



France-IX Technical Report

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Agenda

- **Technical key numbers**
- **Infrastructure deployments**
 - Merger with Rezopole
 - Private room @Telehouse2
 - Introduction of P routers
 - New PoP in Paris: Data4
 - Upgrade Scaleway DC2 and DC3
 - 400G
 - Renewal of Dark Fiber Network in Paris
 - Opening of France-IX Toulouse

Technical team: #Hiring

- Team growing after the merger with Rezopole: **14 people**
- **Need to hire 8 more people, in Paris or Lyon:**
 - 1 ISSM (Information System Security Manager), Paris or Lyon
 - 1 Automation Network Engineer, Netops, Paris or Lyon
 - 2 Network Techs, 1 in Paris, 1 in Lyon
 - 1 Sysadmin Tech, in Paris
 - 3 Fullstack Devs, Paris or Lyon

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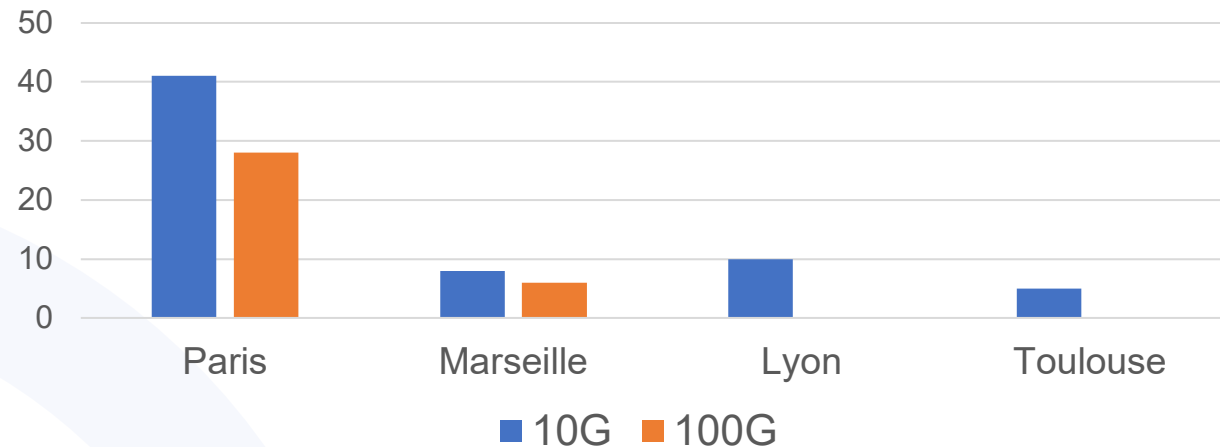
Technical key numbers

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Ports and peering capacity connected during 2021

Ports connected in 2021



- In Paris & Marseille 100G are replacing 10G progressively
- In regions (Lyon, Toulouse), 100G is coming

City	Capacity connected in 2021
Paris	3210 Gbps
Marseille	680 Gbps
Lyon	100 Gbps
Toulouse	50 Gbps
Global	> 4Tbps

Network Availability

- From January 2021 to today,
- More than 5 “9s” everywhere

Paris = 99,9998%



Marseille 100%



Lyon = >99,99999%



Toulouse 100%



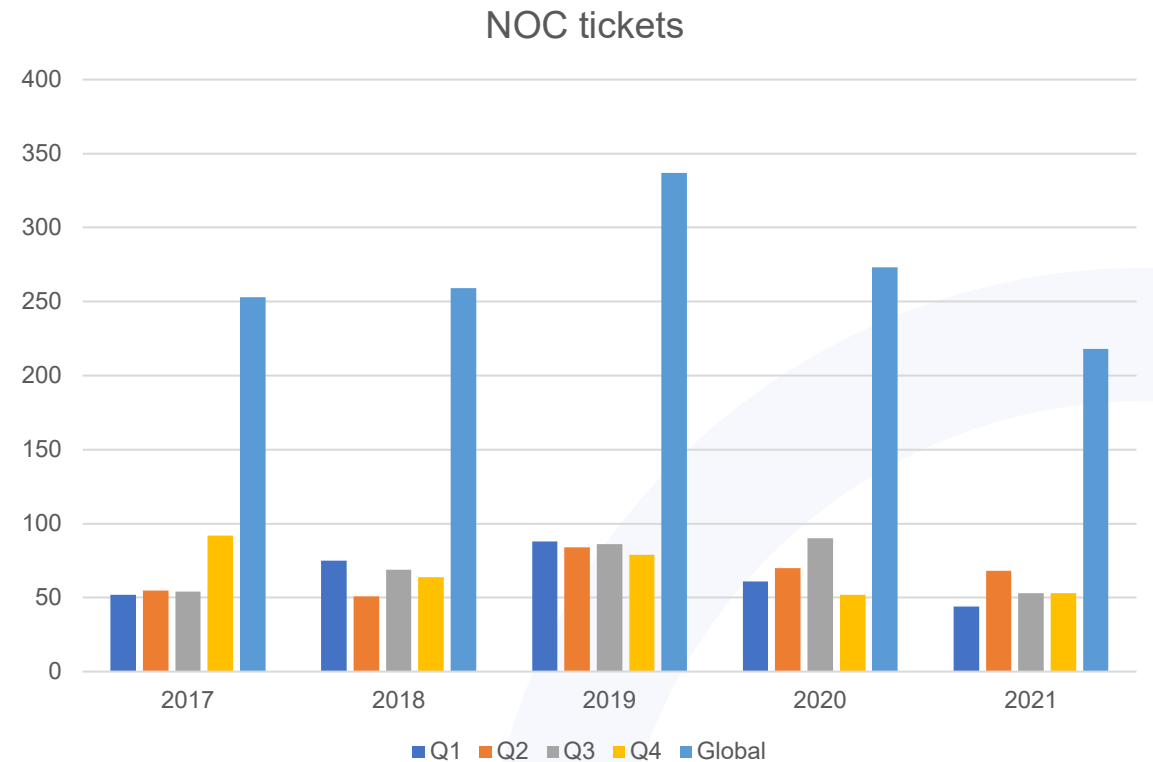
Network availability: no major outage

- **1 issue** observed when committing configurations on Nokia devices
 - Workaround found to avoid the issue occurs again
- A couple of **10G Linecards** on Juniper EX9200 failed



NOC statistics

- Figures have been **stable over the years**
- Decreasing slightly despite the fact there are **more customers** and **more PoPs**



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Rezopole merger

100G ring: Paris, Lyon and Marseille

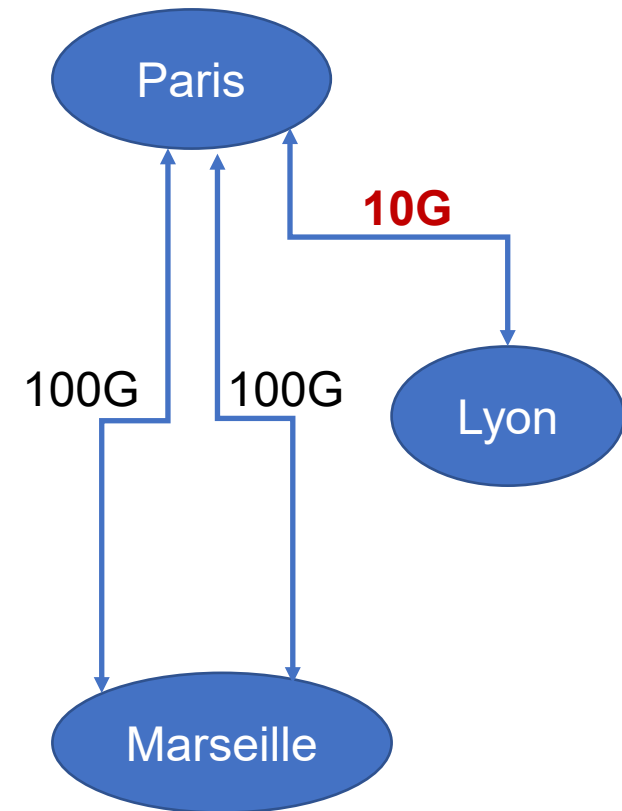


France-IX – Rezipole merger

First technical project: 100G ring

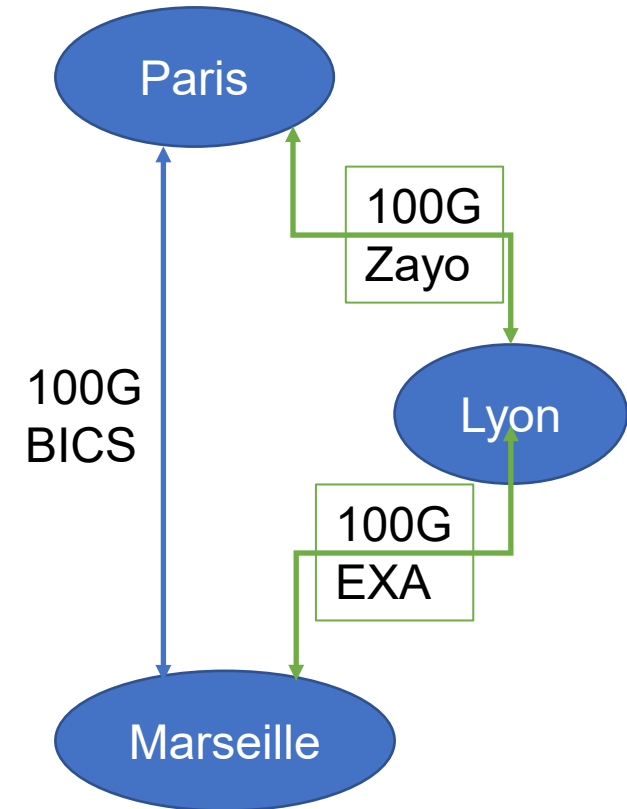
- Old setup:

- Redundant Paris – Marseille path (2019) :
 - 100G via Lyon (Exa)
 - 100G via Clermont (BICS)
- **Existing non protected path Paris – Lyon: 10G (Sparkle)**



France-IX – Rezopole merger 100G ring

- Tender to compare offers and optimize pricing
- New setup: 100G ring Paris – Lyon – Marseille
 - **100G Paris - Lyon: Zayo (NEW)**
 - **100G Lyon - Marseille: Exa (NEW)**
 - 100G Paris – Marseille (via Clermont): BICS (unchanged)
- MPLS working between Paris/Lyon/Marseille
 - **Interoperability between Nokia & Huawei**



Telehouse 2 Private Room

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Private room @Telehouse 2: why?

To better manage existing peering services

- ✓ More than 50% of France-IX Paris customers connected @Telehouse 2, more than **250 customer ports**
- ✓ More than **50% of the traffic** of France-IX Paris
- ✓ **Limited space:** one passive rack, 2 active racks
 - Extensions to be able to gain a few inches in rack depth and install new devices
 - Complexity during migrations
- ✓ Limited power to **grow safely**

Private room @Telehouse 2: why?

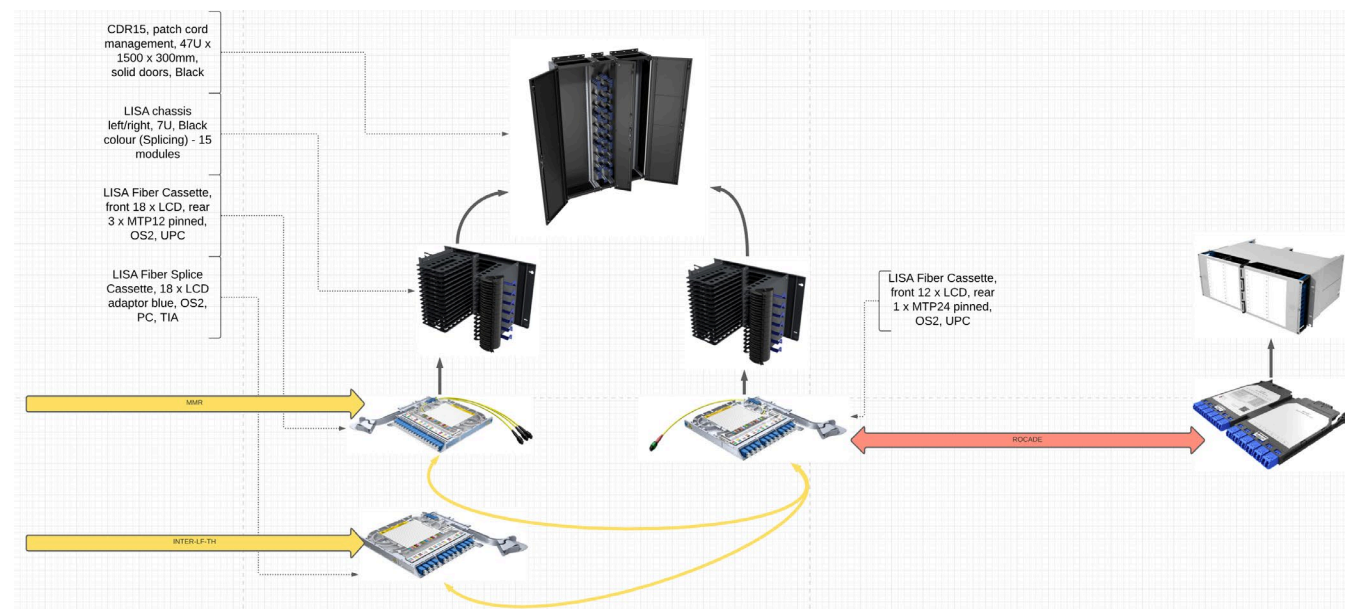
- To be able to launch a granular **hosting service**
 - Focused on hosting network oriented devices
- **Opportunity to build a private room in the new building Telehouse 2 Léon Frot**

Telehouse 2 Léon Frot



Telehouse 2 Léon Frot : Local MMR

- **Two local MMRs**, based on Huber+Suhner LISA and MTP24 interconnexions have been installed
- Room design **redundant and scalable**, ready to manage thousands of fibers
- **Save rack space**



Telehouse 2 Léon Frot



Private room @Telehouse 2 – Léon Frot

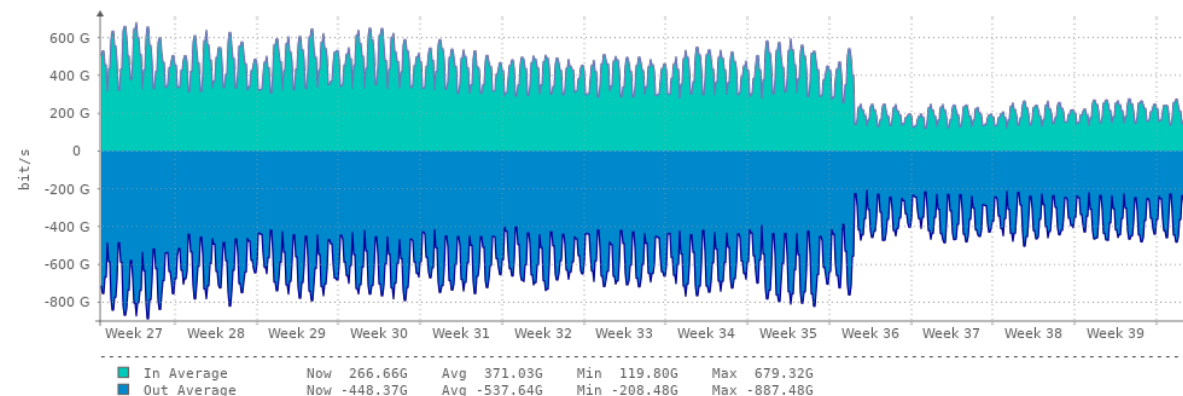
TH2 Voltaire

- **1st rack** installed for Peering services, **2nd rack** in progress

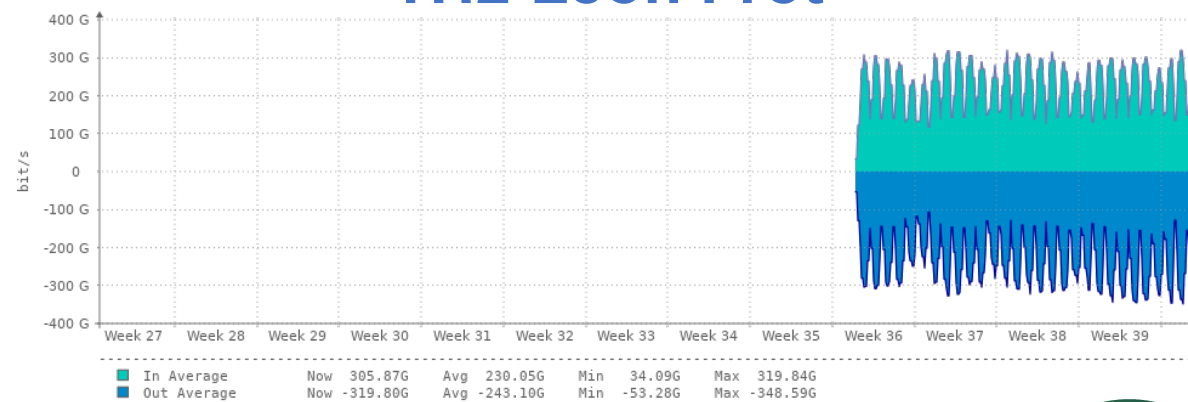
- Half of the customers connected @Telehouse 2 are being migrated

- **400G ports available!!**

- Part of 100G customers migrated, using **QSFP-DD 2x100G LR4**



TH2 Léon Frot



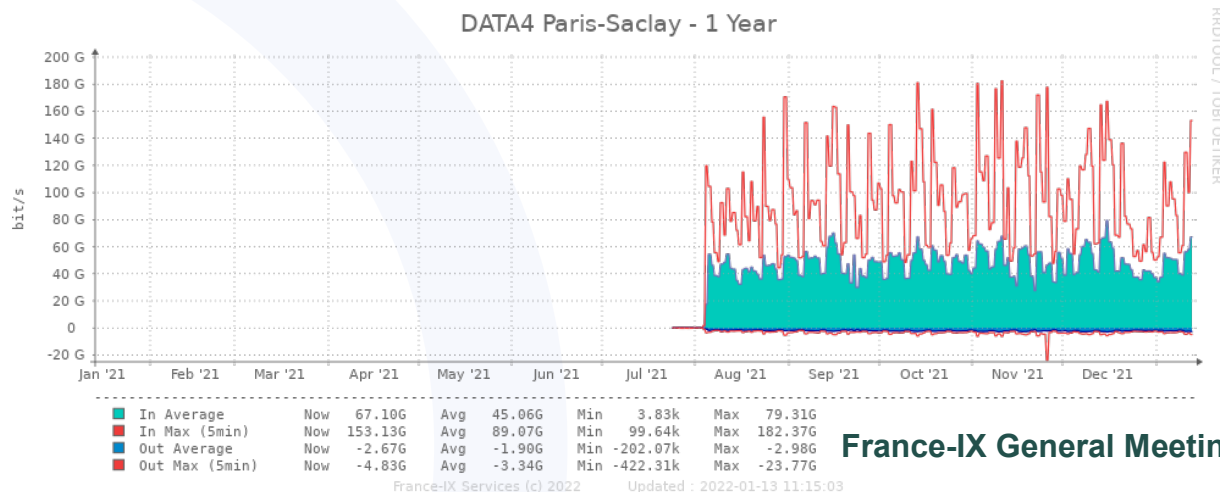
New PoP in Paris: Data4

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New PoP: DATA4

- Same engineering rules to build the PoP
 - **2 redundant** dark fibers to reach core PoPs
- Issues encountered during the deployment with DF
- Starting with 2 Nokia 7250 IXR-e (2x100G + 24x10G) in April
- Moving few months after to a Nokia SR-1 7750, with **400G** ports available!



Peaks reaching
almost **200G**

Upgrading Scaleway DC2 and DC3 PoPs



Upgrading Scaleway DC2 and DC3 PoPs

- Replacement of Juniper EX9214 by Nokia SR-1s, in line with previous deployments made during 2020
 - More 100G ports and more density, **36x100G ports**
 - **Replacing a 17-rack unit device by a 3U device + 1.5U satellite**
- Upgrade of backbone capacity: **2x400G** towards Core PoPs: Interxion PAR5 and Telehouse2

Introduction of P routers

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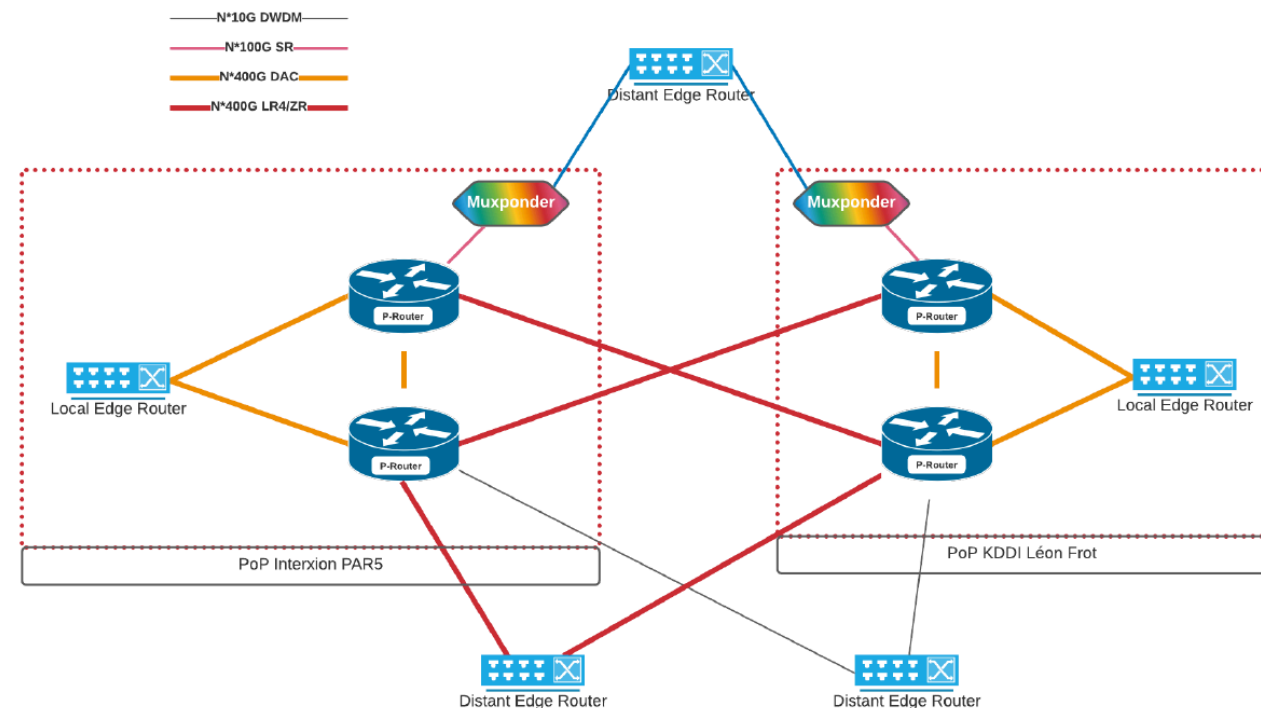


Introduction of P-routers in Paris

- P and PE functions were performed by the same router
 - 10 PoPs in Paris, with traffic growing
 - 3 PE routers @ Telehouse2 site (Voltaire + Léon Frot), complex architecture to interconnect them
 - + and + backbone ports: equivalent of **60-80x100G ports connected**
 - Cost of a backbone port in a PE router much more expensive than a backbone port in a P router
 - Thresholds will be reached soon: P router more cost effective
- **Tender to compare P routers in April/May**

Introduction of P-routers in Paris

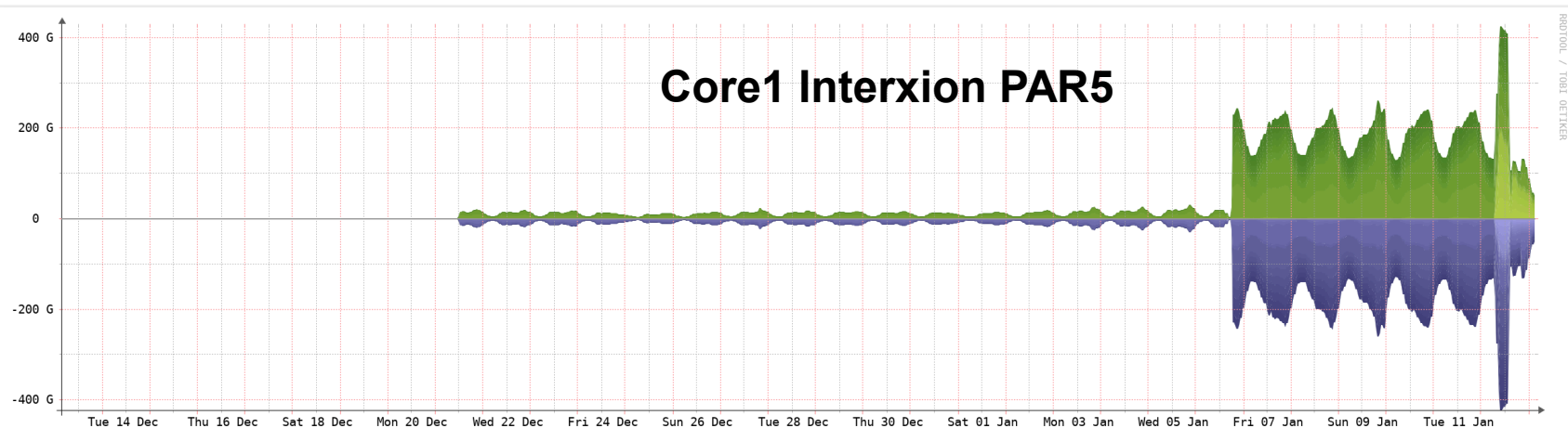
- Requirements and criteria
 - 400G, MPLS, density, power consumption, ...
- 4 vendors compared
 - ~~Arista 7280R3~~
 - ~~Juniper PTX10k~~
 - ~~Nokia 7250 IXR-X3~~
 - **Cisco 8201-32FH selected in July**



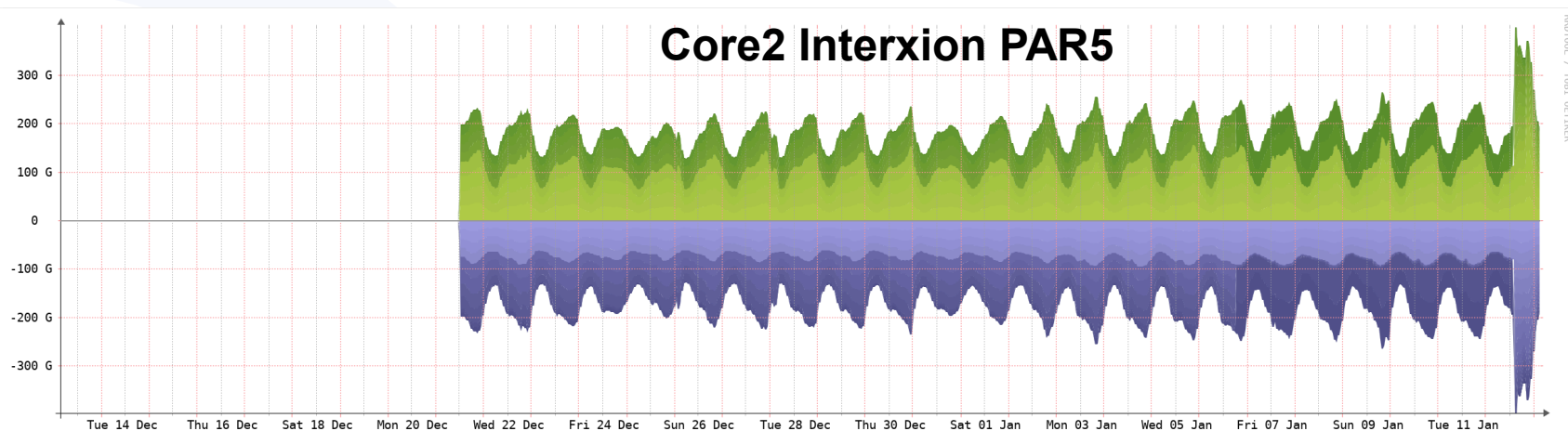
Introduction of P-routers in Paris

- **POC and Try&Buy to validate the platform in Sept/Oct**
- **Interoperability with existing PEs**
 - **Nokia, Juniper, Extreme**
- **400G tests with 3rd party optics**

Introduction of P-routers in Paris



- Deployment in progress
- >30% of traffic crossing 2 P routers



- Interxion PAR5 almost finished
- Telehouse 2 planned for January/February



400G



400G: several challenges

- **QSFP-DD 400G LR4**: 400G ports available for customers

But also...

- Optimize the cost of 100G customer ports
 - **QSFP-DD 2x100G ports**
 - New optics allowing 4 times 100G in a QSFP-DD cage, need to wait the market would be enough mature (**QSFP-DD 4x100G LR or QSFP-DD 4x100G DR4**)
- **400G DAC and AOC**: optimize the P-PE and P-P interconnection **locally**
- **400G ZR and ZR+**: optimize the cost of optical transport
 - Instead of using OTN Muxponder, use directly 400G optics in the router (like 10G DWDM)
 - **Ongoing tests with 4 vendors**



Dark Fiber deployment in Paris



Renewing Dark Fibers in Paris

- **New PoPs (Data4, TH3)**
- **Unhappy with some Dark Fibers providers**
- **Aim to reduce the number of partners and increase the volume → optimise costs**
 - **Aim to keep only 2 partners if possible**

Renewing Dark Fibers in Paris

- **10 dark fibers deployed (new or replacement)**
- **IELO and EXA (formerly GTT) selected**
- **Long work (and sometimes painful) to follow the DF deployment**

Opening France-IX Toulouse

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France-IX Toulouse

Agreement with TOUIX to take over IXP activity in Toulouse

- Previously working on a **volunteer basis**, aim to have more dedicated human resources
- Probably more capacity to convince **international players** to come in regions, sometimes they require 24/7 guarantees

1 PoP: Fullsave TLS00 to start

- 1 Nokia IXR-e
- 10G link to Paris (pending)

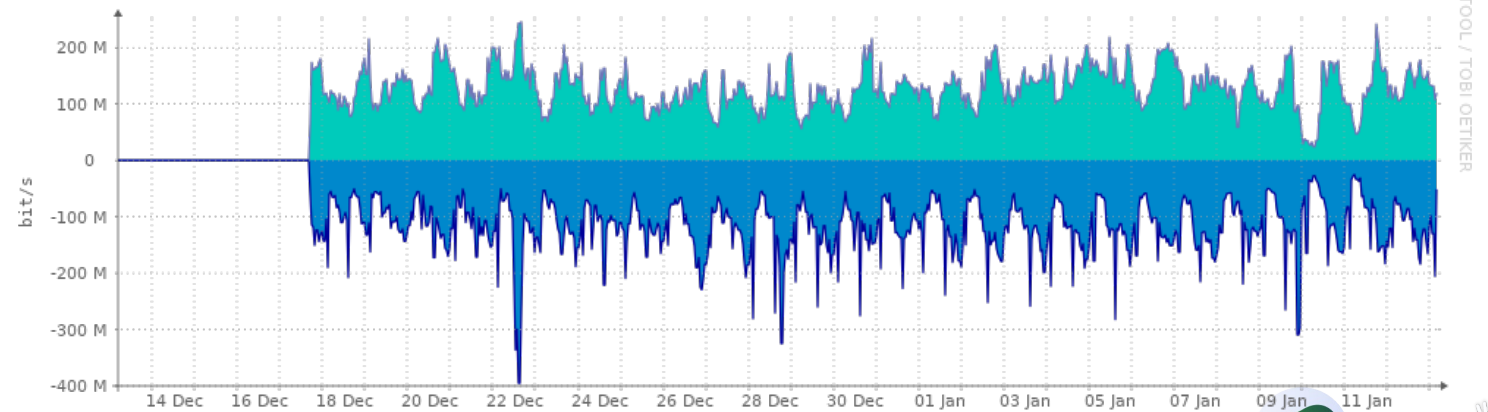
Launch: end of 2021, most of the TOUIX members have already joined France-IX Toulouse

- 6 members connected, 2 pending

France-IX Toulouse



All POPs in Toulouse ex. ToulX - 1 Month



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Thank you!

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