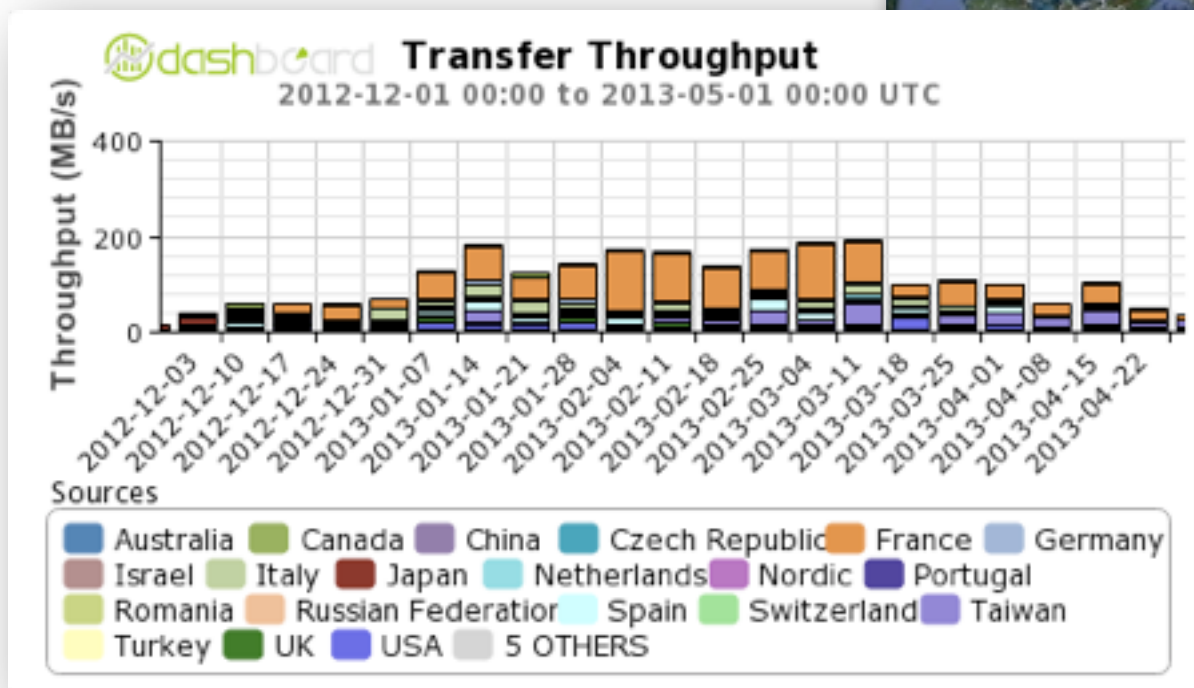
~50% to France

# Data transfer to/from Japan over last six months

sustained ~200MB/s for several months

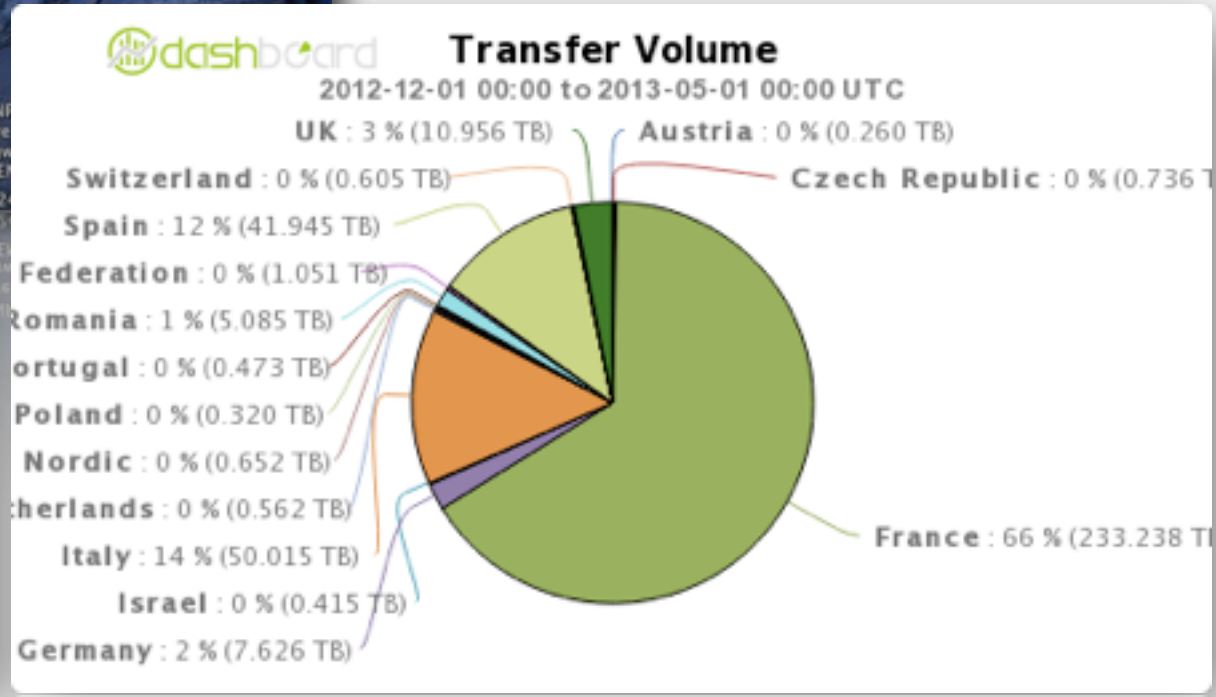
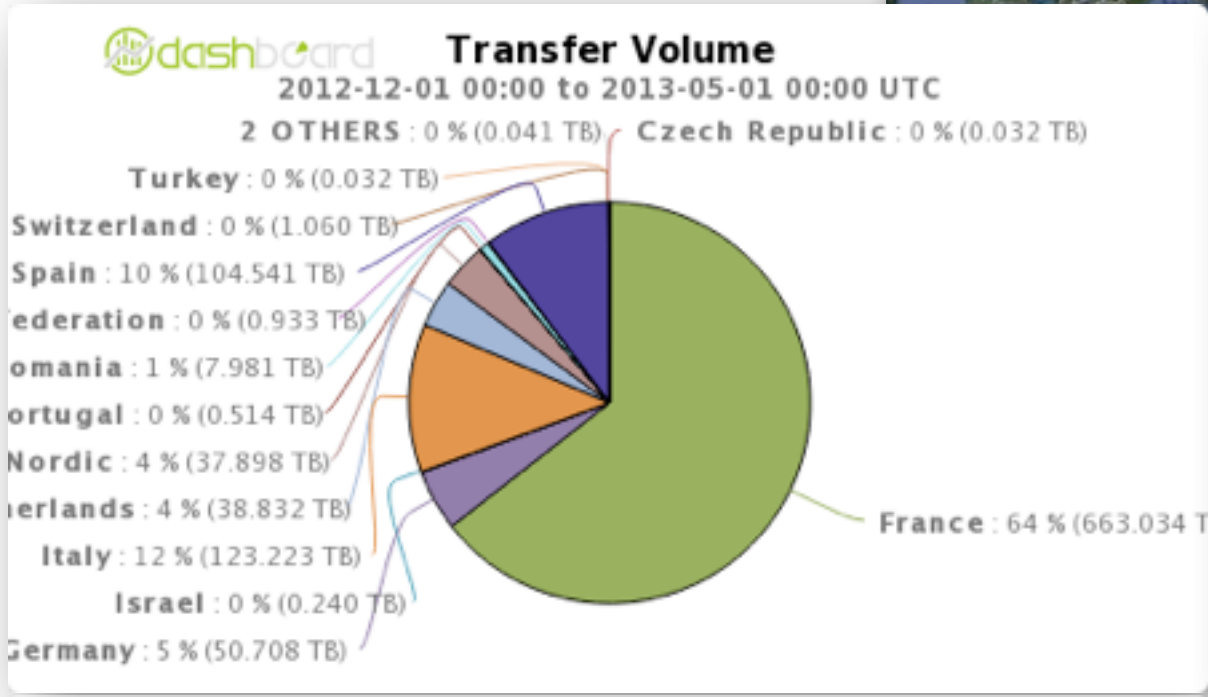
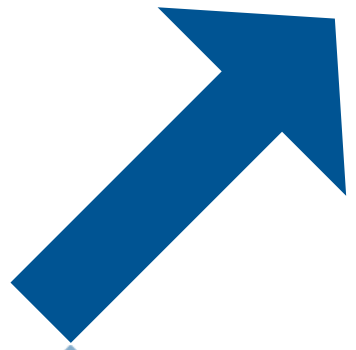


sustained ~60MB/s for several months



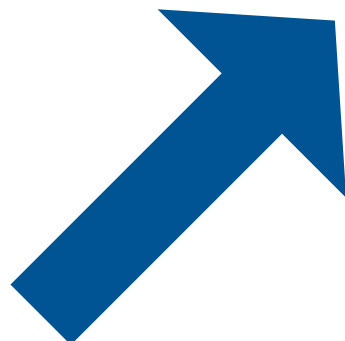


# Data exchanges between Europe & Japan over last six months

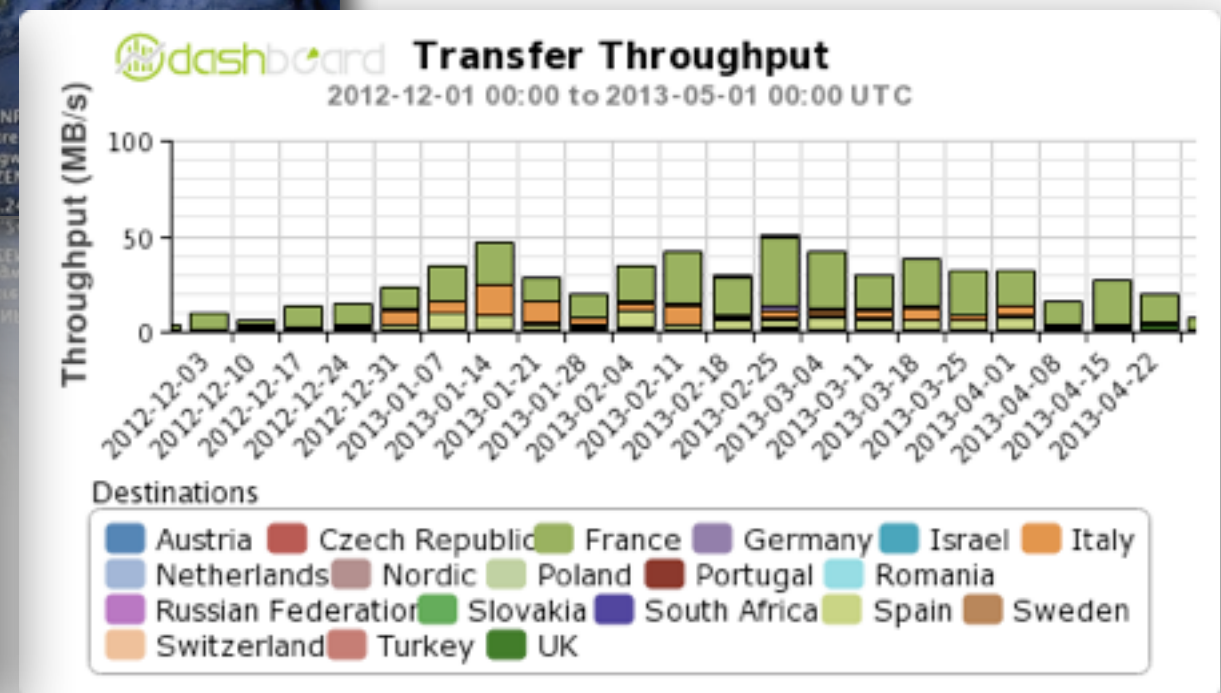
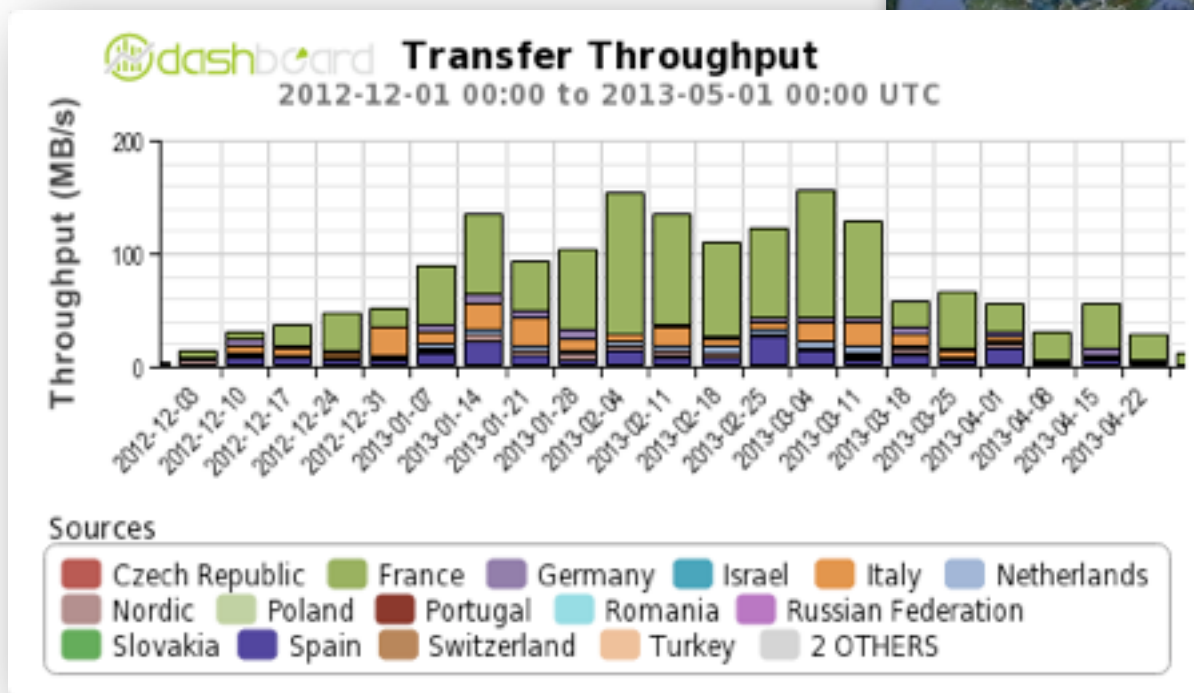


# Data exchanges between Europe & Japan over last six months

sustained ~150MB/s for several months

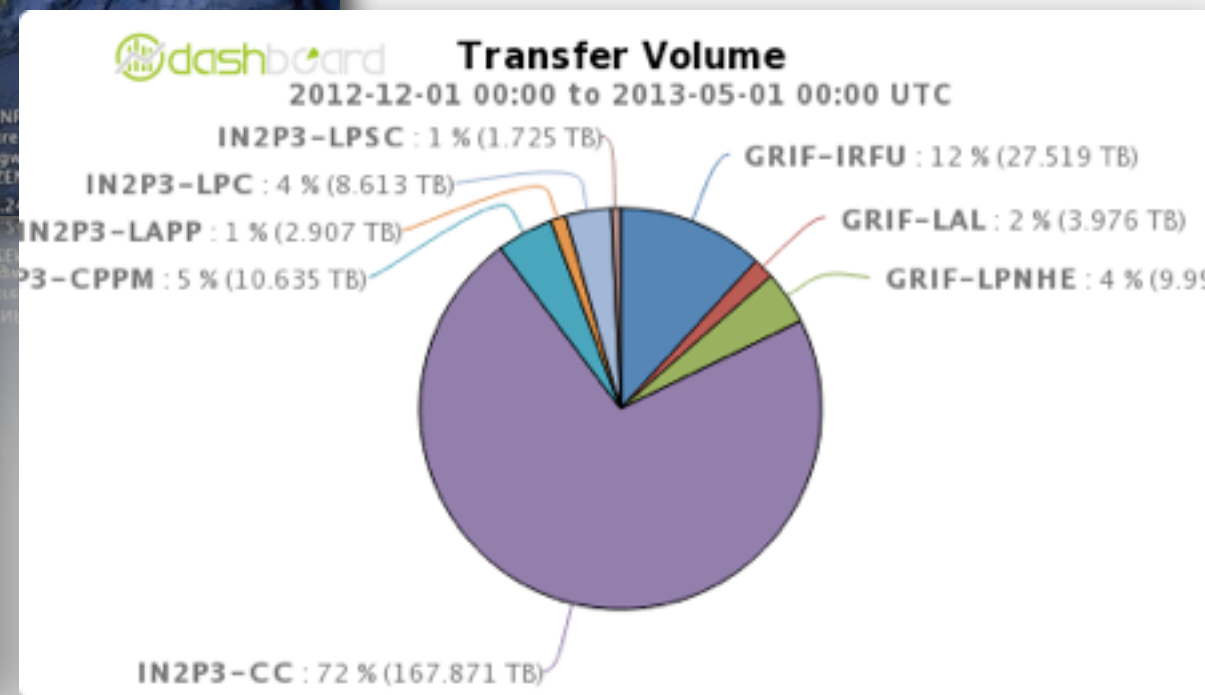
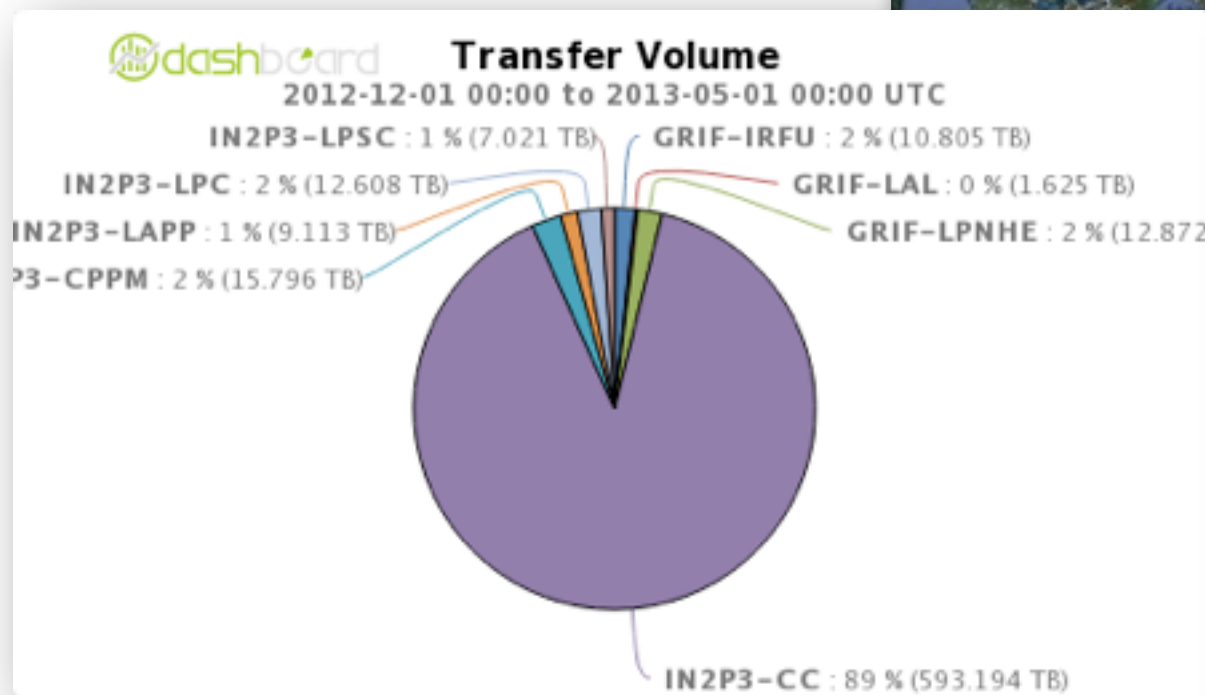


sustained ~50MB/s for several months





# Data exchanges between France & Japan over last six months

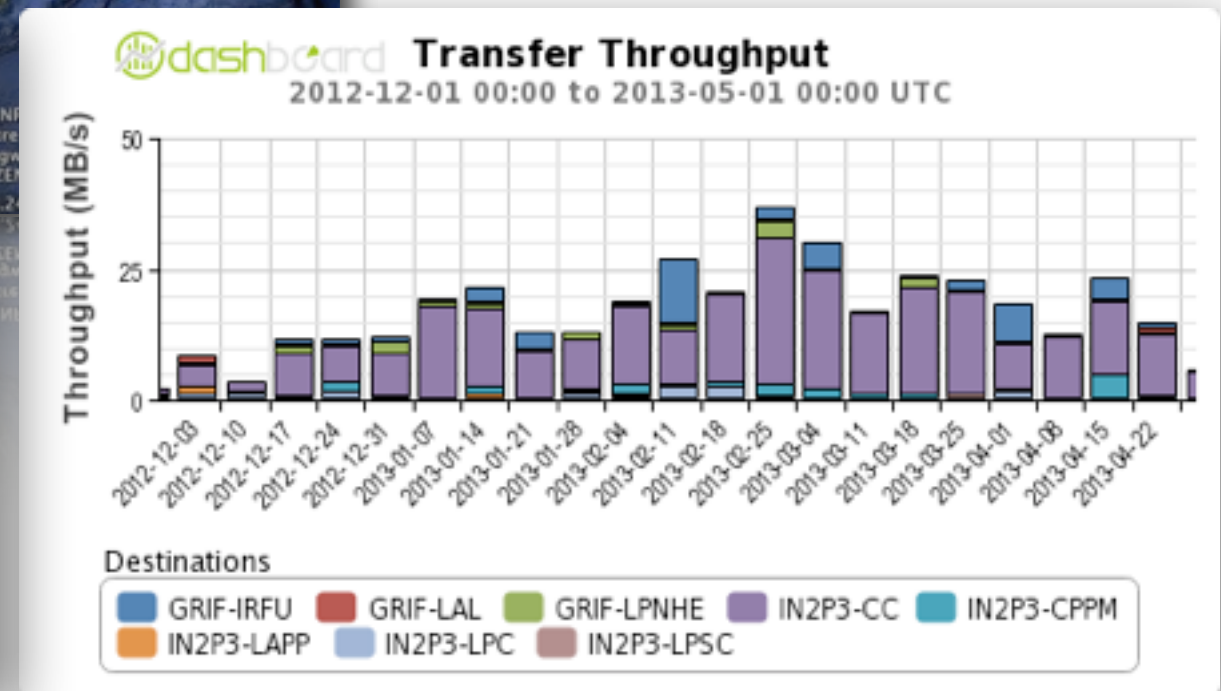
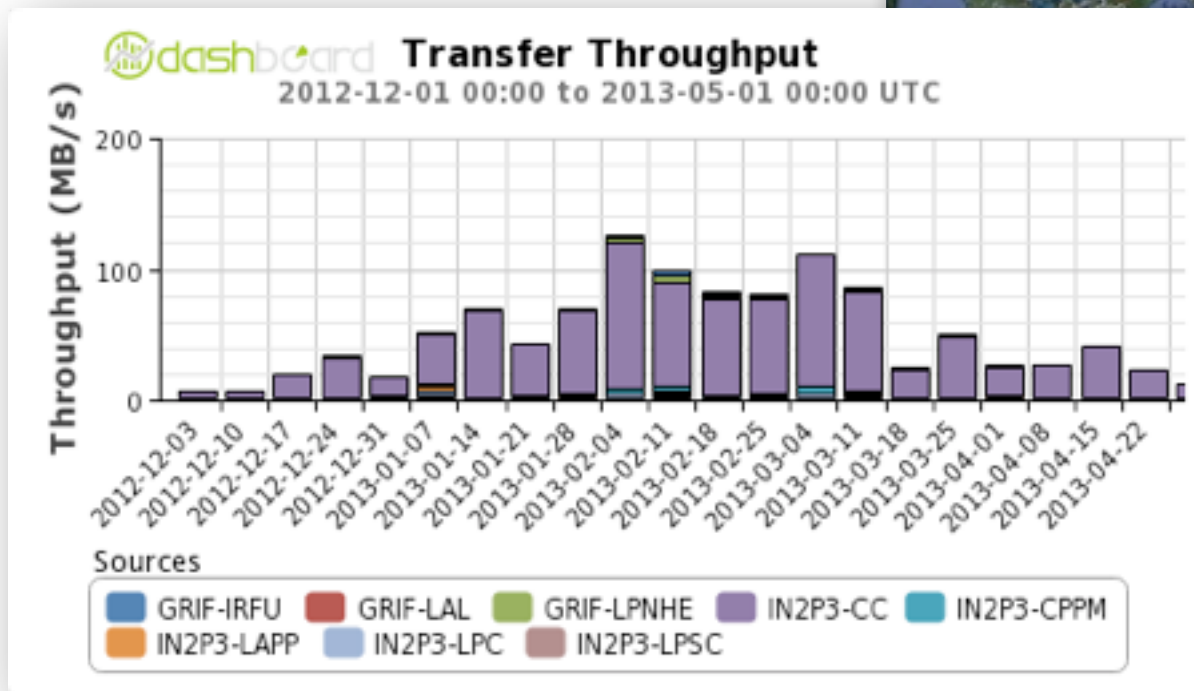
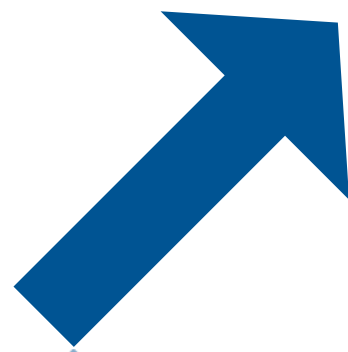


**90% from IN2P3-CC**

Eric Lançon

**~72% to IN2P3-CC**

# Data exchanges between France & Japan over last six months





# Once the link is there...

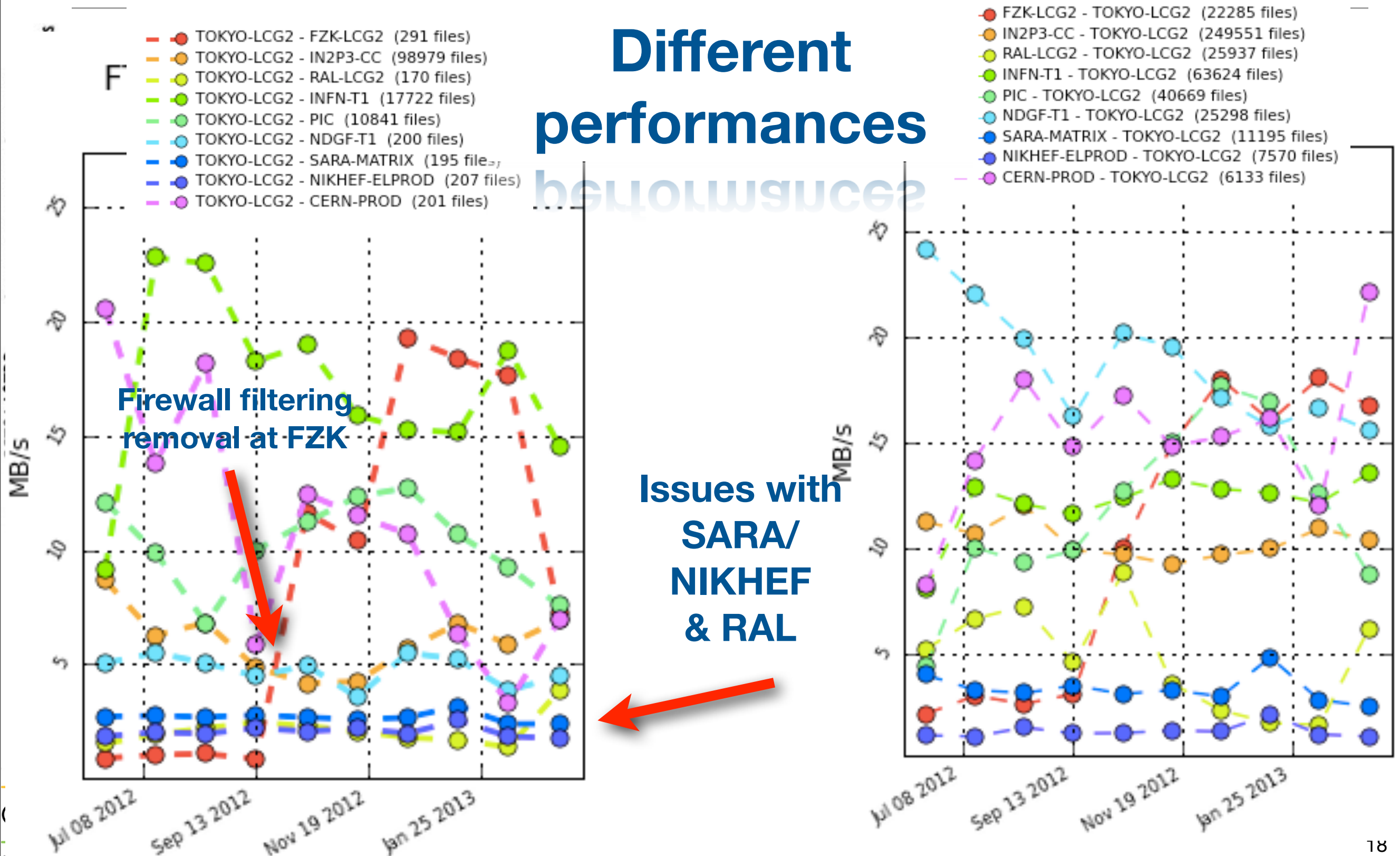
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Many issues to solve for the various sites which are connected

# Calibrated ATLAS file transfers

## Tokyo to/from European T1s

### Different performances



- IN2P3-CC - TOKYO-LCG2 (249551 files)
- GRIF-IRFU - TOKYO-LCG2 (3737 files)
- GRIF-LAL - TOKYO-LCG2 (635 files)
- GRIF-LPNHE - TOKYO-LCG2 (5804 files)
- IN2P3-CPPM - TOKYO-LCG2 (6030 files)
- IN2P3-LAPP - TOKYO-LCG2 (3524 files)
- IN2P3-LPC - TOKYO-LCG2 (5269 files)
- IN2P3-LPSC - TOKYO-LCG2 (3209 files)

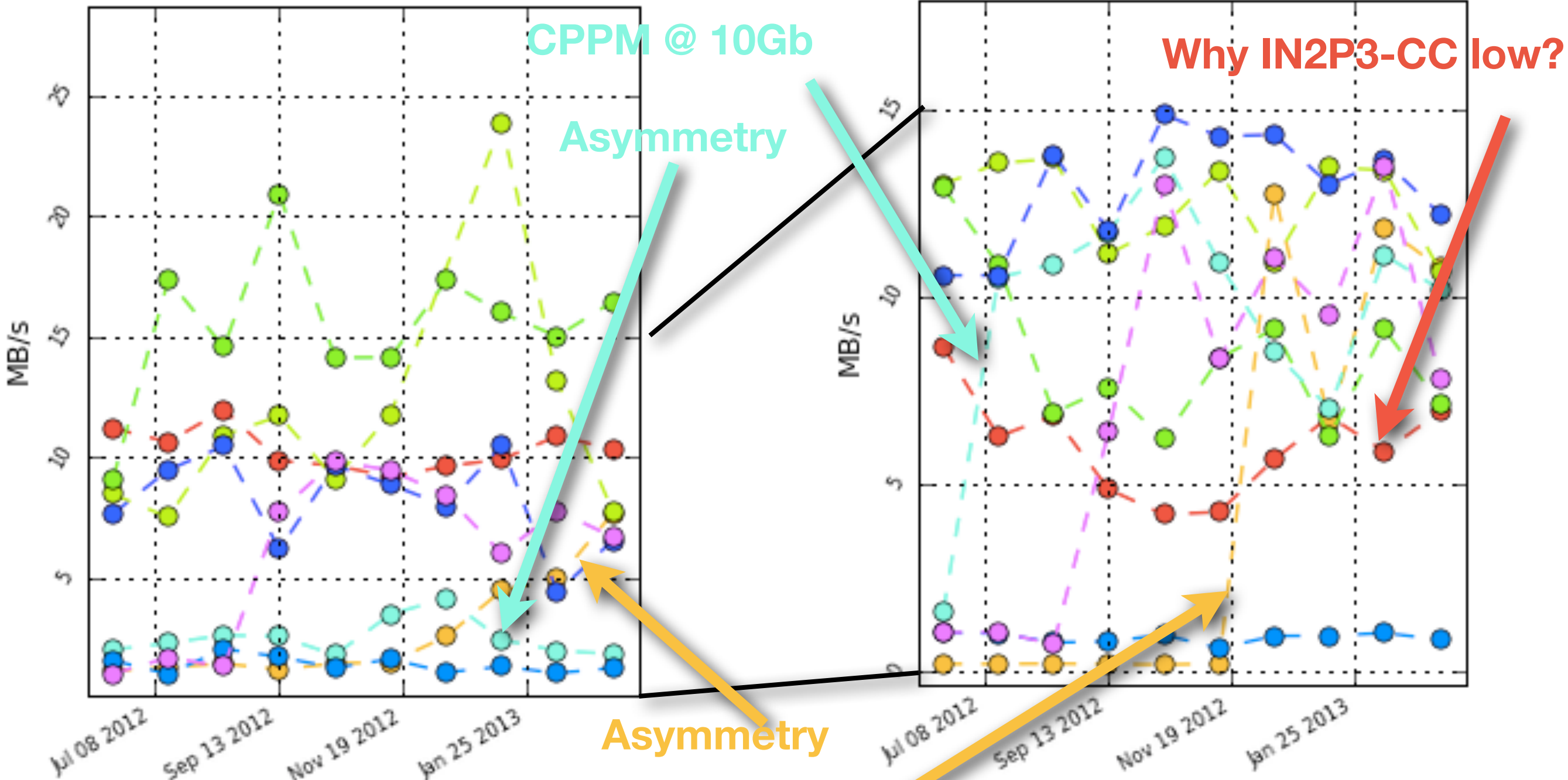
# FR sites-Tokyo

Lot of asymmetries

- TOKYO-LCG2 - IN2P3-CC (98979 files)
- TOKYO-LCG2 - GRIF-IRFU (6679 files)
- TOKYO-LCG2 - GRIF-LAL (4945 files)
- TOKYO-LCG2 - GRIF-LPNHE (5683 files)
- TOKYO-LCG2 - IN2P3-CPPM (4536 files)
- TOKYO-LCG2 - IN2P3-LAPP (2232 files)
- TOKYO-LCG2 - IN2P3-LPC (3973 files)
- TOKYO-LCG2 - IN2P3-LPSC (2045 files)

FTS transfer rates per file

FTS transfer rates per file



IRFU new connected to LHCONE



# perfSonar monitoring

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- perfSonar (PS) machines deployed **now** on ~almost every site of FR-cloud
- Inter-cloud tests (throughput & bandwidth, traceroute to come) **centrally** configured via FR-cloud mesh `/afs/cern.ch/project/gd/wlcmg-ops/perfsonar/conf/frcloud.json (.conf)`
- FR-cloud to T1s mesh to come. New version of pperfSonar (v3.4) needed (include statements)
- Monitoring still 'primitive' (see next slide), but all information available on a central page

# Today's view of FR-cloud matrix

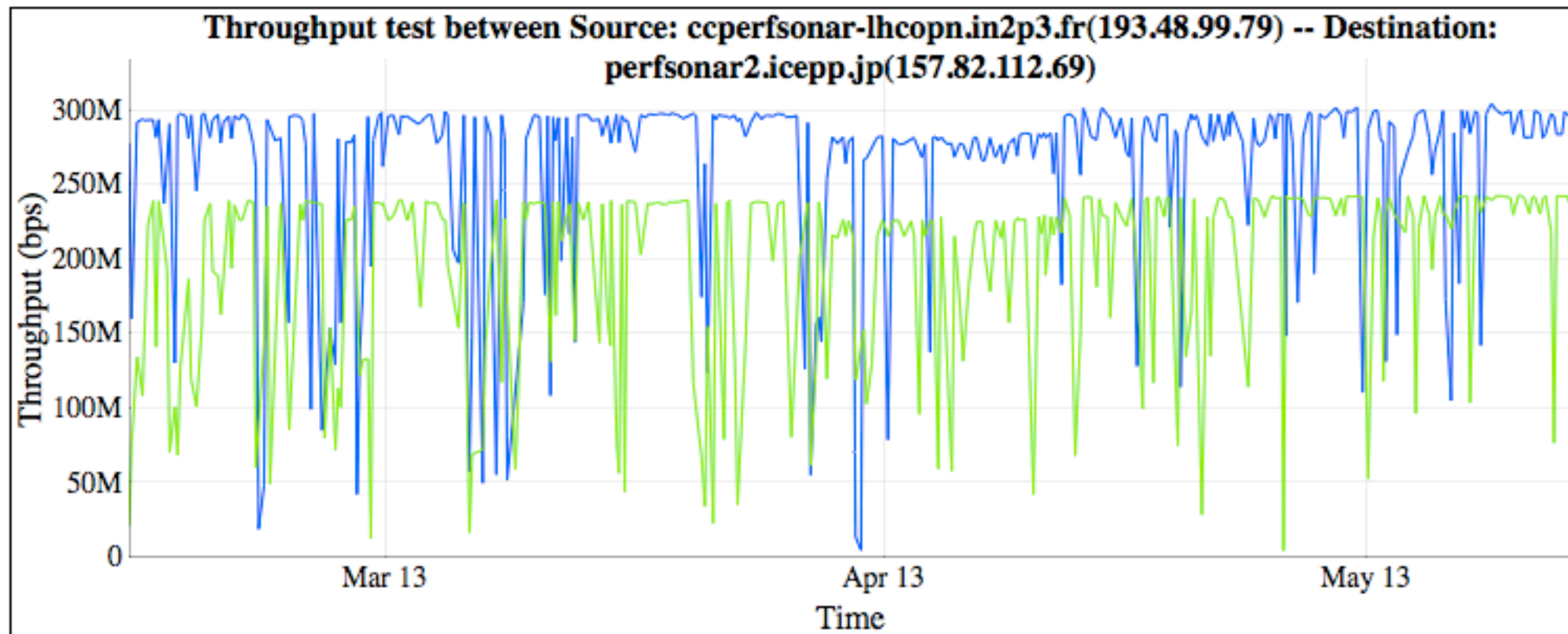
LHC-FR Throughput

	---	0	1	2	3	4	5	6	7	8	9	10
<b>0:BEIJING-LCG2</b> (perfsonar.ihep.ac.cn)	---	0.33 0.00	0.39 0.39	0.40 0.39	0.40 0.40	0.32 0.33	0.09 0.00	0.00 0.00	0.05 0.01	0.11 0.07	0.33 0.33	
<b>1:CC-IN2P3-T2</b> (ccperfsonar1.in2p3.fr)	0.00 0.40	---	0.00 0.85	0.00 0.76	0.00 0.92	0.00 0.93	0.00 0.08	0.00 0.00	0.00 0.03	0.00 0.00	0.00 0.27	
<b>2:GRIF-IRFU</b> (perfsonar02.datagrid.cea.fr)	0.26 0.30	0.77 0.00	---	0.94 0.88	0.94 0.87	0.58 0.80	0.06 0.05	0.00 0.00	0.02 0.01	0.04 0.04	0.28 0.22	
<b>3:GRIF-LAL</b> (psonar2.lal.in2p3.fr)	0.31 0.33	0.94 0.00	0.94 0.94	---	0.95 0.94	0.93 0.91	0.05 0.07	0.00 0.00	0.05 0.04	0.03 0.02	0.19 0.23	
<b>4:GRIF/LPNHE</b> (lpnhe-psb.in2p3.fr)	0.13 0.32	0.59 0.00	0.91 0.93	0.94 0.95	---	0.60 0.47	0.05 0.05	0.00 0.00	0.04 0.03	0.03 0.02	0.11 0.26	
<b>5:IN2P3-CPPM</b> (marperf01.in2p3.fr)	0.23 0.29	0.77 0.00	0.54 0.92	0.90 0.91	0.71 0.78	---	0.07 0.07	0.00 0.00	0.05 0.07	0.04 0.05	0.20 0.23	
<b>6:IN2P3-LAPP</b> (lapp-ps01.in2p3.fr)	0.12 0.06	0.27 0.00	0.09 0.39	0.09 0.45	0.24 0.31	0.24 0.21	---	0.00 0.00	0.01 0.02	0.02 0.02	0.10 0.04	
<b>7:IN2P3-LPC</b> (clrperf-bwctl.in2p3.fr)	0.18 0.31	0.64 0.00	0.47 0.64	0.47 0.60	0.27 0.37	0.58 0.01	0.03 0.01	---	0.02 0.01	0.01 0.00	0.25 0.24	
<b>8:RO-02</b> (atrogr009.nipne.ro)	0.29 0.31	0.91 0.00	0.92 0.92	0.79 0.66	0.87 0.93	0.05 0.03	0.01 0.01	0.00 0.00	---	0.00 0.94	0.21 0.22	
<b>9:RO-07</b> (perfsonar1.nipne.ro)	0.24 0.29	0.03 0.00	0.79 0.75	0.58 0.71	0.74 0.66	0.00 0.05	0.00 0.01	0.00 0.00	0.94 0.00	---	0.00 0.01	
<b>10:Tokyo</b> (perfsonar2.icepp.jp)	0.25 0.28	0.23 0.00	0.24 0.21	0.21 0.24	0.23 0.20	0.16 0.23	0.00 0.00	0.00 0.00	0.17 0.19	0.14 0.16	---	



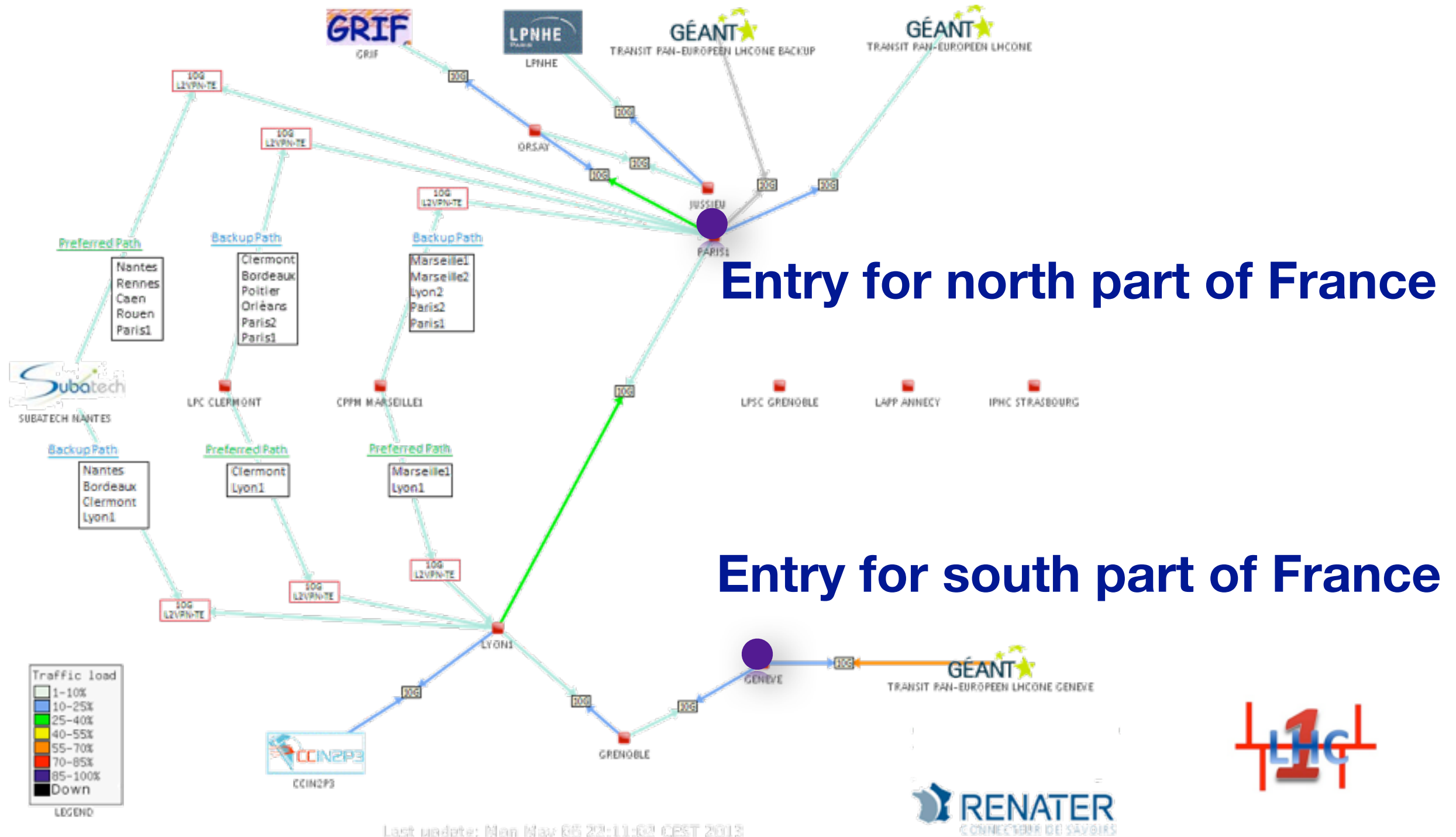


# Asymmetry IN2P3-CC - Tokyo confirmed by perfSonar measurements



**~30% better for IN2P3-CC → Tokyo**

# Once Tokyo connected to LHCONE via Washington link

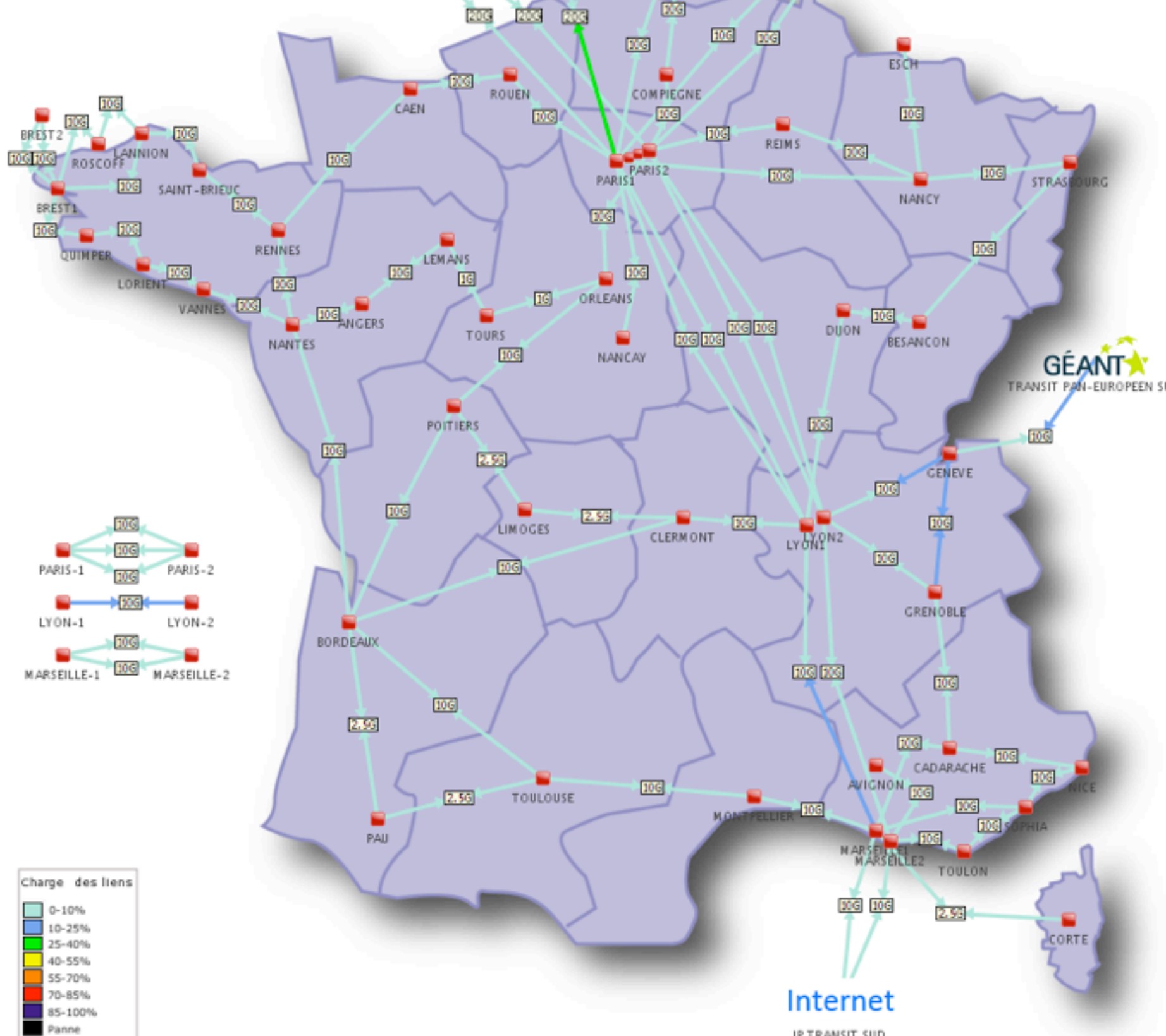




ありがとう

Thank you

Merci







**Traffic load**

- 1-10%
- 10-25%
- 25-40%
- 40-55%
- 55-70%
- 70-85%
- 85-100%

