

LCG France network and LHCONE project, review of the situation and prospective

Version 1.0 / 30th November 2011

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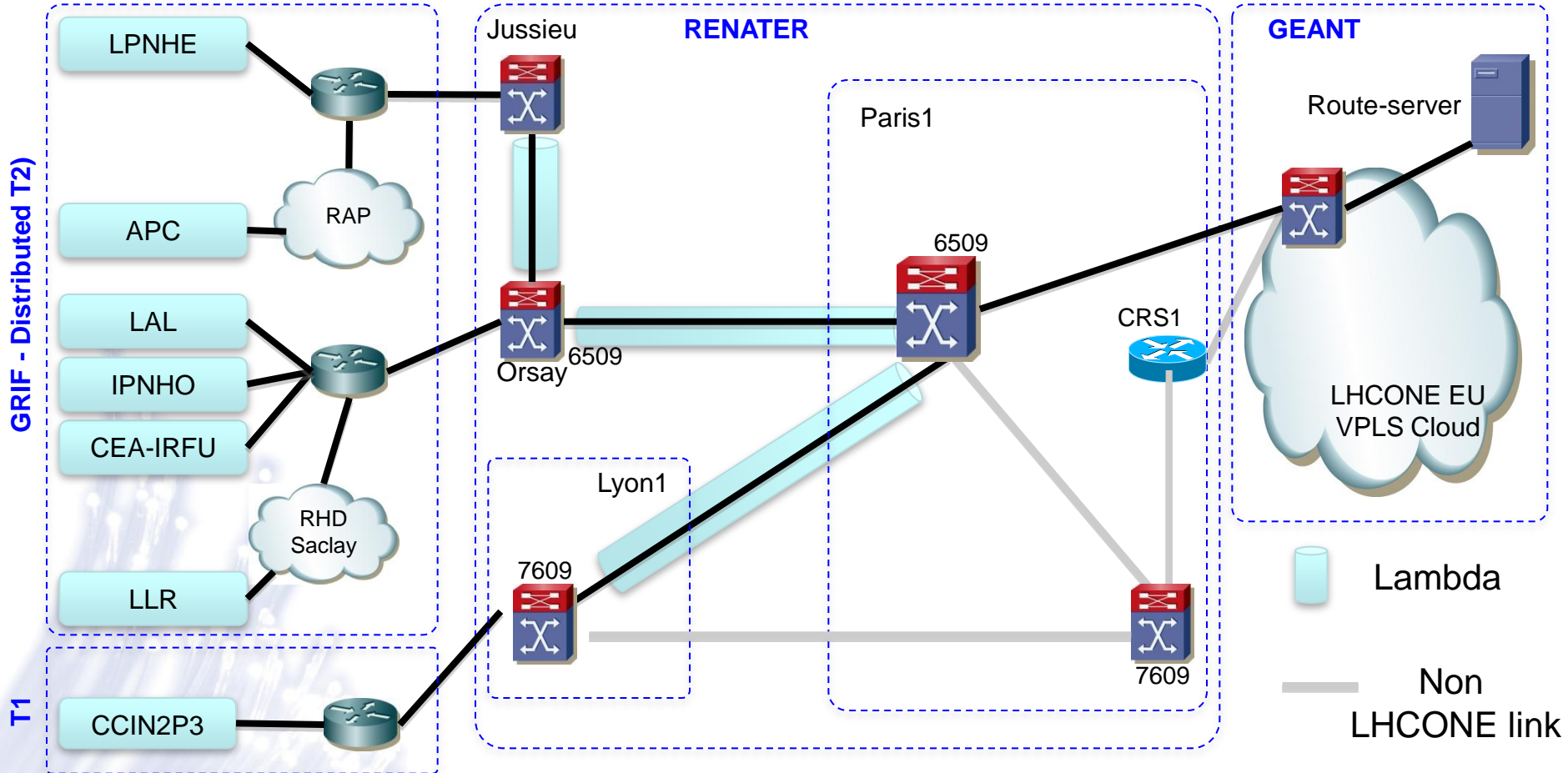


Agenda

- LHCONE – Current status
- LHCONE - Future architecture
- LHCONE – investment : current and future
- LHCONE international
- LHCONE network operation and monitoring
- Crucial importance of network reliability
- Conclusions

LHCONE FR Prototype

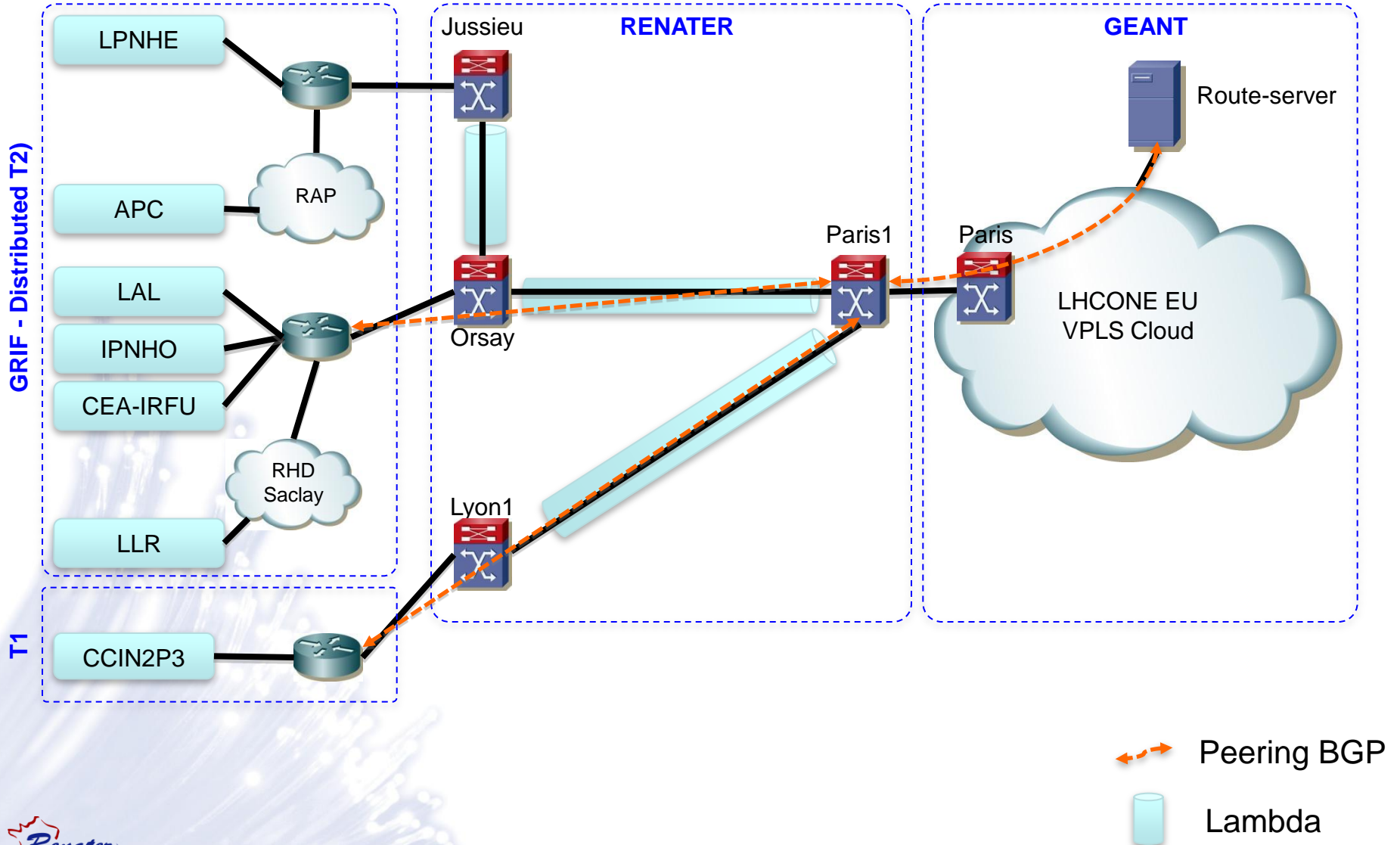
Current State



- LHCONE switched to production phase the 6 October 2011
 - Test run with DANTE, DFN and DESY
- Performance, connectivity, route exchange, LHCONE backup (Standard IP)

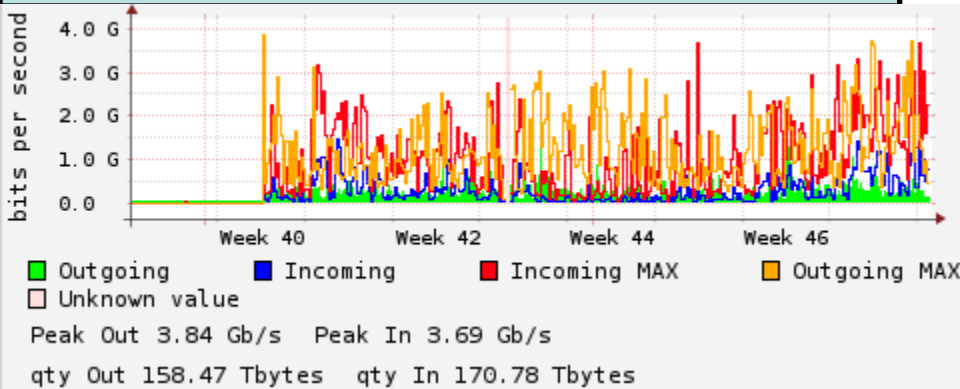


LHCONE FR gateways



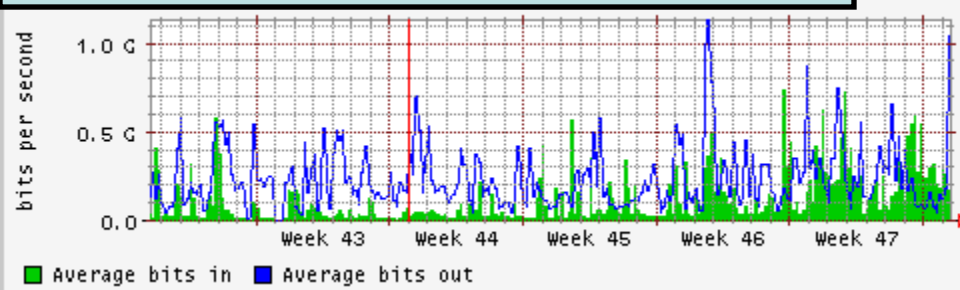
French LHCONE STATISTICS

International connection with GEANT

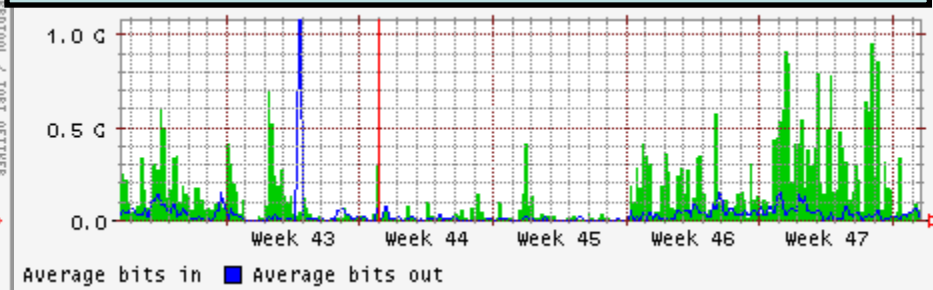


LHCONE is currently used intensively for production

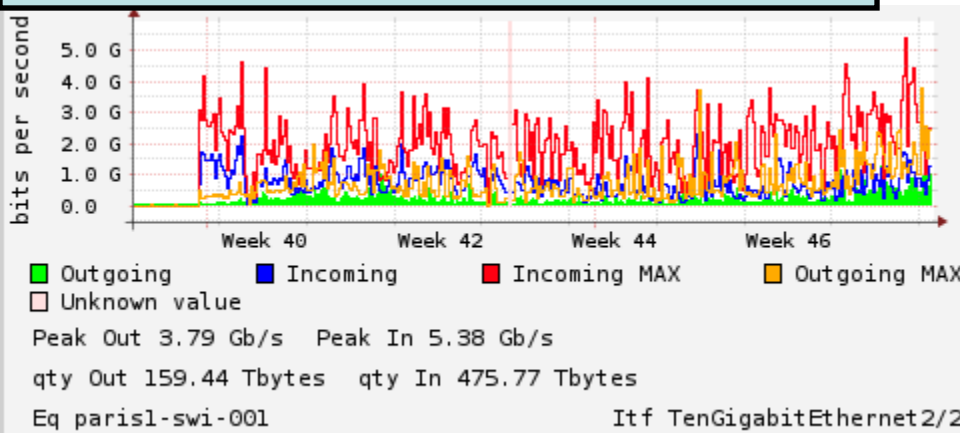
Lyon: CC-IN2P3, lyo-lhcone-paris



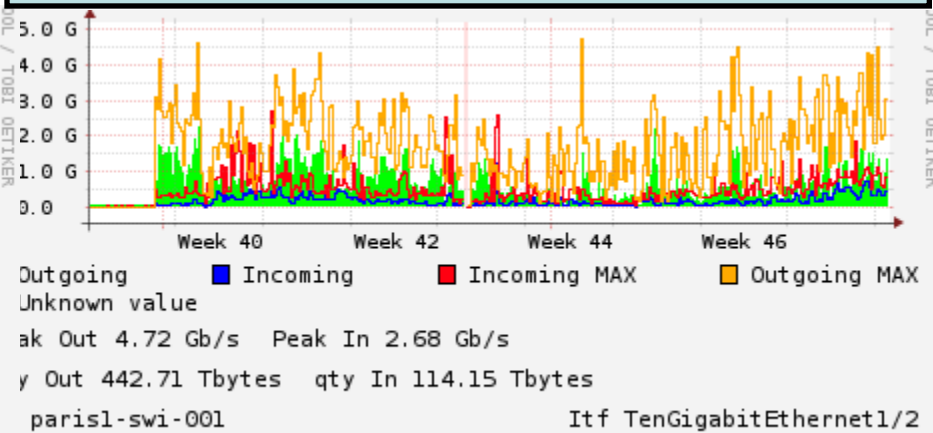
Orsay: GRIF, grif-lhcone-paris



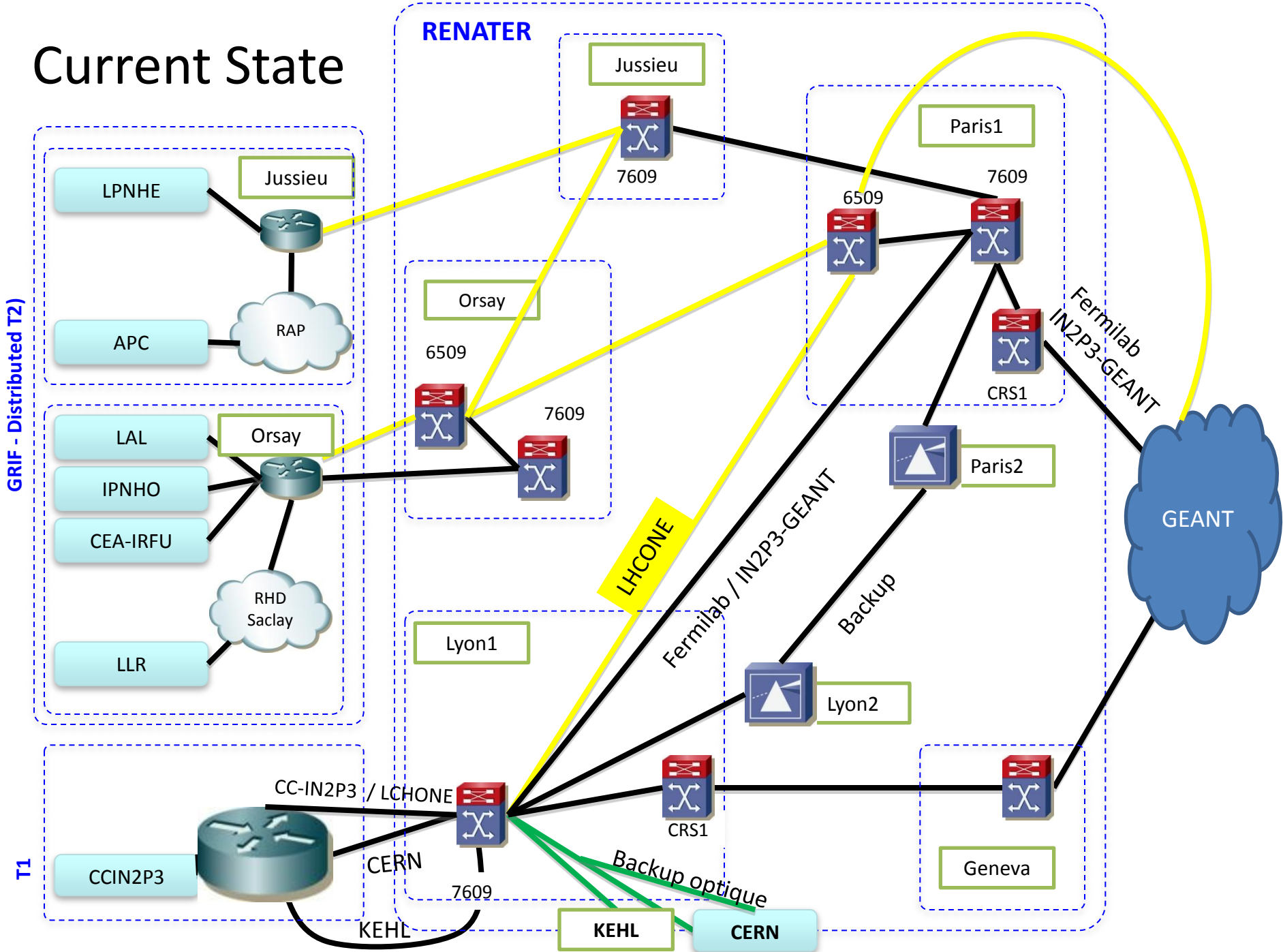
Lyon: RENATER Paris - Lyon



Orsay: RENATER, Paris - Orsay



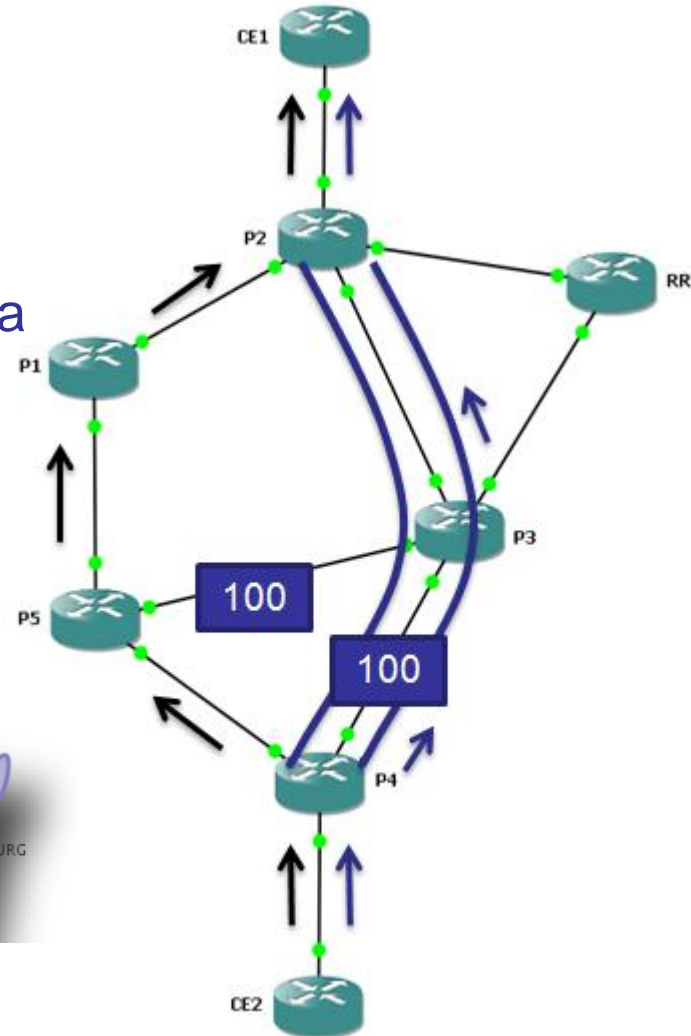
Current State





LHCONE future architecture

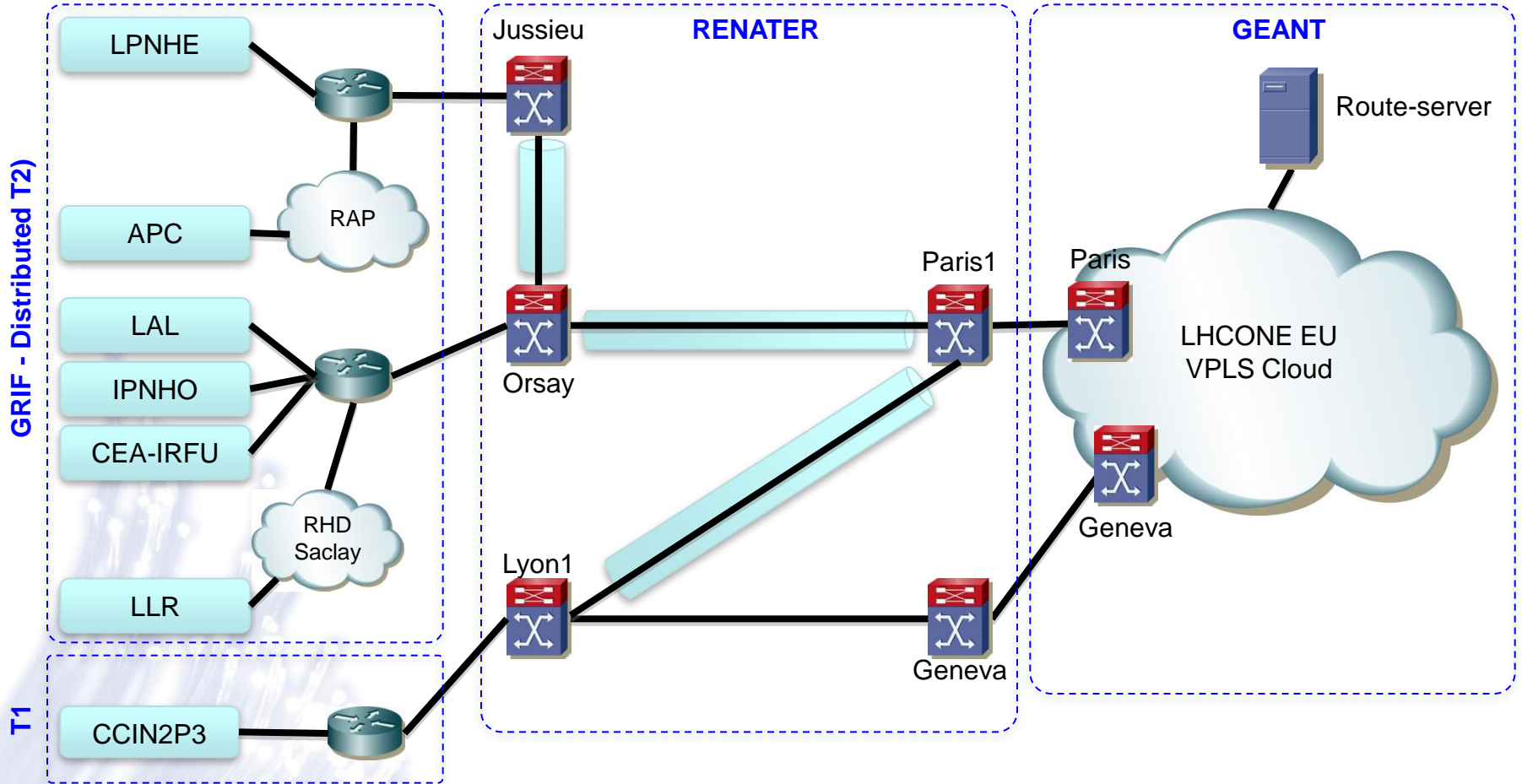
- New switch-router in Lyon
- New connection with GEANT in Geneva
 - Backup path available
 - Traffic load sharing
- Big T2 connected thanks to dedicated lambda
- T2s connected thanks to L2VPN
 - Traffic engineering allow to direct the path used through “unloaded span” of RENATER



- New CEA connection in Saclay



LHCONE FR prototype : 2nd step



T1

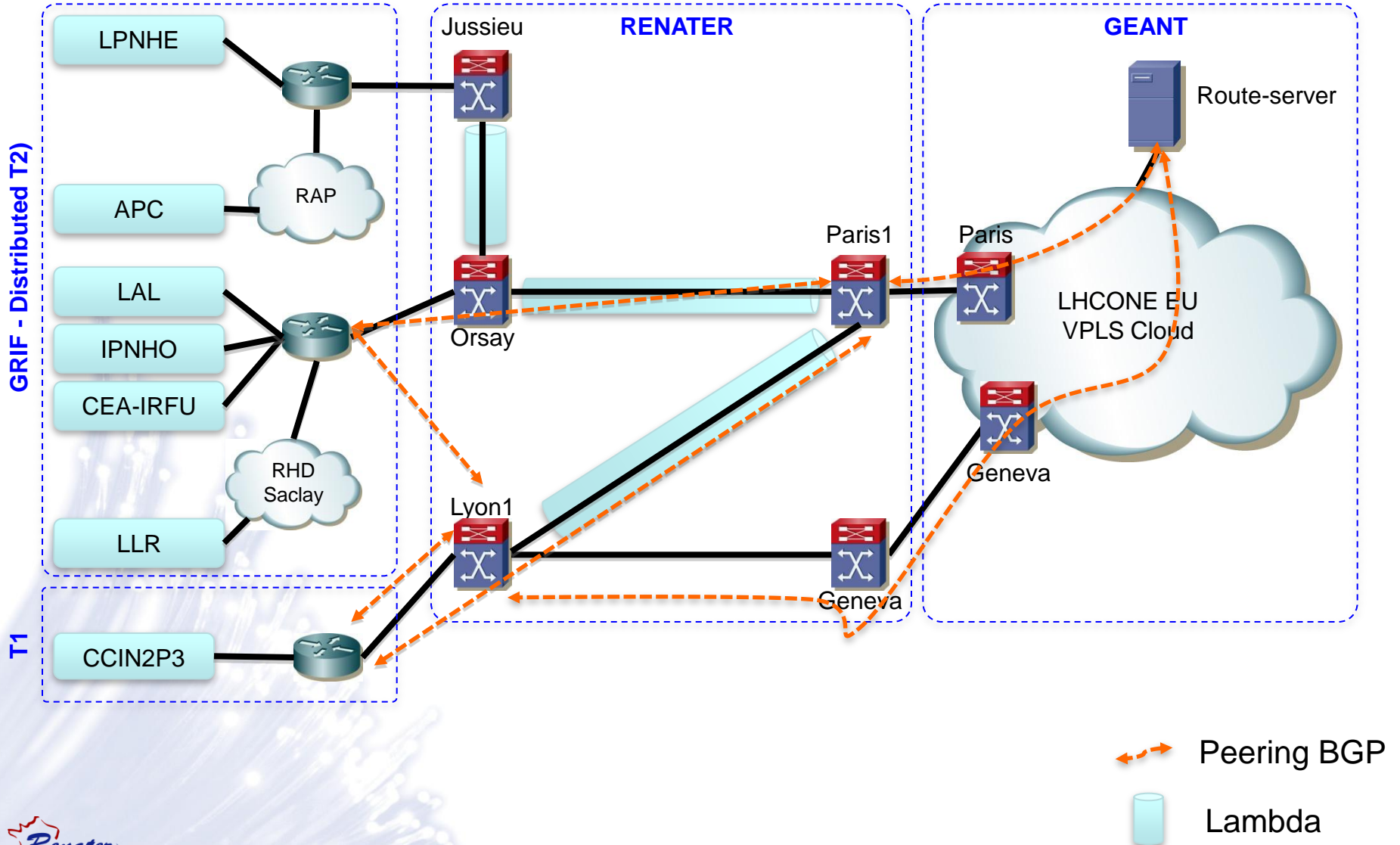
GRIF - Distributed T2)



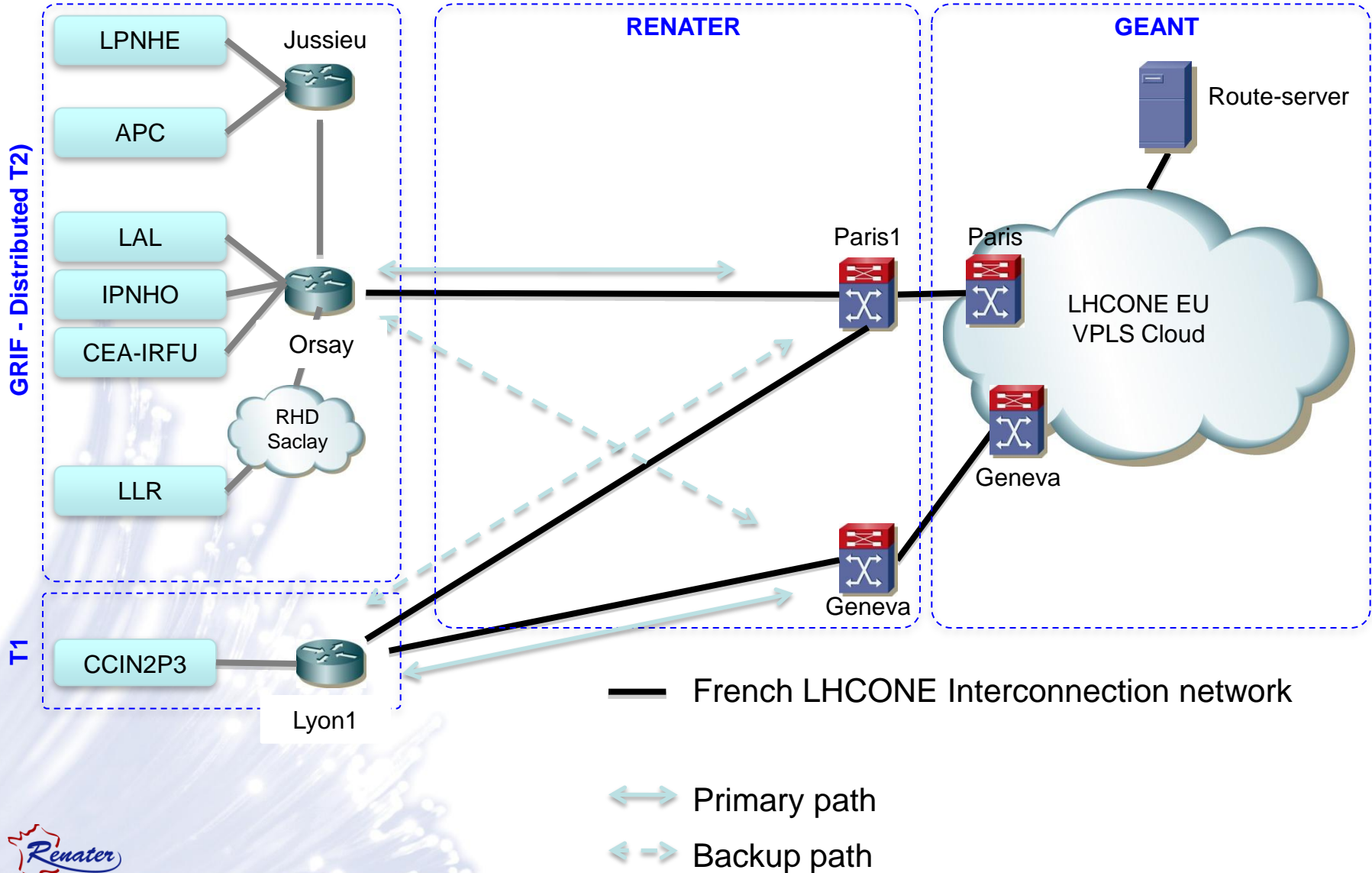
 Lambda



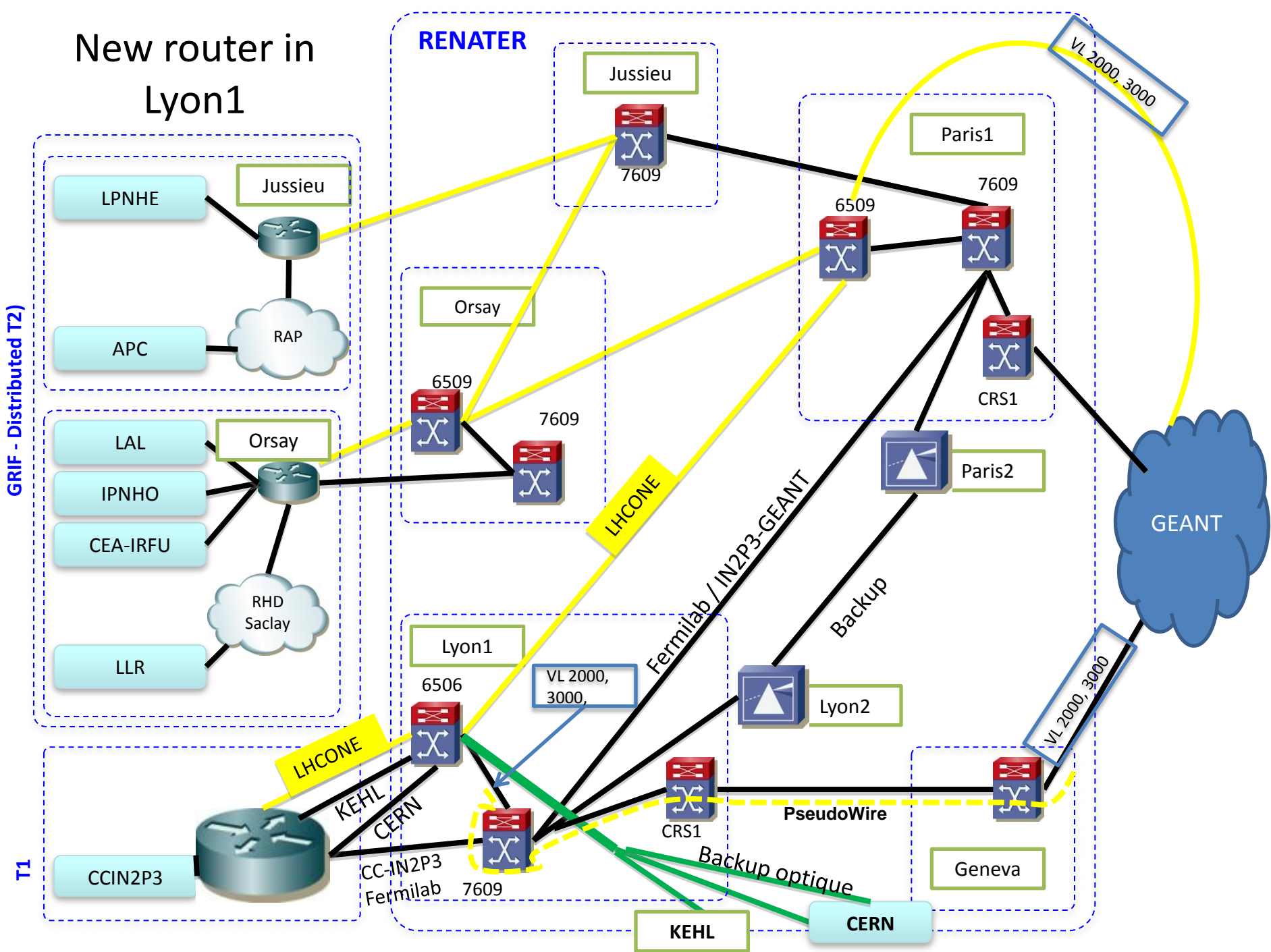
LHCONE FR gateways



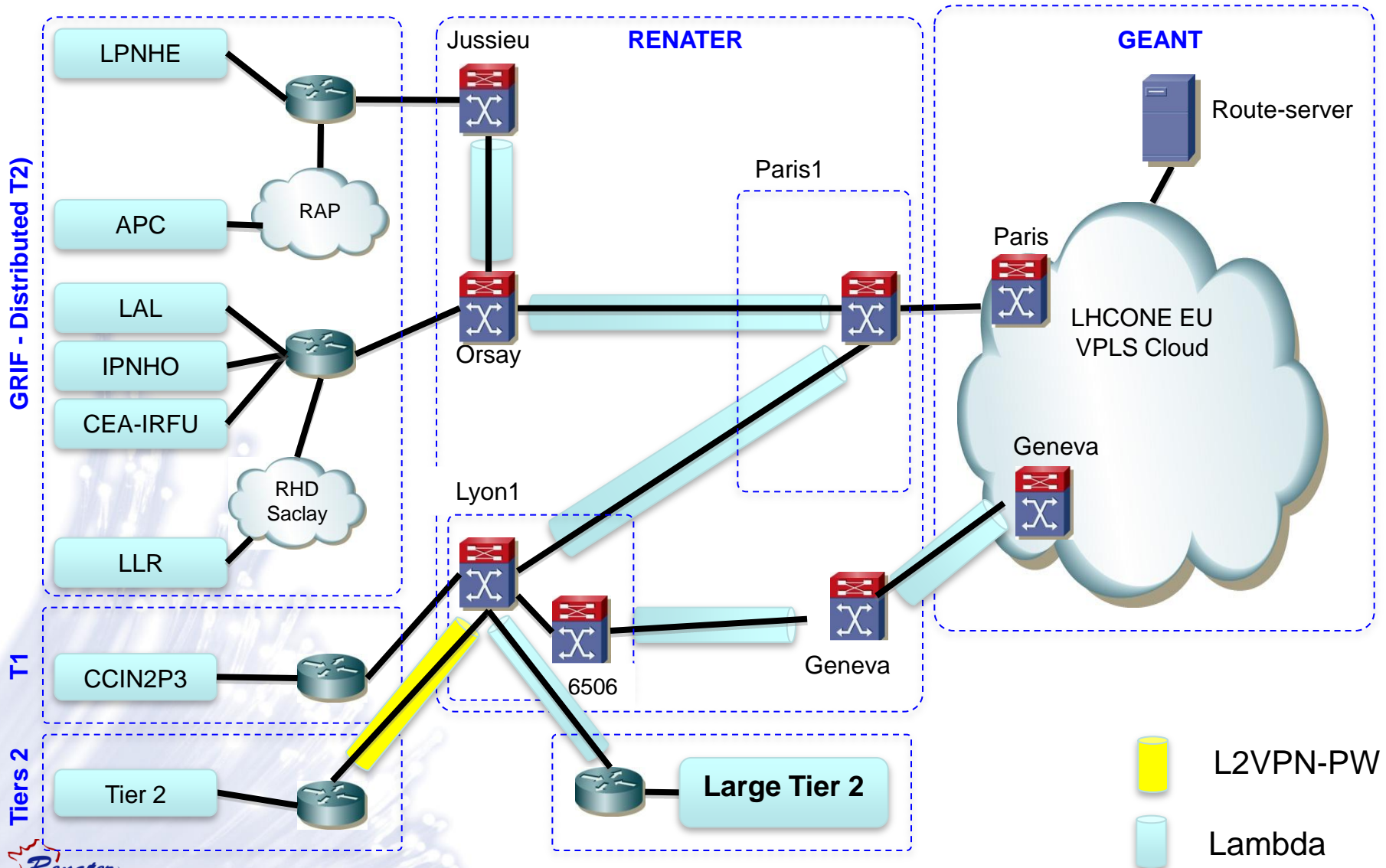
LHCONE FR gateways: BGP policy alternative



New router in Lyon1



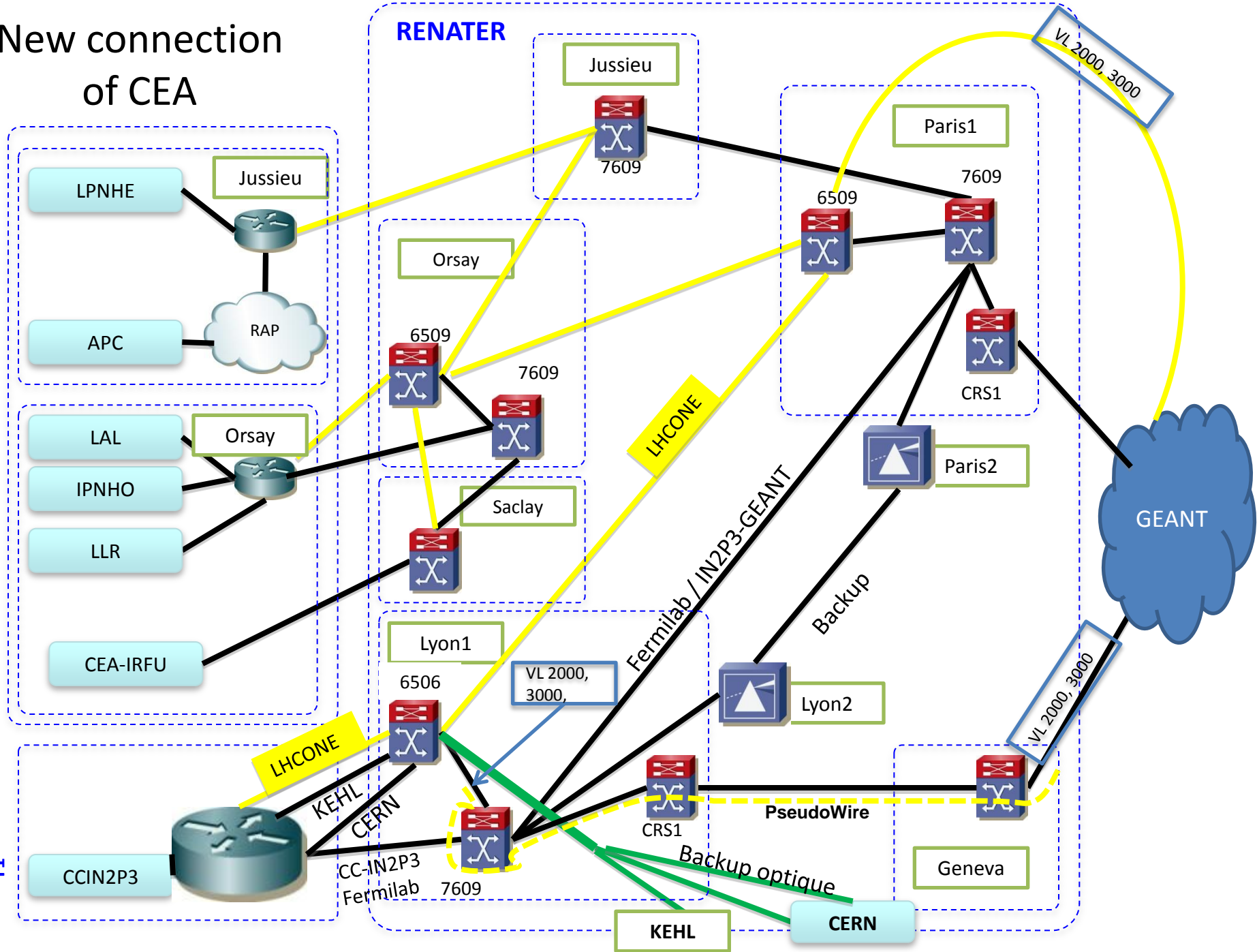
French LHCONE final objective



New connection of CEA

GRIF - Distributed T2

T1





French LHCONE investment

- Current

Dedicated connection to international LHCONE 10 Gb in Paris

New router in Paris

Orsay – new port 10 GB

Nantes – improve connection up to 10 Gb – on going

- Future investment already committed

Lyon :

- New router
- New 10Gb ports
- Separation of CC-IN2P3 connections over several network cards and routers → better resilience

Dedicated connection to international LHCONE 10 Gb in Geneva / CERN

New PoP in CEA Saclay, New 10Gb connection for CEA, IRFU (Saclay – Orsay)

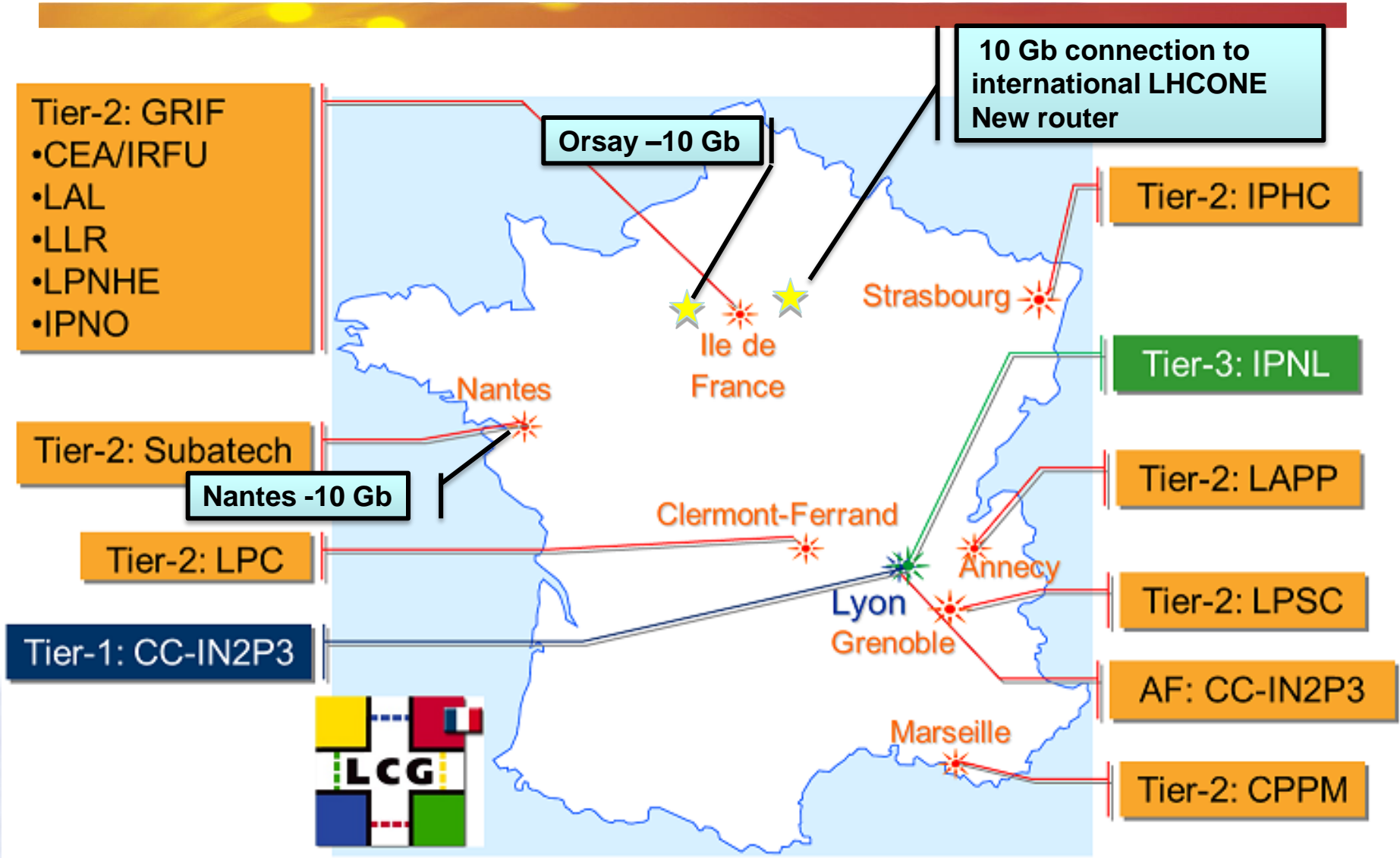
Marseille – improve connection up to 10 Gb

- New PoP in Annecy

Thanks to Amplivia, still under discussion

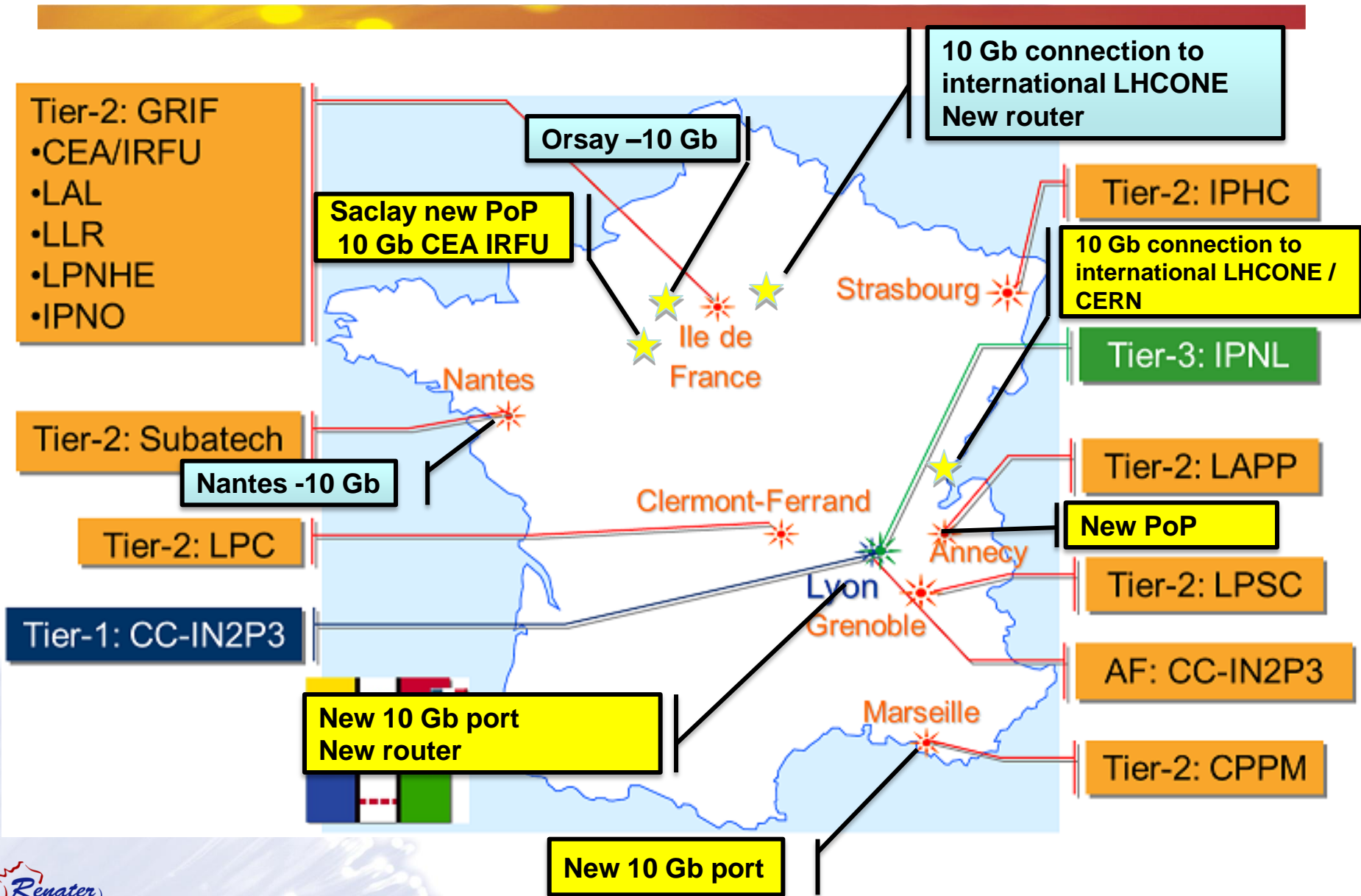


French LHCONe investment





Future French LHCONE investment



With the courtesy of J. Bernier CC-INP3



LHCONE international

- Current state

Italy (GARR), Germany (DFN), Spain (RedIRIS), CERN are connected to LHCONE
US connected now (MIT, University of Toronto)

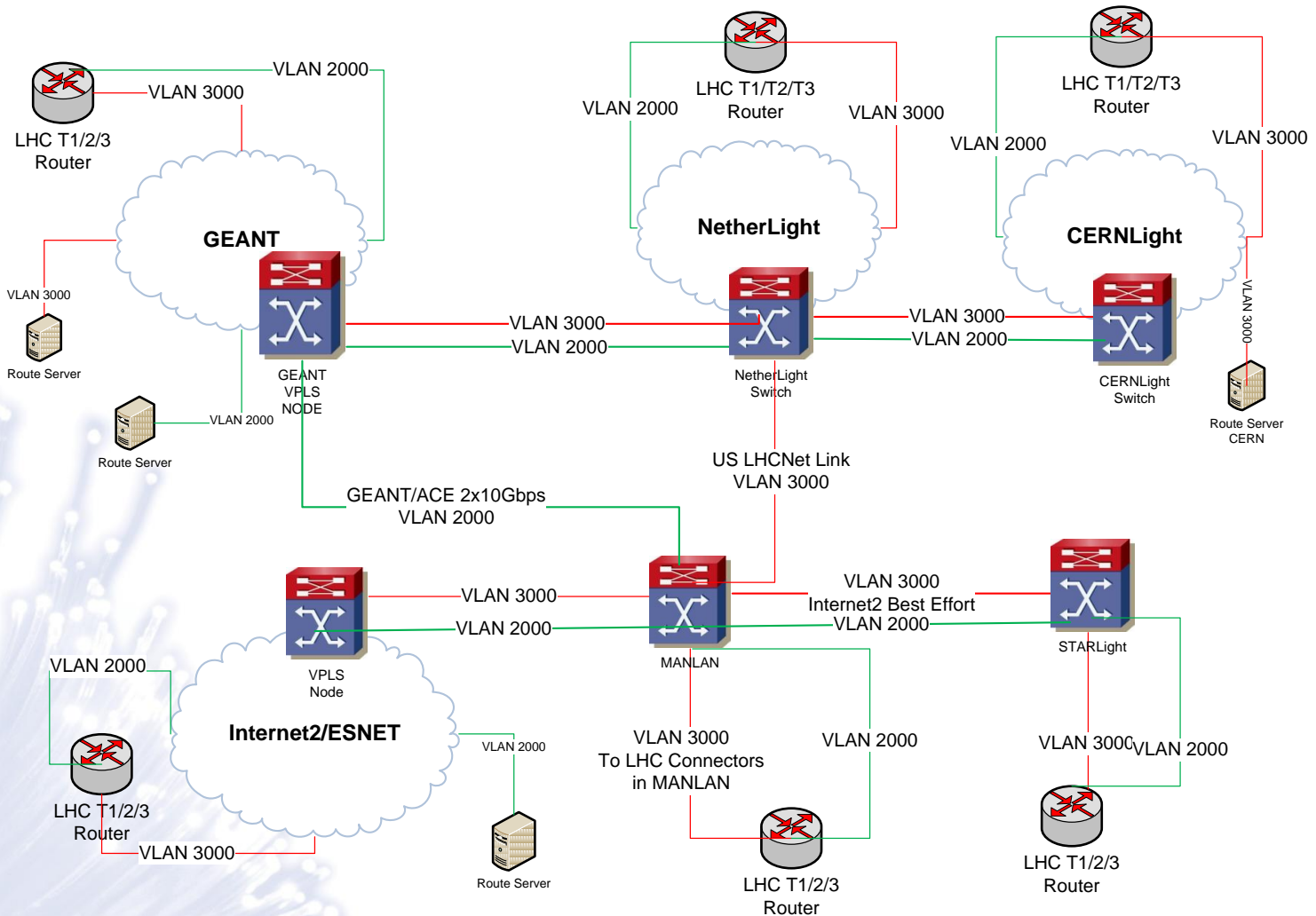
- Loop issue

Several loop were made in US and caused several outage



LHCONE international

Interim solution: L2 loop issue



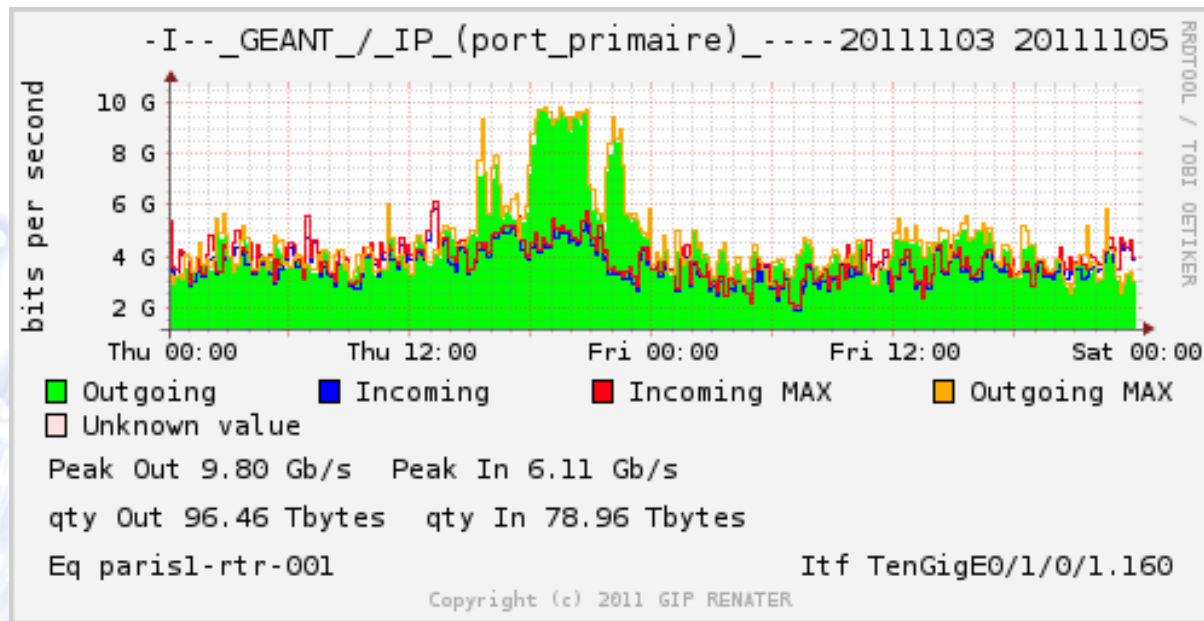


LHCONE operation and monitoring

- Example of usage by WLCG of RENATER connection to GEANT
- Network operation procedure and model
- Monitoring

LHCONE operation

- Connection to GEANT reach to saturation point the 3rd of November 2011 due to big transfer with University of Wisconsin Madison



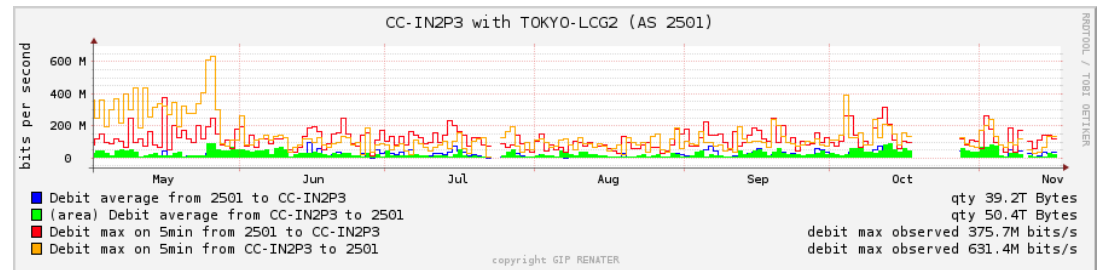
LHCONE operation

- Layer 2 Loop on international LHCONE → several outages
- Performance between CC and Tokyo T2s on standard GEANT IP transit

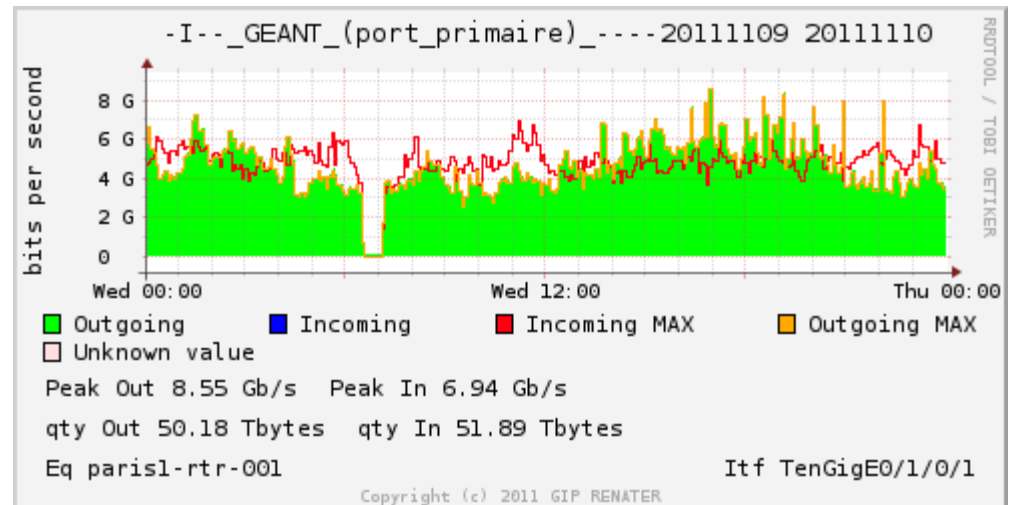
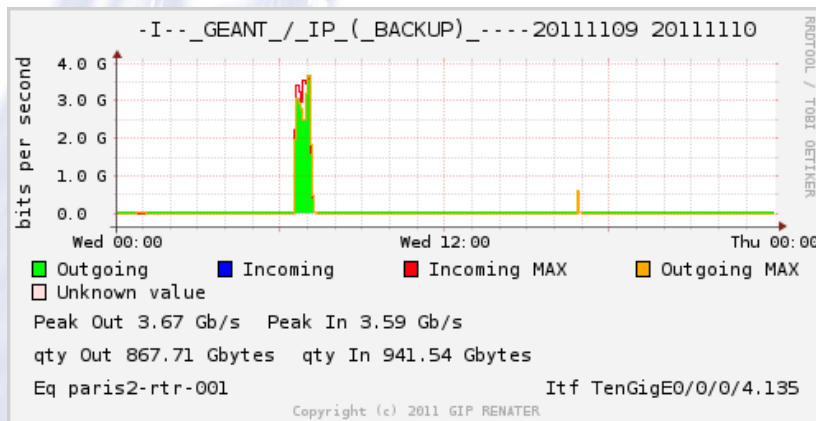
Lot of statistic was provided

Lot of tests was made with
CC-IN2P3 network team

CC-IN2P3 discovered that LBE tag was the cause of the pb



- Jumbo Frame due MTU misconfiguration, pb fixed
- The operational model should be better defined and set-up with LCG community





LHCONE PerfSONAR

With the courtesy of L. Caillat and J. Bernier CC-INP3

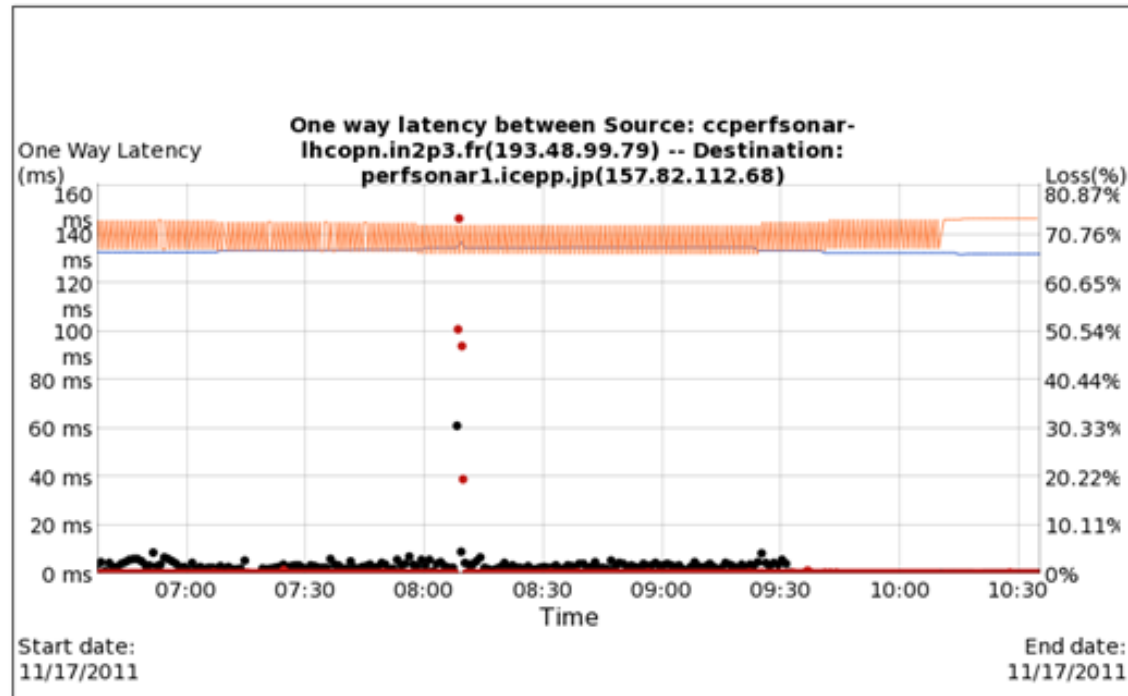
- PerfSONAR-PS already installed in CC-INP23 helped to debug the performance issue between CC and Tokyo
- Here the monitoring tool was used in End-to-End context
- Monitoring should be Mandatory

perfSONAR

perfSONAR One Way Latency

- Questioning about the PerfSONAR version to be deployed in LCHONE T2: GEANT or PerfSONAR-PS?
- Interoperability of the two versions?
- A workshop with DANTE on the current state of “GEANT PerfSONAR” is planned on the 9 Dec. 2011 at RENATER

Scale Y axis from 0 Show Reverse Direction Data



Timezone: GMT+0100 (CET)





LHCONE monitoring

All start here: <http://pasillo.renater.fr/metrologie/LCG/>

- **Statistics of transfer between French LCG site to « very known T2s »**
ranked by foreign T2s
- Quantity of traffic between RENATER BGP AS and all LCG sites (177)
- **French LHCONE Weather Map**
- **Detailed statistics of links on French LHCONE**



LHCONE monitoring

- **Statistics of transfer between French LCG site to « very known T2s » ranked by foreign T2s**

Weathermap (daily stats when mouse over links): [here](#)

Links statistics: [here](#)

Quantity of traffic between RENATER BGP AS and all LCG sites (177): [here](#)

following information in test:

Traffic between French Tiers and:

CH-CERN: [Day](#) - [Last 6 months](#)

CA-TRIUMF: [Day](#) - [Last 6 months](#)

DE-KIT: [Day](#) - [Last 6 months](#)

IT-INFN-CNAF: [Day](#) - [Last 6 months](#)

NL-T1: [Day](#) - [Last 6 months](#)

NL-T1: [Day](#) - [Last 6 months](#)

NDGF: [Day](#) - [Last 6 months](#)

ES-PIC: [Day](#) - [Last 6 months](#)

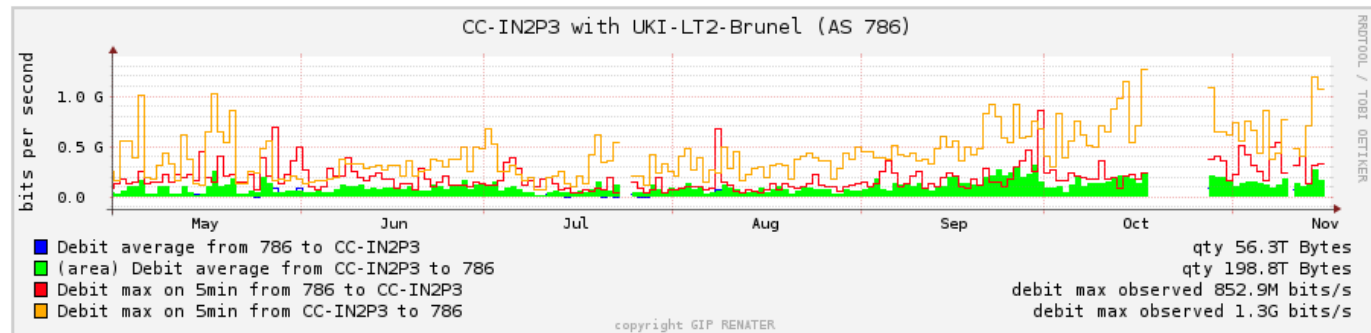
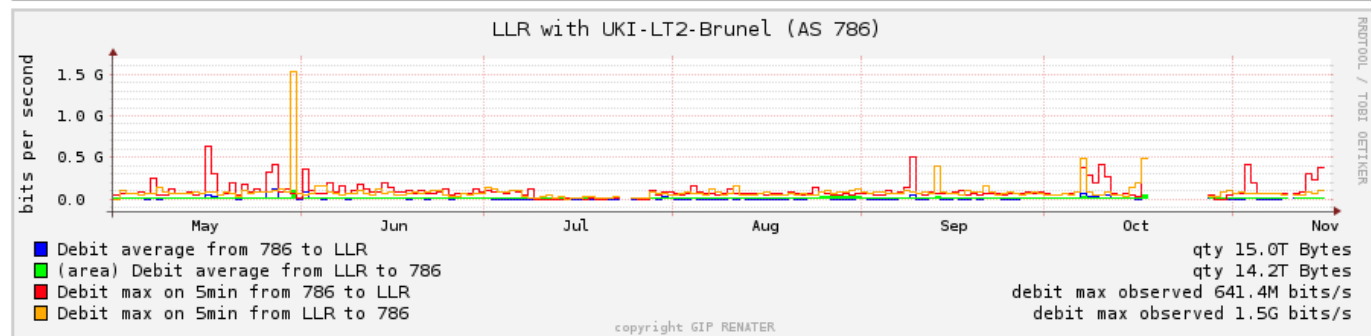
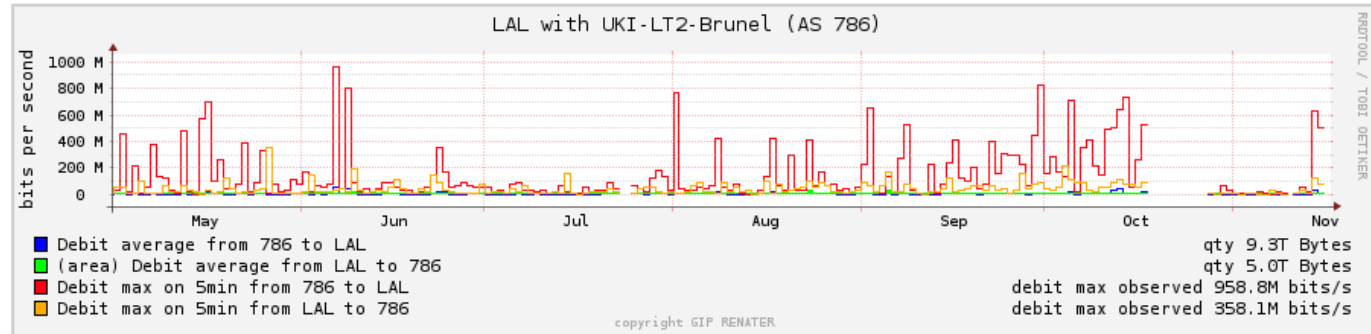
TW-ASGC: [Day](#) - [Last 6 months](#)



LHCONE monitoring

- **Statistics of transfer between French LCG site to « very known T2s »**
Traffic statistics between French Tiers and BGP AS 786 through RENATER and GEANT

Statistics refreshed all 5 minutes.



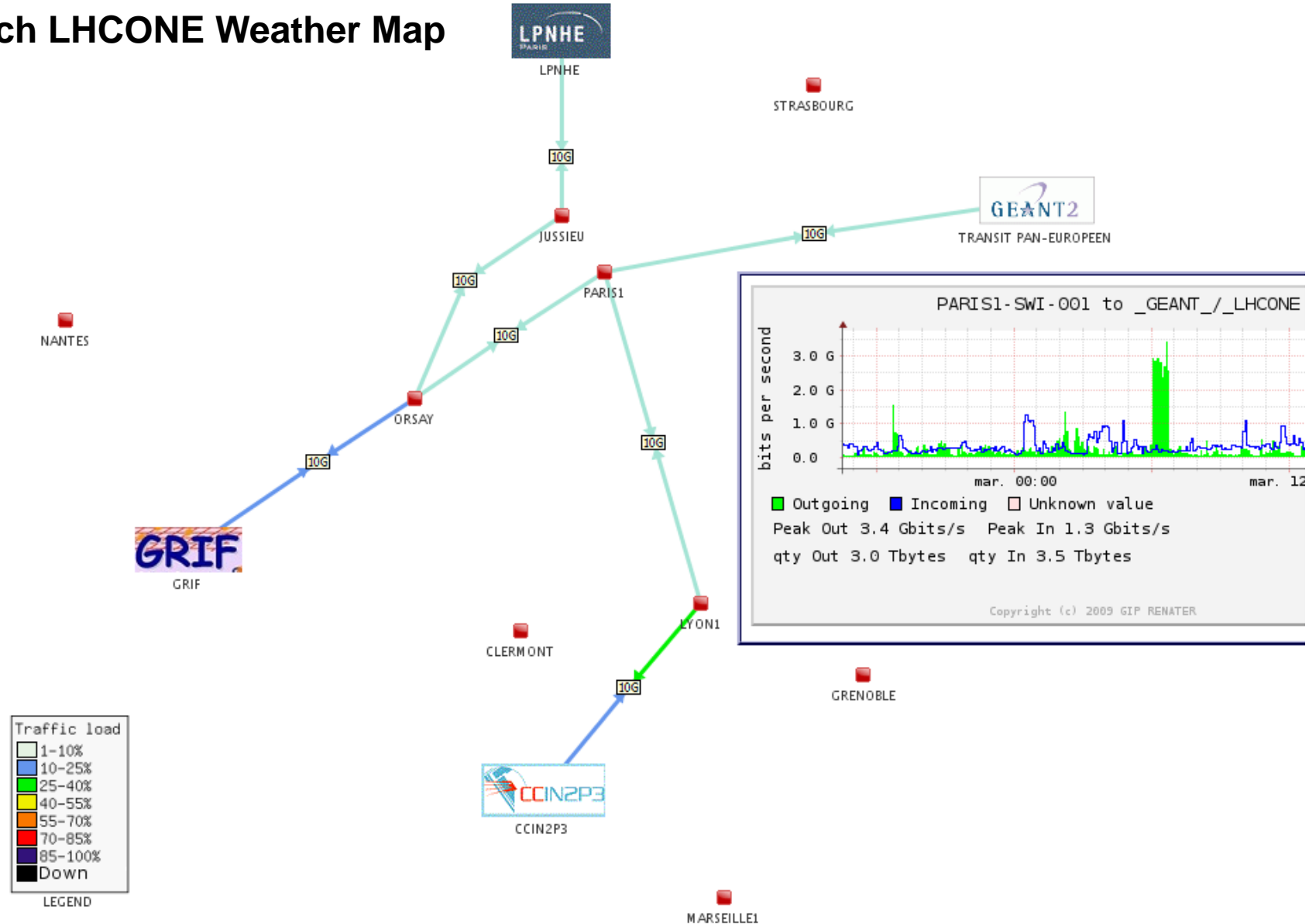
RAL example





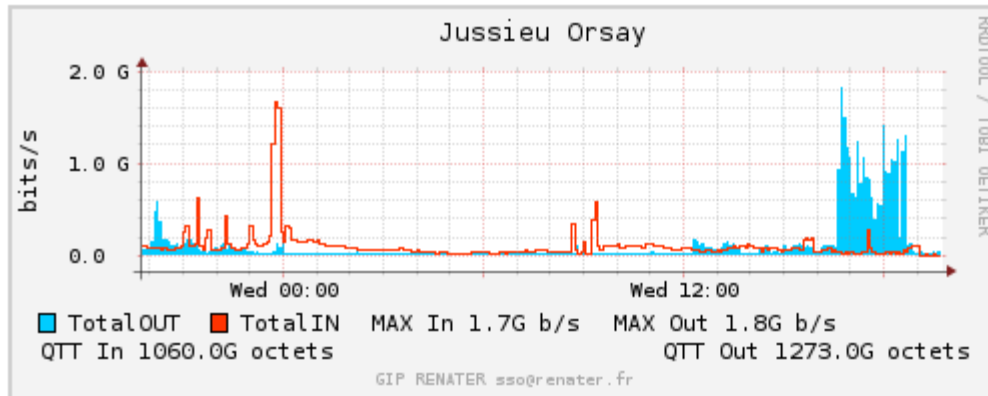
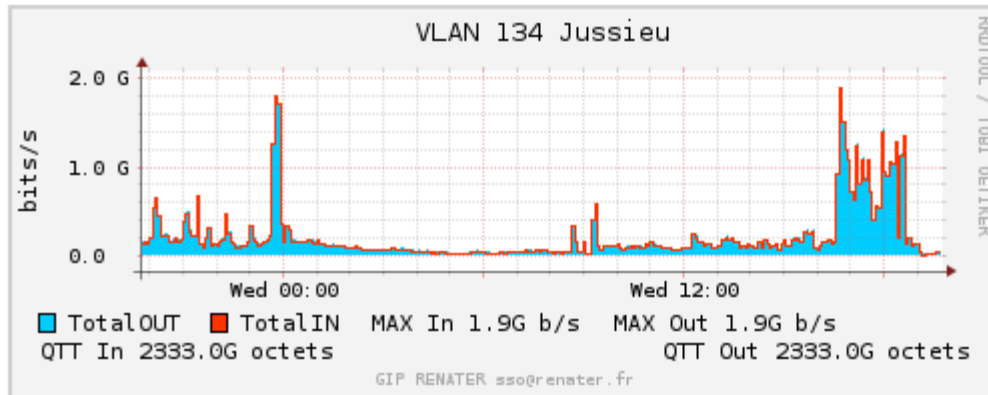
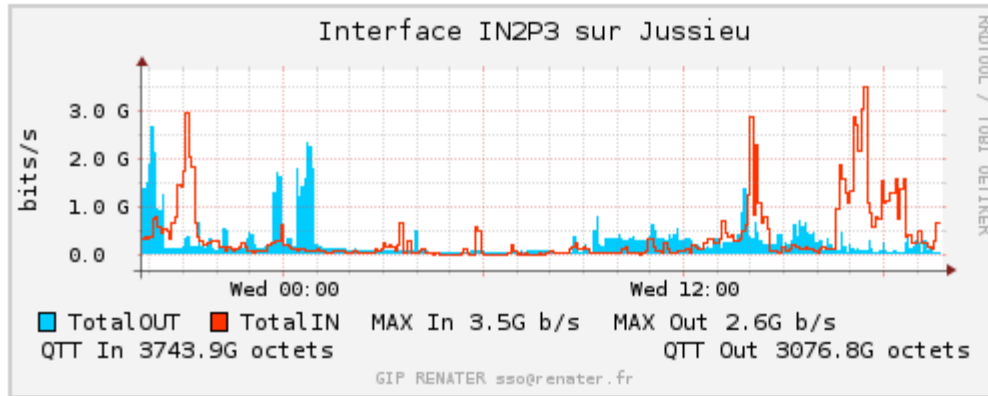
LHCONE monitoring

• French LHCONE Weather Map





• Detailed statistics of links on French LHONE

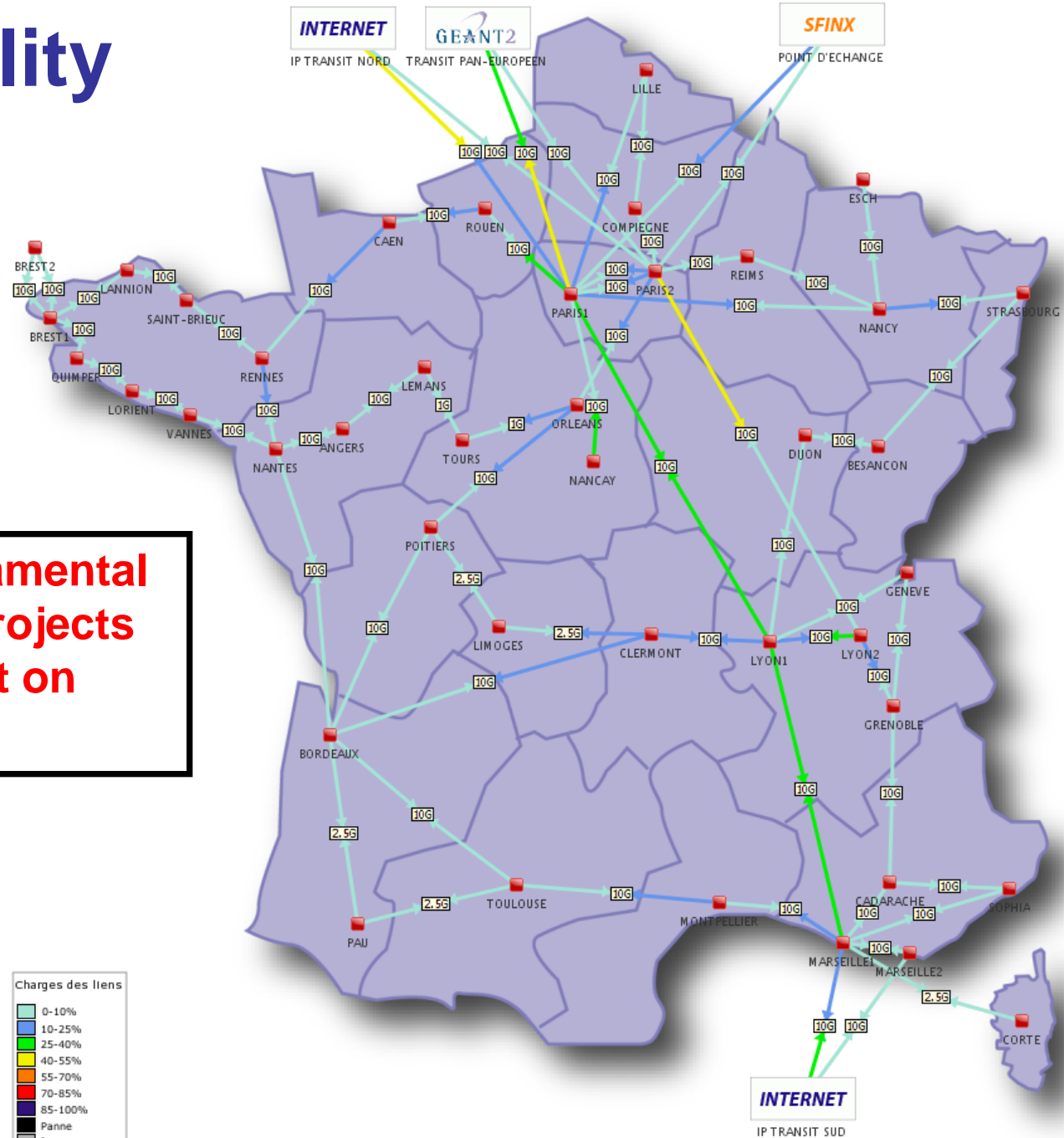




Reliability



Reliability is fundamental for scientific projects that are built on network



Charges des liens

0-10%
10-25%
25-40%
40-55%
55-70%
70-85%
85-100%
Panne
Inconnue





Conclusion

- Support of RENATER for WLCG
 - Investment : Orsay, Paris, Nantes, dedicated connection to LHCONE international
 - Manpower : ISR and SRU team connection to LHCONE international
 - The support to the LHCONE will continue :
 - Investment in Lyon, Marseille, Saclay (CEA), Geneva / dedicated connection to HCONe international GEANT/CERN, Annecy (LAPP)
 - Engineering (design, operation model, monitoring, optimization, follow-up),
 - Daily operation network: NOC
- Network should be taken in consideration in scientific Call
- Good coordination at European level is crucial
- A good collaboration with CC-IN2P3 Network team
 - This collaboration could be extended to other partners of LHCONE
 - Your feedback is crucial for RENATER
- Operational model should be defined and set-up with French LCG community
 - Monitoring, statistics, troubleshooting