



# Technical Update

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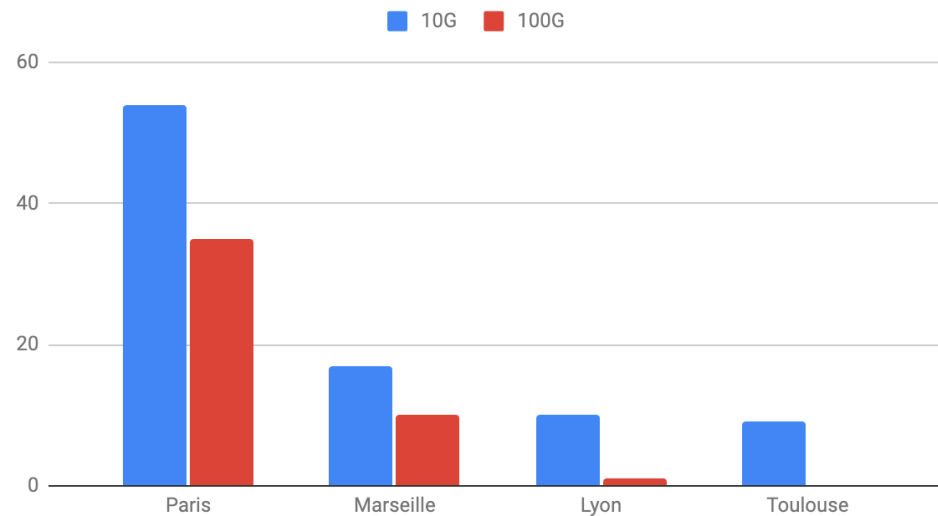
# Agenda

- **Technical key numbers**
- **Infrastructure deployments : past and ongoing**
  - **Feedback on P routers deployment**
  - **Paris : 400G deployed, soon 800G**
  - **Lyon and AURA region : complete renewal**
  - **Opening of France-IX Toulouse and Lille**
- **New services**
  - **Cloud on ramps**
  - **IP transit**

# Technical key numbers

# Ports and peering capacity connected from July 2021 to December 2022

Paris, Marseille, Lyon and Toulouse



- In Paris & Marseille, 100G ports are progressing
- In 2023, we expect to deliver the same amount of 10G and 100G ports

City	Capacity connected
Paris	<b>4040 Gbps</b>
Marseille	<b>1170 Gbps</b>
Lyon	<b>200 Gbps</b>
Toulouse	<b>90 Gbps</b>
<b>Global</b>	<b>5.5Tbps</b>

# Network Availability from July 2021 to December 2022

- 5 “9s” almost everywhere

Paris > **99,9999%**

Marseille > **99,9989%**

Lyon > **99,9999%**

Toulouse **100%**

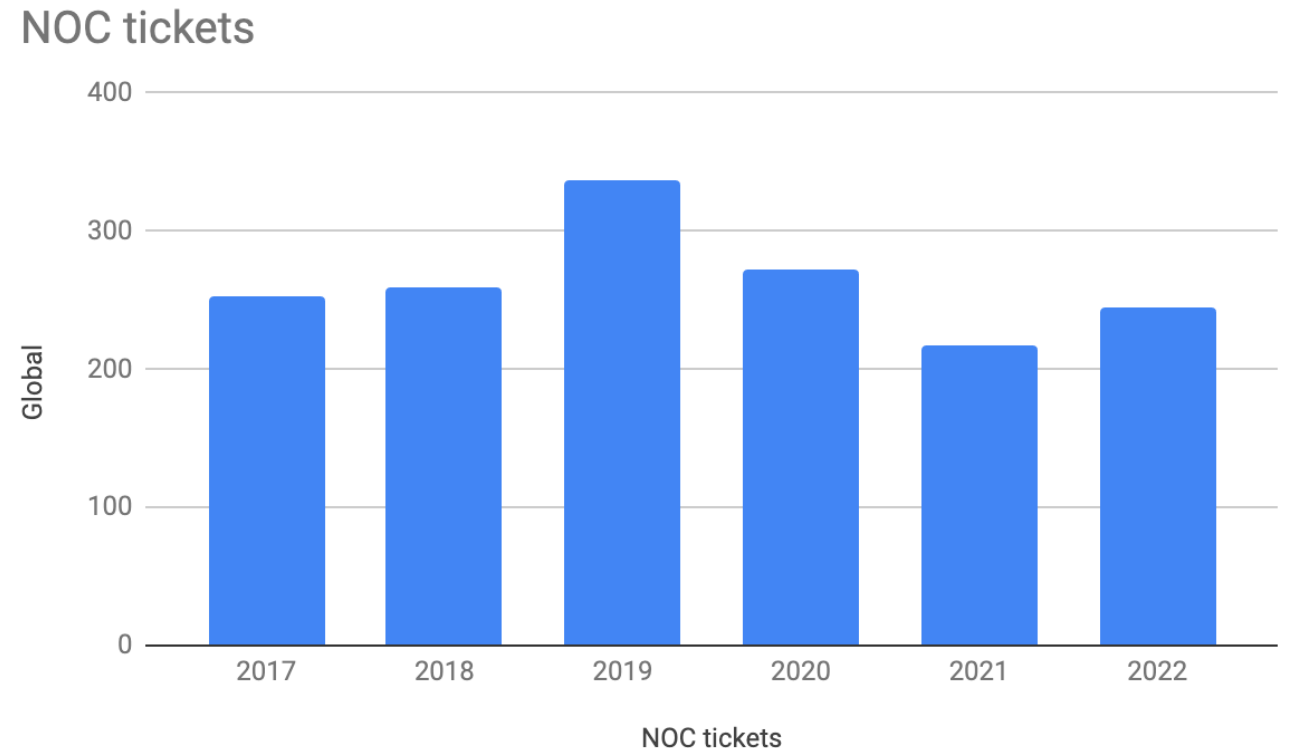
# Network availability: no major outage

- **DC : Electrical maintenance : DC Human mistake, 2 power feeds down for few seconds**
- **Hardware : 1 linecard rebooted**
- **Issue related to France-IX maintenances**
  - Time exceeded, due to software upgrade issue
- **Route server : issue synchronising routes with IRR/ROA validators**

# Support statistics : NOC

## from July 2021 to December 2022

- NOC : 24/7 support, level1
- 350 tickets
- Figures have been **stable over the years, around 250 requests/year**
- Stable despite the fact there are **more customers** and **more PoPs**

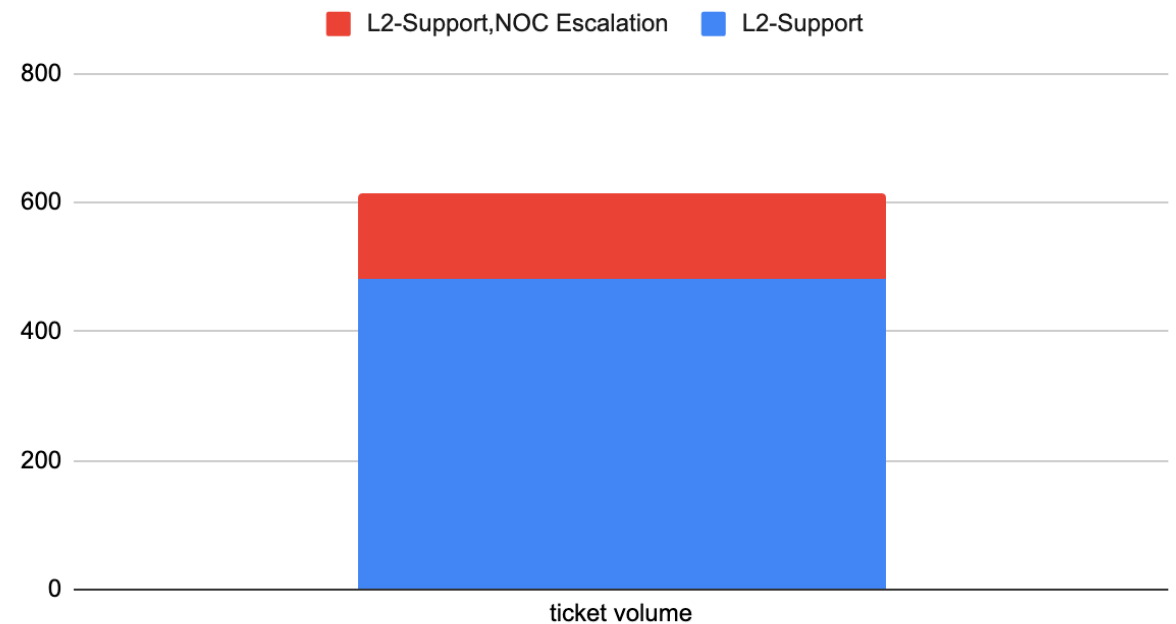


# Support statistics : Level 2

from July 2021 to December 2022

- **Level 2 tickets**
  - **Mainly on working hours**
  - **NOC escalations/Urgent requests**
- **616** requests

L2-Support and L2-Support,NOC Escalation



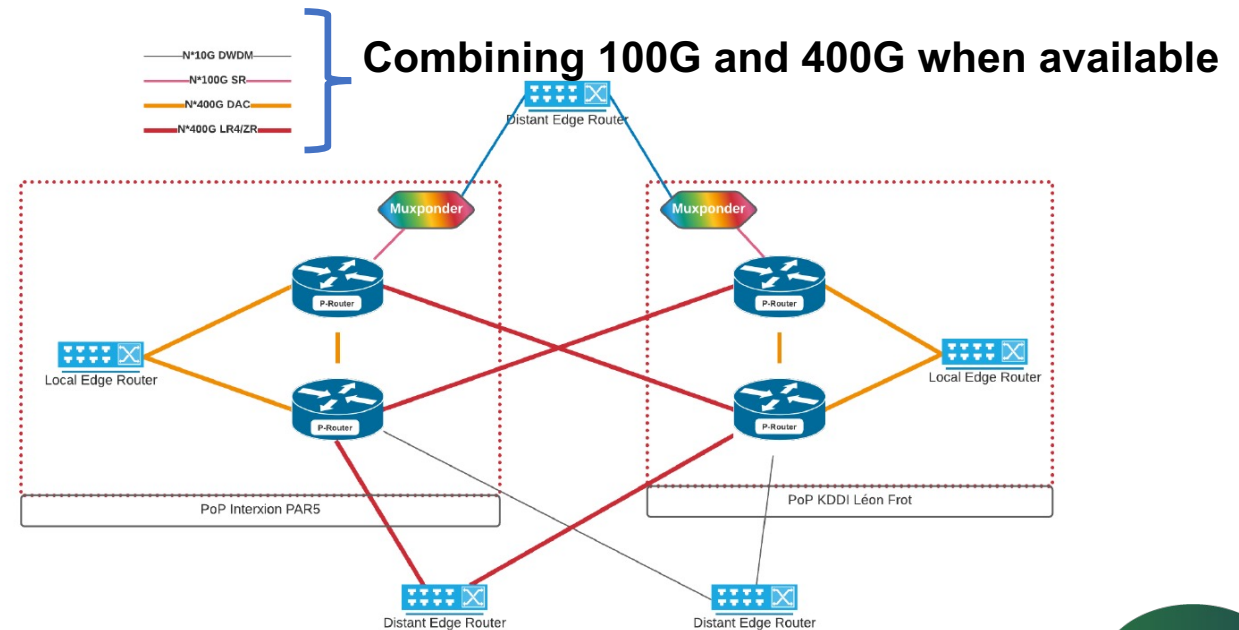
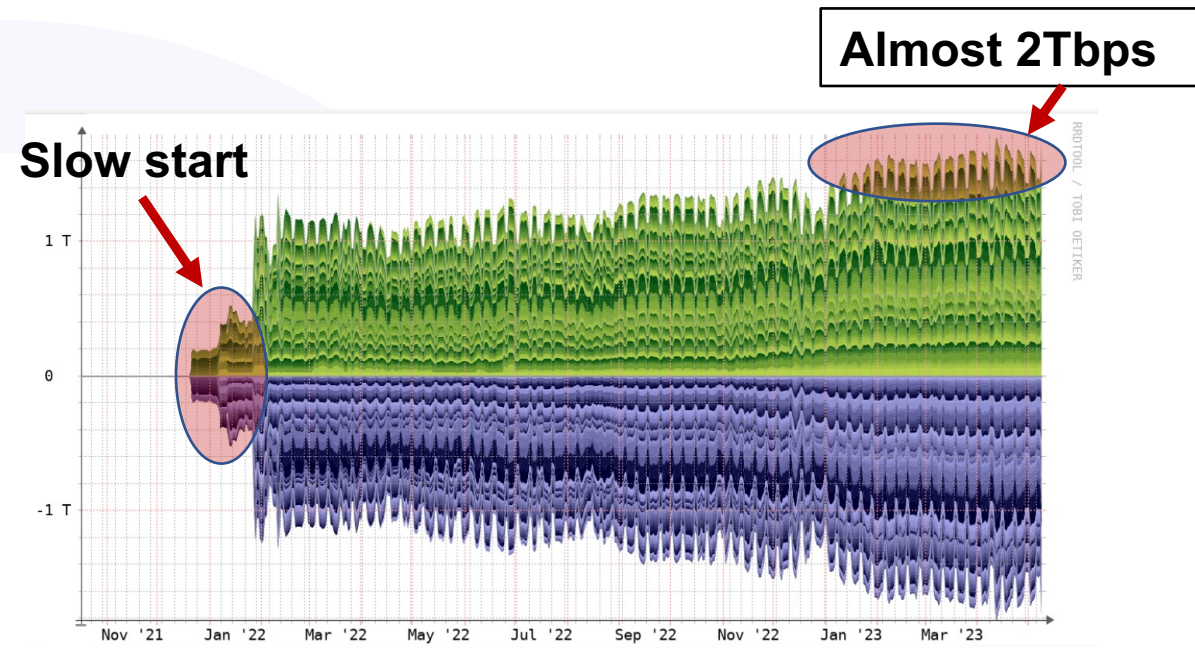


# Infrastructure deployments

# 400G Core/P-routers Cisco in Paris

## Feedback after 18 months

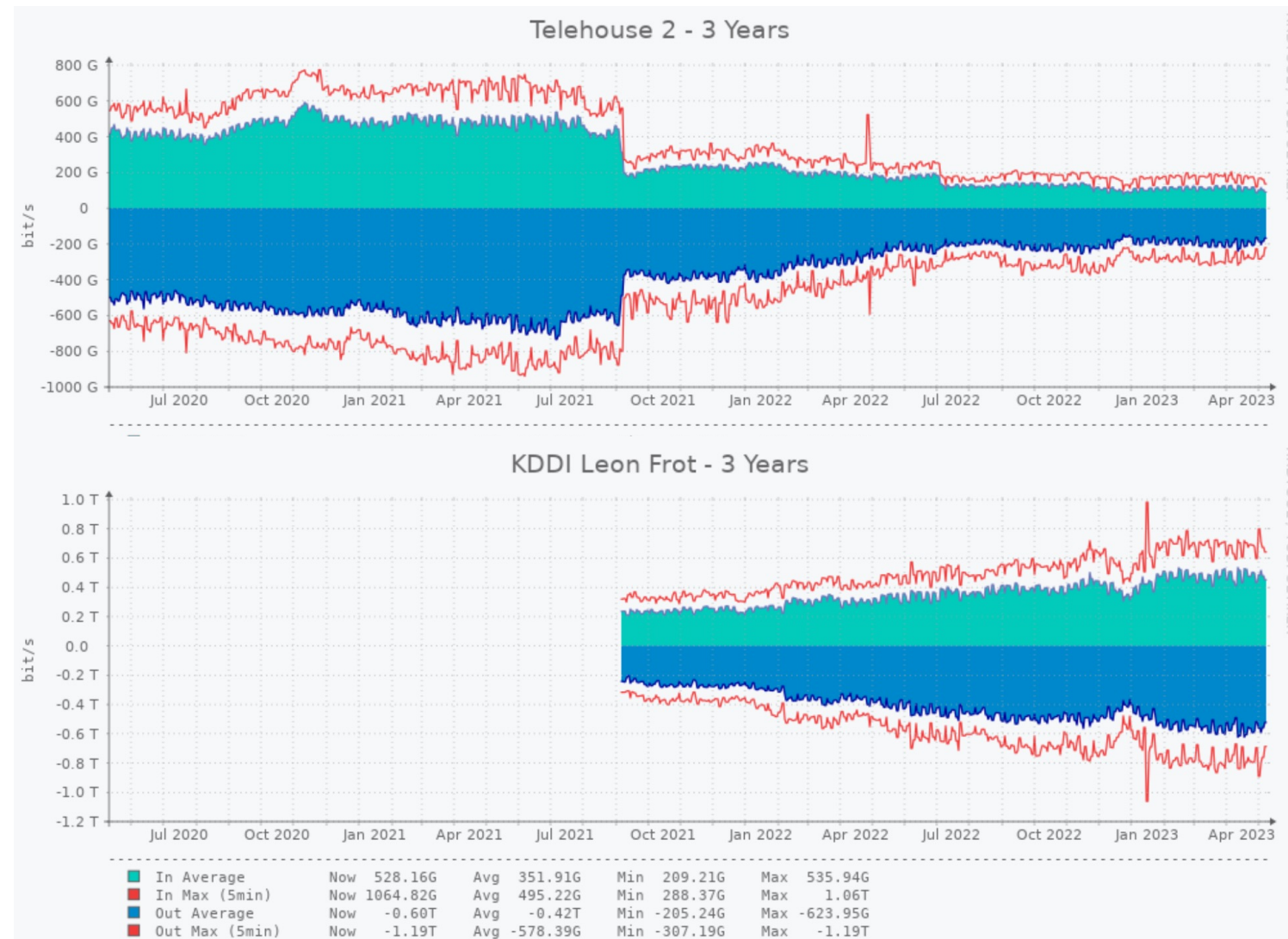
- Optimising architecture and **costs** by introducing dedicated MPLS P routers
- 4 core routers deployed : Cisco 8201-32FH, 32x400G ports line-rate
  - 2x Interxion PAR5
  - 2x Telehouse 2



# Paris : Nokia Edge roll out (1)

- Migration from Telehouse 2 Voltaire to Leon Frot (private room) **achieved**
- 2 new Nokia 7750 SR-2S deployed @Telehouse 2 Leon Frot
  - FP4 based, 400G supported
  - QSFP-DD 400G ports used for backbone interconnection
  - QSFP-DD 2x100G LR4 for customers
- MMR customers migrated from Voltaire to **Léon Frot : 154 customers**
- 1 Nokia 7750 SR-2 still in service @**Voltaire** to connect customers using Legacy cabling : **108 Customers**

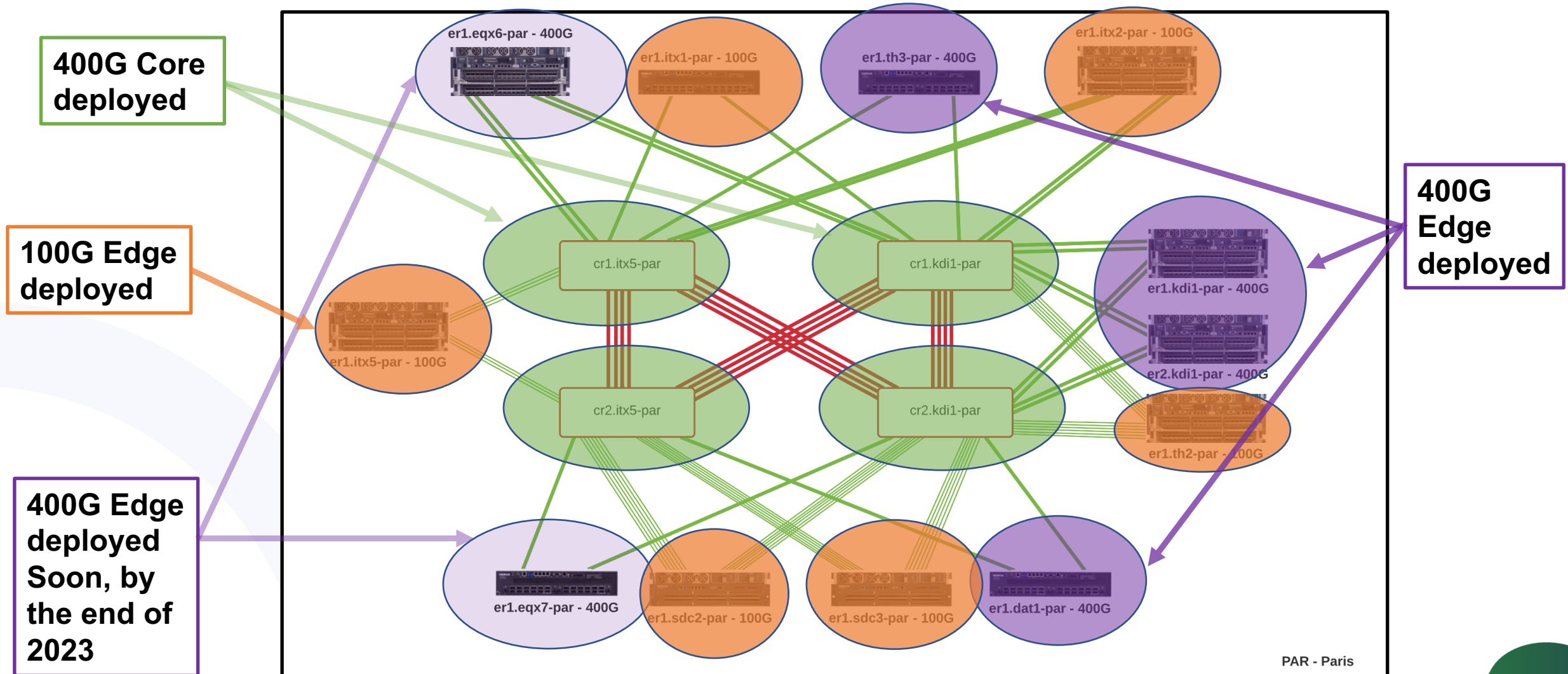
Customers @Telehouse 2 are spread over 3 devices



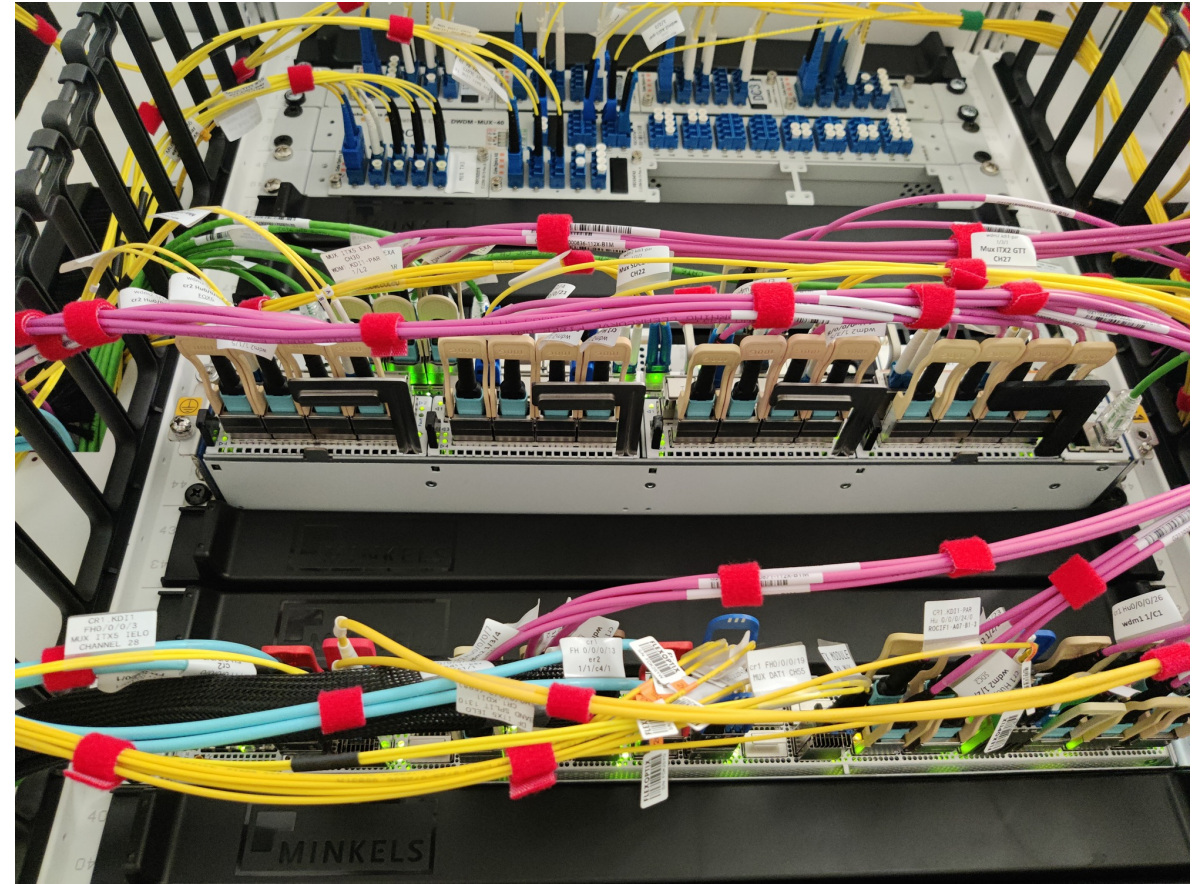
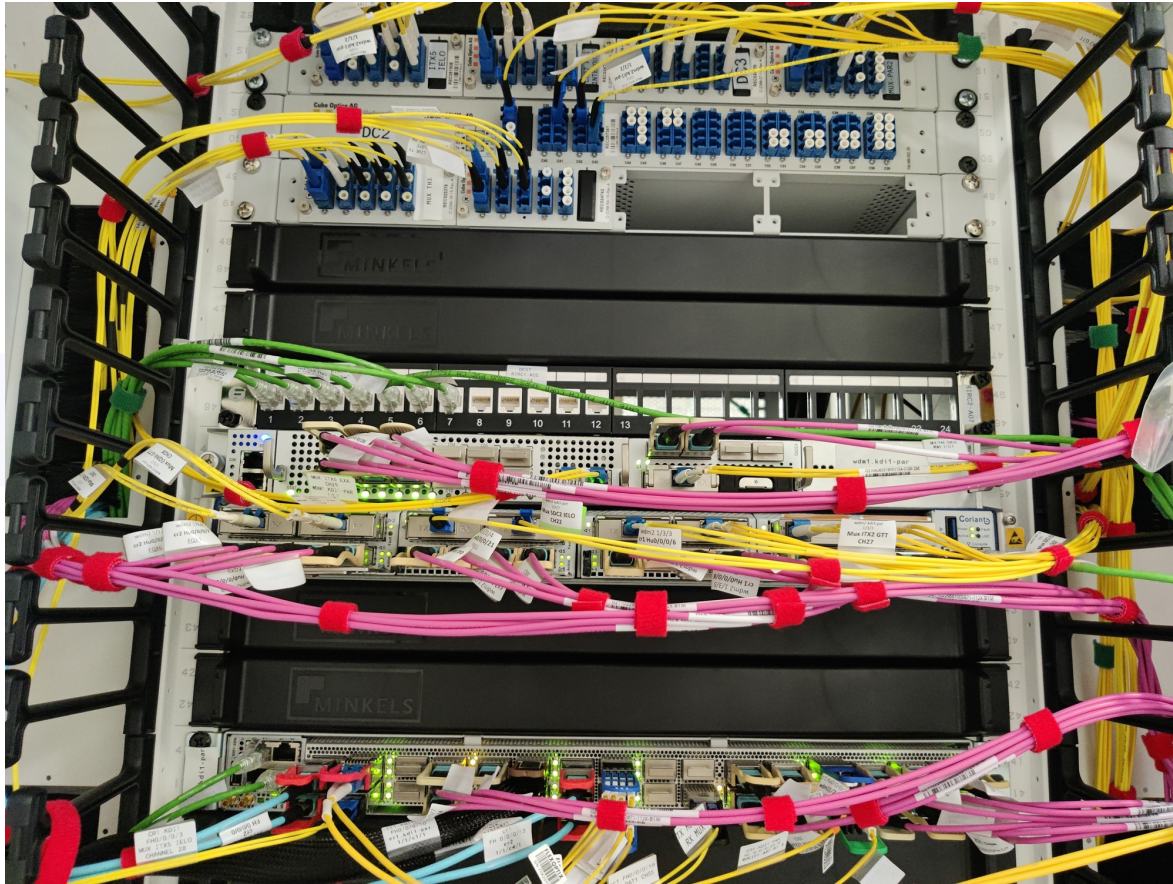
# Paris : Nokia Edge roll out (2)

- Data4 and TH3 migrated to a Nokia 7750 SR1, FP4 based, 400G capable
- 400G ZR optics + EDFA amplifiers used to optimize transport between Data4 and core PoPs
  - 60km link deployed between Data4 and Interxion PAR5
- Next steps:
  - Equinix PA7 : FP4 based, 400G capable, Nokia SR1
  - Equinix PA6 : Strong growth, new FP5 based, Nokia SR-1-X, supporting **800G ports**, more power efficient

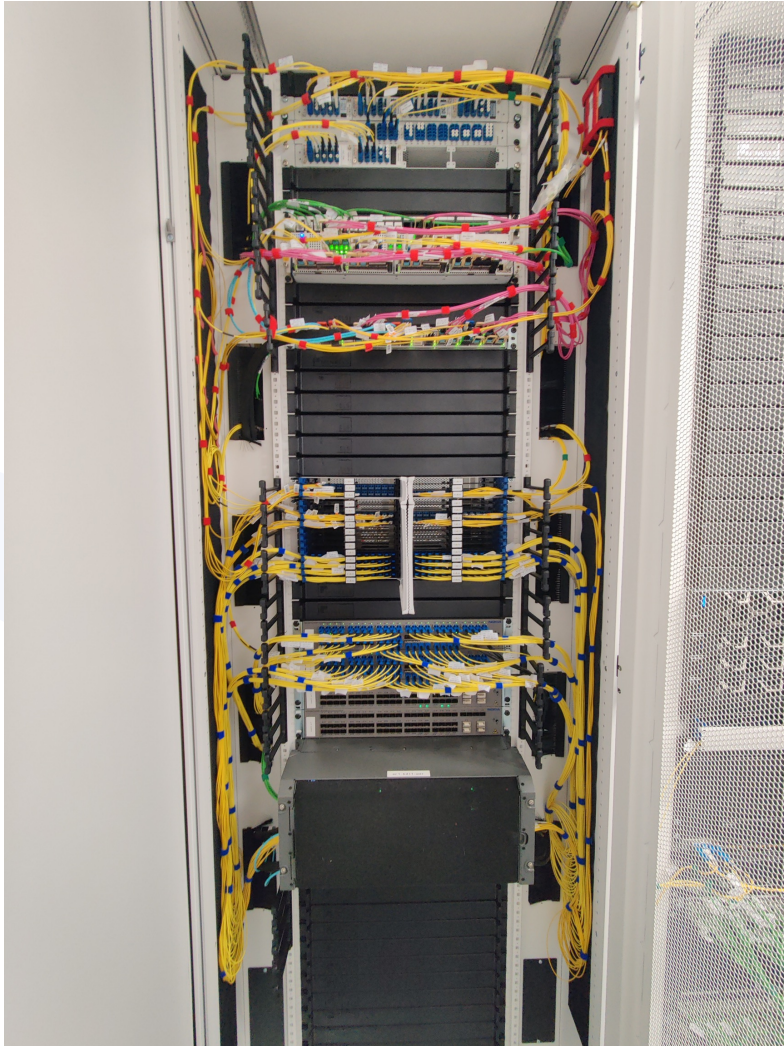
# Paris : Core + Edge roll out (3)



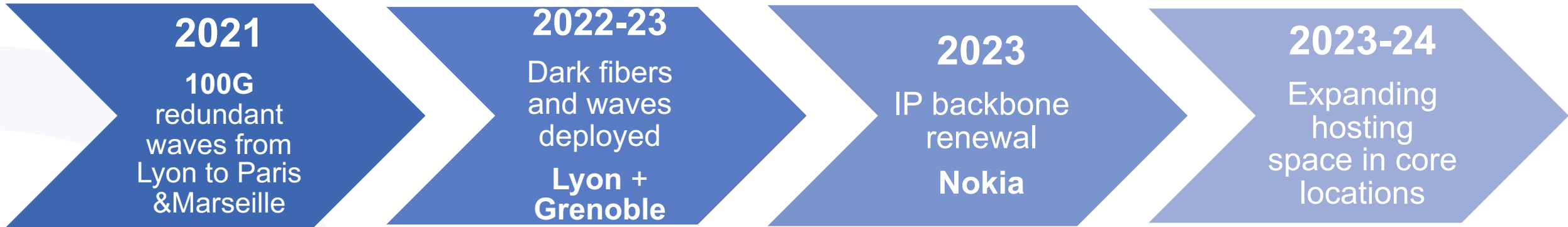
# Paris : Core roll out in pictures



# Paris : Edge roll out in pictures



# Lyon/AURA : Complete renewal



**2021**  
**100G**  
redundant  
waves from  
Lyon to Paris  
&Marseille

**2022-23**  
Dark fibers  
and waves  
deployed  
**Lyon +  
Grenoble**

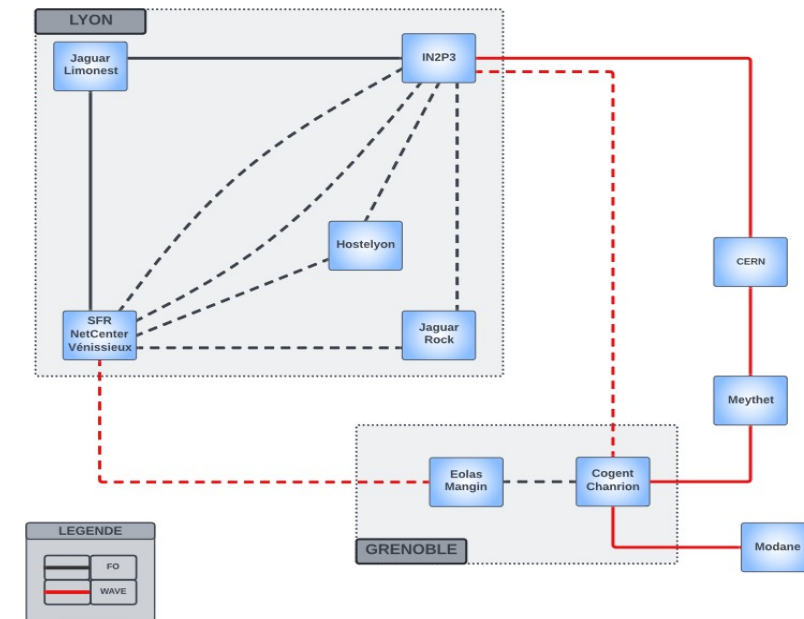
**2023**  
IP backbone  
renewal  
**Nokia**

**2023-24**  
Expanding  
hosting  
space in core  
locations



# Lyon/AURA : Complete renewal Dark fiber and wave infrastructure

- Deployment of 100G redundant waves between Lyon, Paris and Marseille
- Dark fibers between main PoPs in Lyon : 100G links are being deployed, introducing DWDM MUXes
- Redundant 10G waves between Lyon and Grenoble



➔ All PoPs are dual attached now and links with SLAs

# Lyon/AURA : Complete renewal Network infrastructure

- Progressive replacement of Huawei / Cisco devices by Nokia devices
- Homogeneous infrastructure : Backbone and Services
- For main Edge PoPs, Nokia 7750 SR1-48, FP5 based
  - During summer 2023 for 2 main core PoPs : IN2P3 and Netcenter SFR
  - 100G and 400G ports supported
  - PAYG model
- For small and medium PoPs, Nokia 7250 IXR
  - 100G ports available

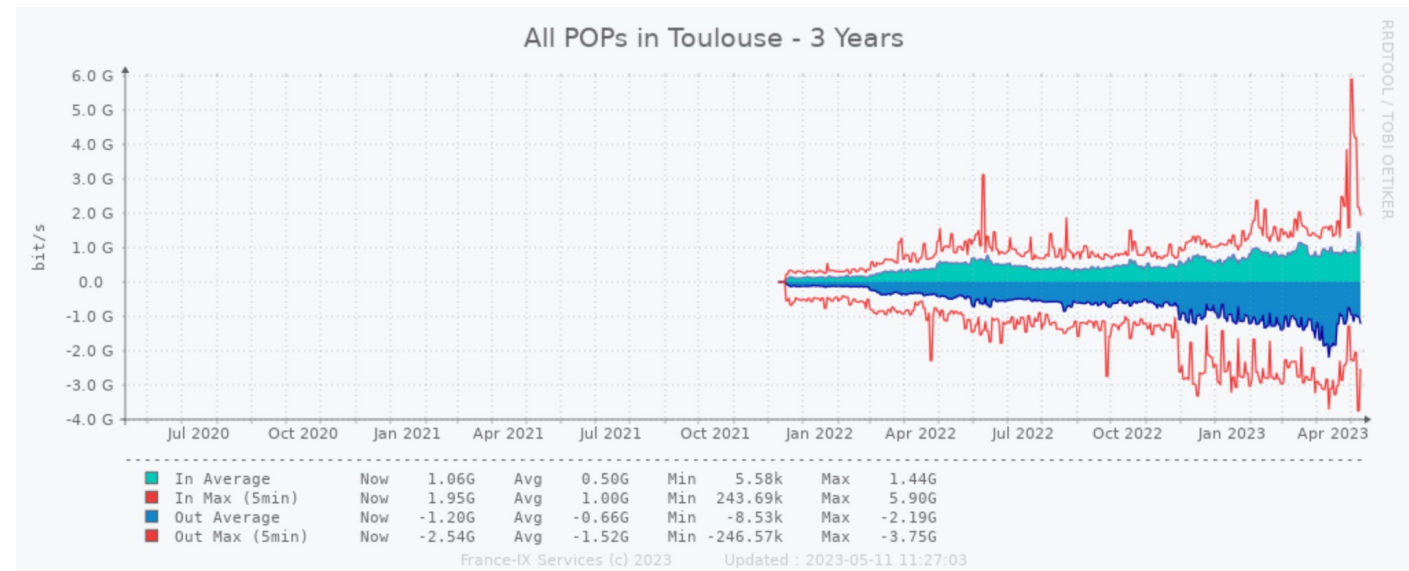
# Lyon/AURA : Complete renewal Hosting

- **Enhance hosting services by adding additional rack space**
  - **IN2P3 and Netcenter SFR**
- **Cleaning existing hosting infrastructure**
- **Goals :**
  - **Easier management**
  - **Less risk when maintenance operations are performed**

# Opening new regions

# New regions : Toulouse and Lille

- Nokia 7250 IXR to start, 100G ports available
- Local peering
- Remote peering possible :
  - Interconnected with other cities with redundant 100G waves
  - MPLS backbone



# New regions : Toulouse and Lille

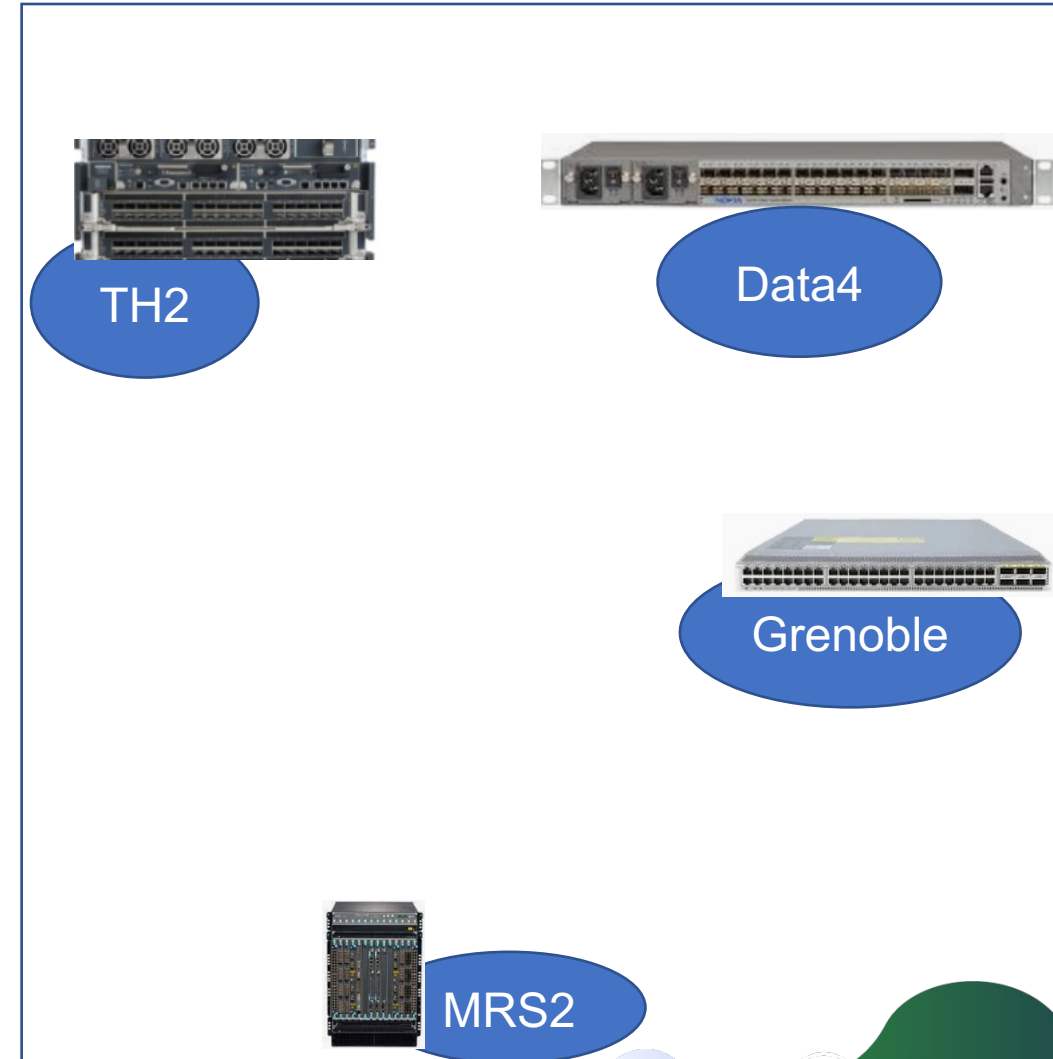
## In pictures



France-IX General Meeting - 11 May 2023

# Optimizing expenses, musical chairs game

- **Nokia 7250 IXR to start in small PoPs (TH3, Lille, Toulouse):**
  - Broadcom based, same CLI
  - 2x100G or 6x100G available + nx10G ports
  - Upgrade to Nokia 7750 SR-1 when the PoP grows (TH3)
  - Redeployment of IXRs in small PoPs (Grenoble)
- Replacing Juniper EX9200 in Interxion MRS2 by Nokia SR-2S that was used in TH2



- **New services**
  - **Cloud-on-Ramps**
  - **IP Transit/DDoS protection**



# Cloud-on-Ramps, why?

- In addition to peering services, some customers are looking for private connectivity to cloud providers
- Goal : facilitate connectivity to main cloud providers (Google, Microsoft, Amazon), but not only
- Partnerships being established

# IP Transit + DDoS Mitigation

- **IP transit has been available for years through France-IX Market Place, by establishing layer 2 circuits between providers and customers**
- **Looking for a more efficient and flexible way to offer IP transit**
  - **Few days to configure one additional VLAN on existing France-IX port to activate IP transit service**
  - **Available on ALL regions**
  - **Based on Orange AS5511 service**
  - **Possibility to activate DDoS mitigation, based on Arbor solution**

# Thank you !

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