



# Building the new GÉANT Network

**Bram Peeters**

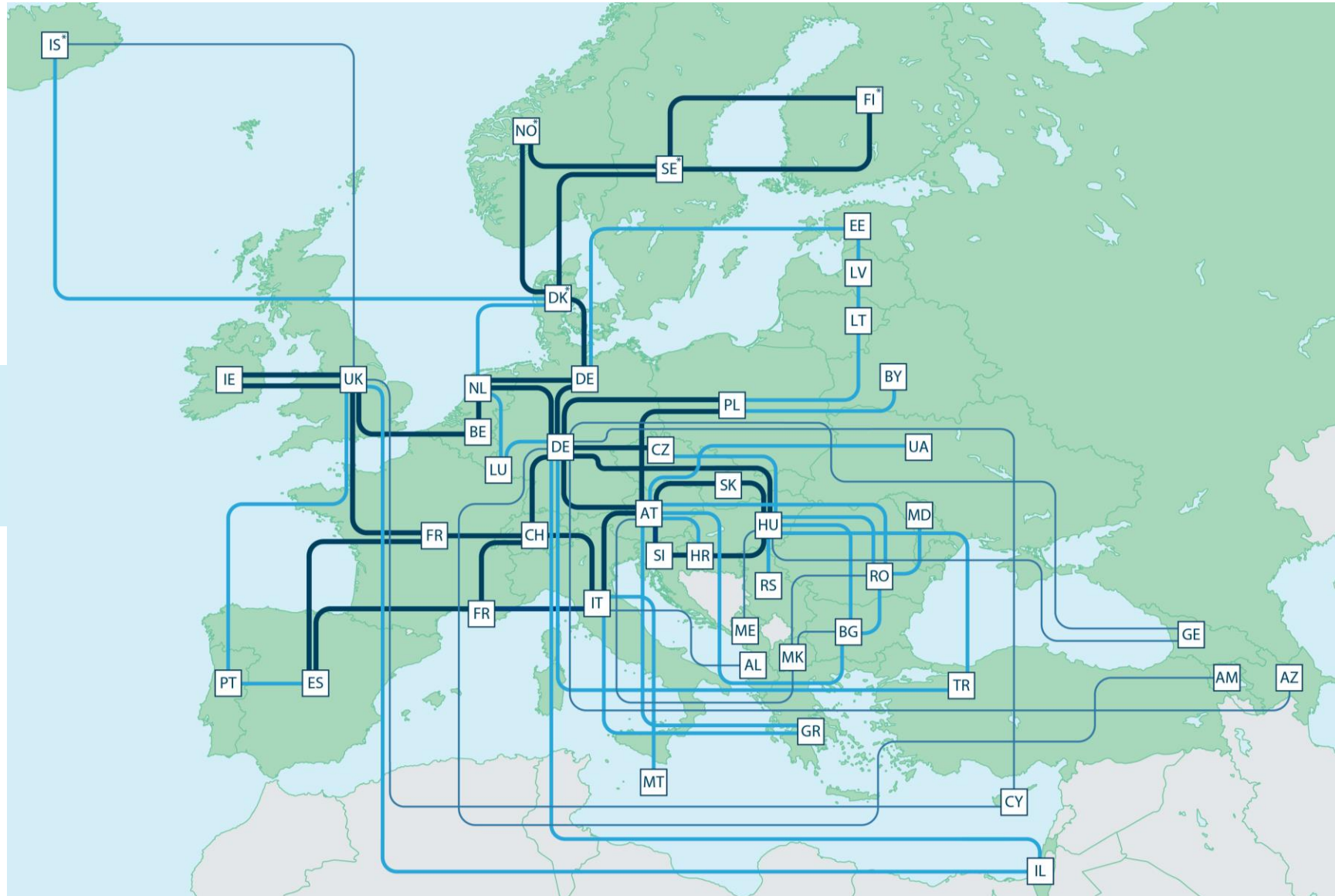
*Chief Network Operation Officer*

**Vincenzo Capone**

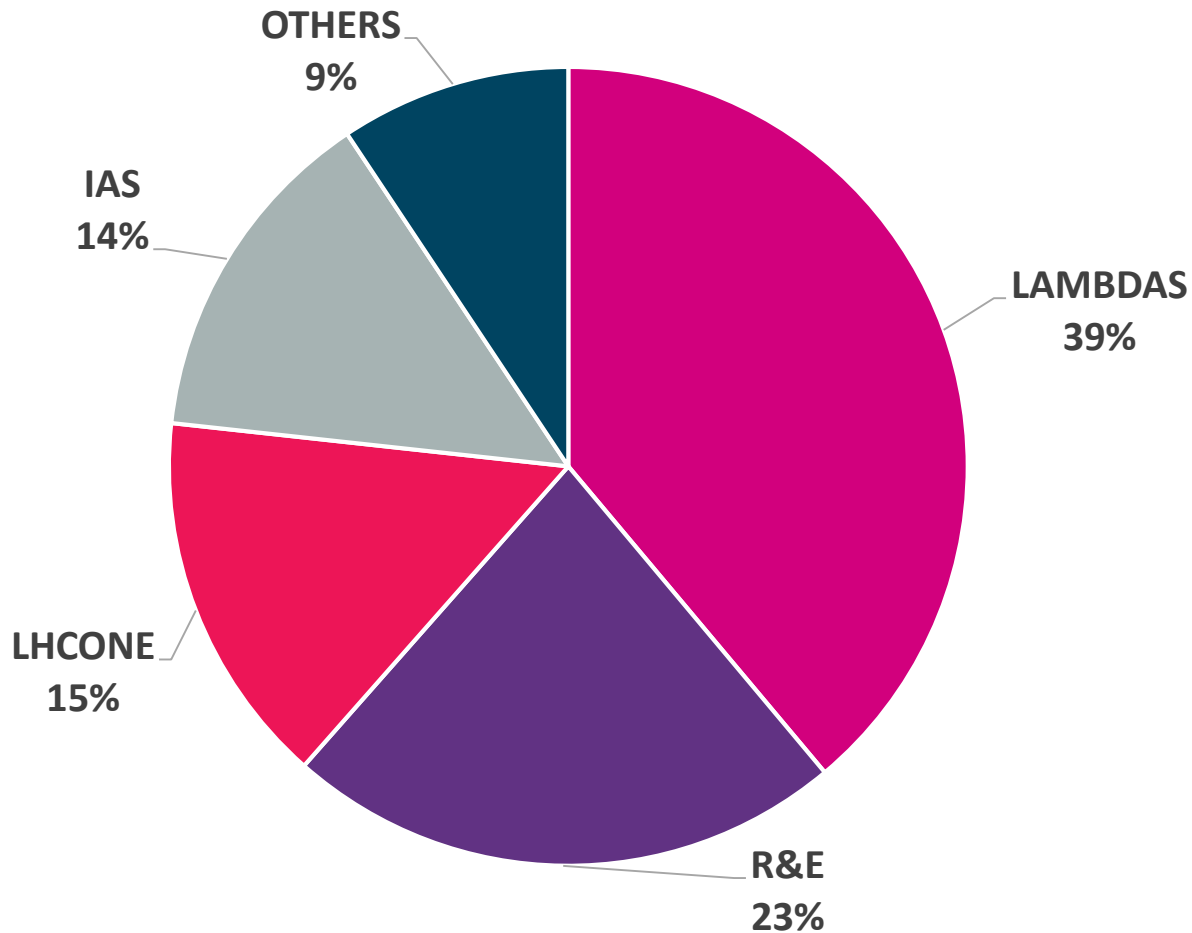
*Head of Research Engagement and Support*

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# GÉANT current topology



# Traffic Distribution on the GÉANT network (current)



**LAMBDAS** – 10G and 100G Ethernet point to point services provisioned directly for NRENs/partner

**R&E** – IP/MPLS routing for Global R&E prefixes

**LHCONE** – Dedicated L3VPN for LHC

**IAS** – GÉANT on-net Internet Access Service

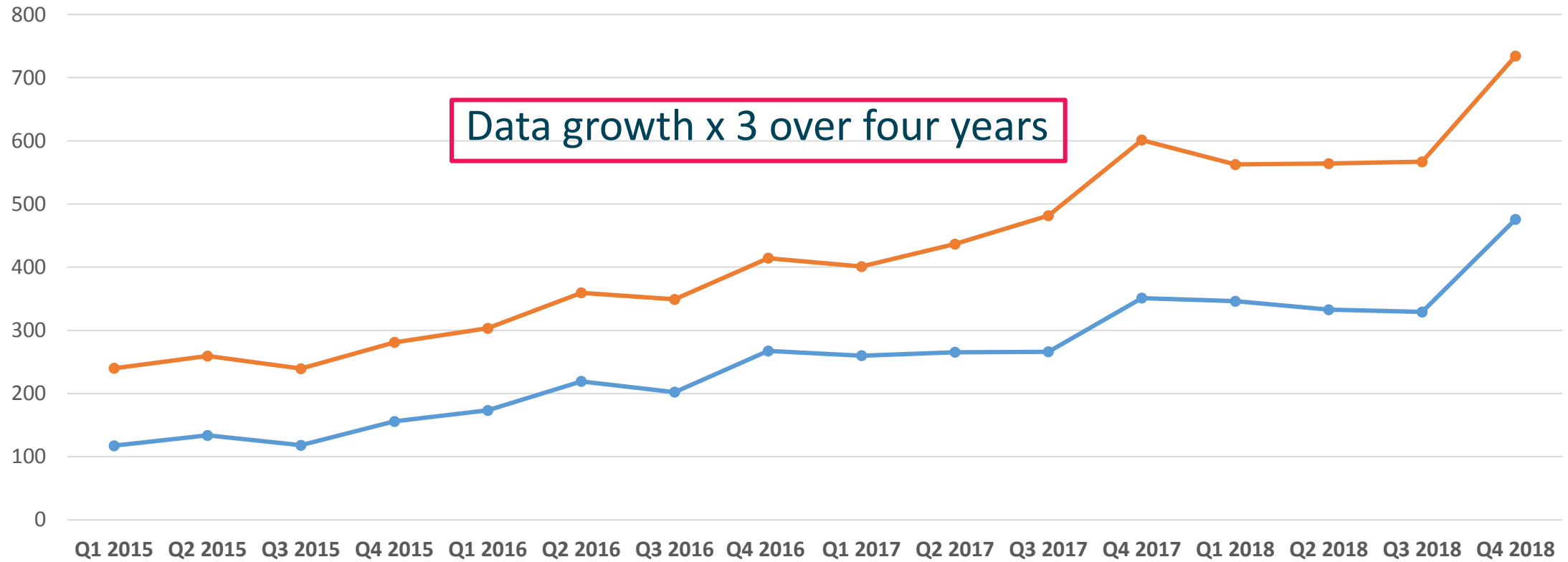
**OTHERS** – includes other L3VPNs, L2VPNs, Cloud services, MDVPN, GÉANT Open and LANs

# Challenges

- **Exponential traffic increase**
- **Flat (or shrinking) budget**
- **Need for programmability**
- **Reduce vendor lock-in**
- **Keep the existing mission and design rationale**

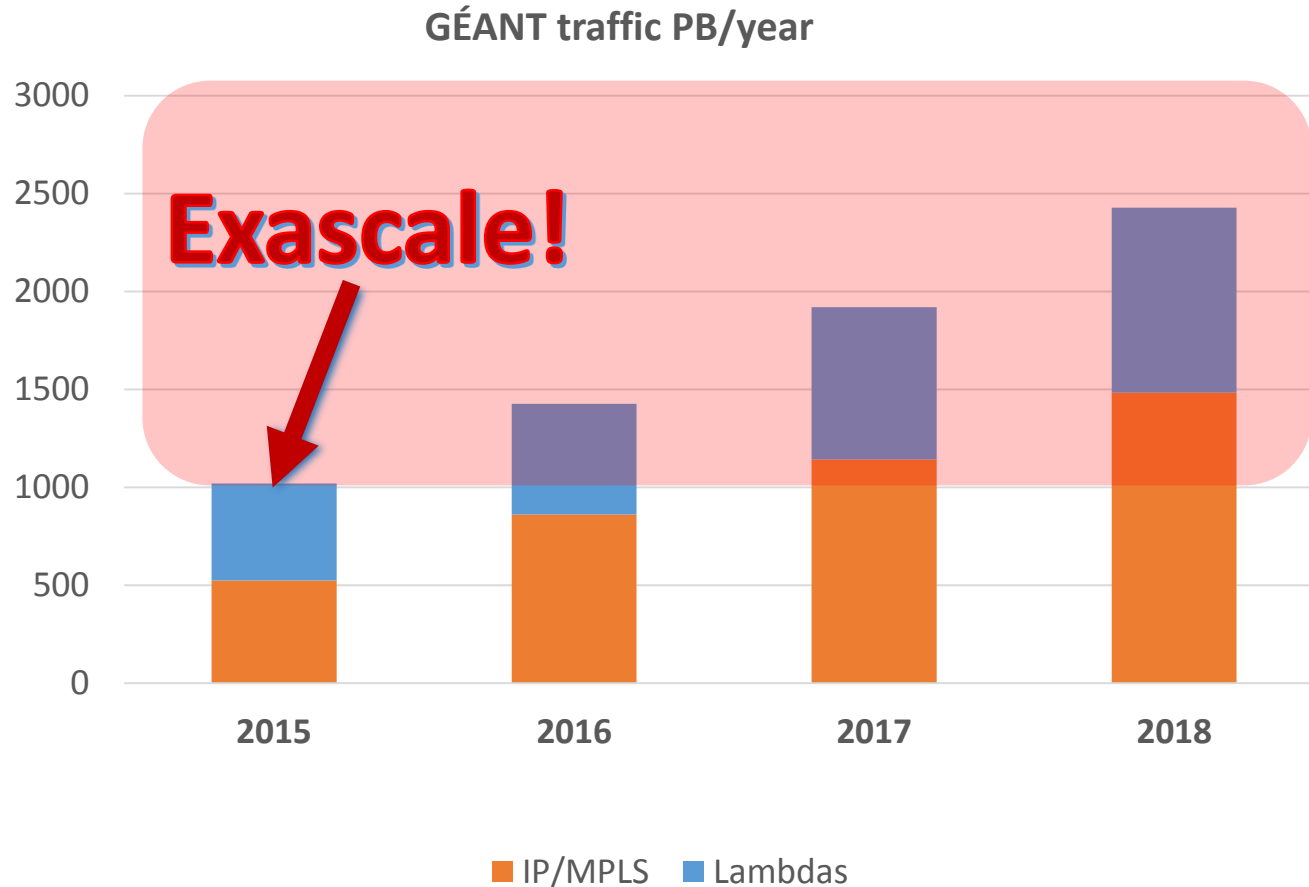
# Traffic trends

GÉANT traffic PB – Quarterly view





# Network and Capacity Growth



- 2.4 EB of data received in 2018
- 26.4% growth from 2017 (29.9% for IP/MPLS)
- Longer term trend ~30%

# Enter the GN4-3N project

(formerly known as IRU-SGA)

- EC created a funding vehicle to procure infrastructure on long terms contracts **and with 100% funding.**

*“Go beyond the state-of-the-art by restructuring the backbone network through exploration and **procurement of long-term IRUs** and associated equipment to **increase the footprint**, stimulating the market in cross-border communications infrastructure **whilst decreasing the digital divide and reducing costs**”*

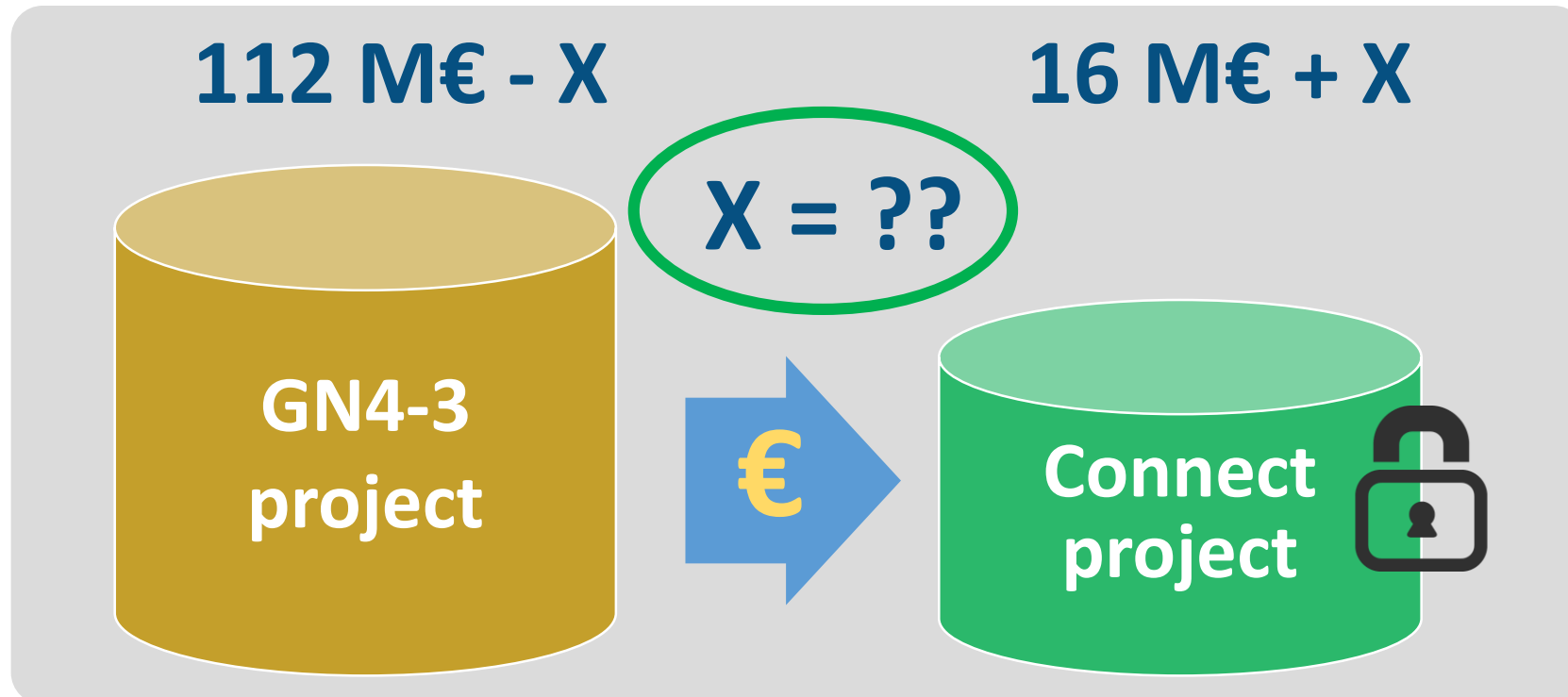
*“Improve the **minimum service level** of the smaller European NRENs and their users by ensuring connectivity speeds **of 100 Gbps** (where technically and economically feasible)”*

Extract from objective for the IRU SGA

- Funding cycle 2019-2022
- Budget at least 16M€, out of total 4-year GÉANT project budget of 128M€

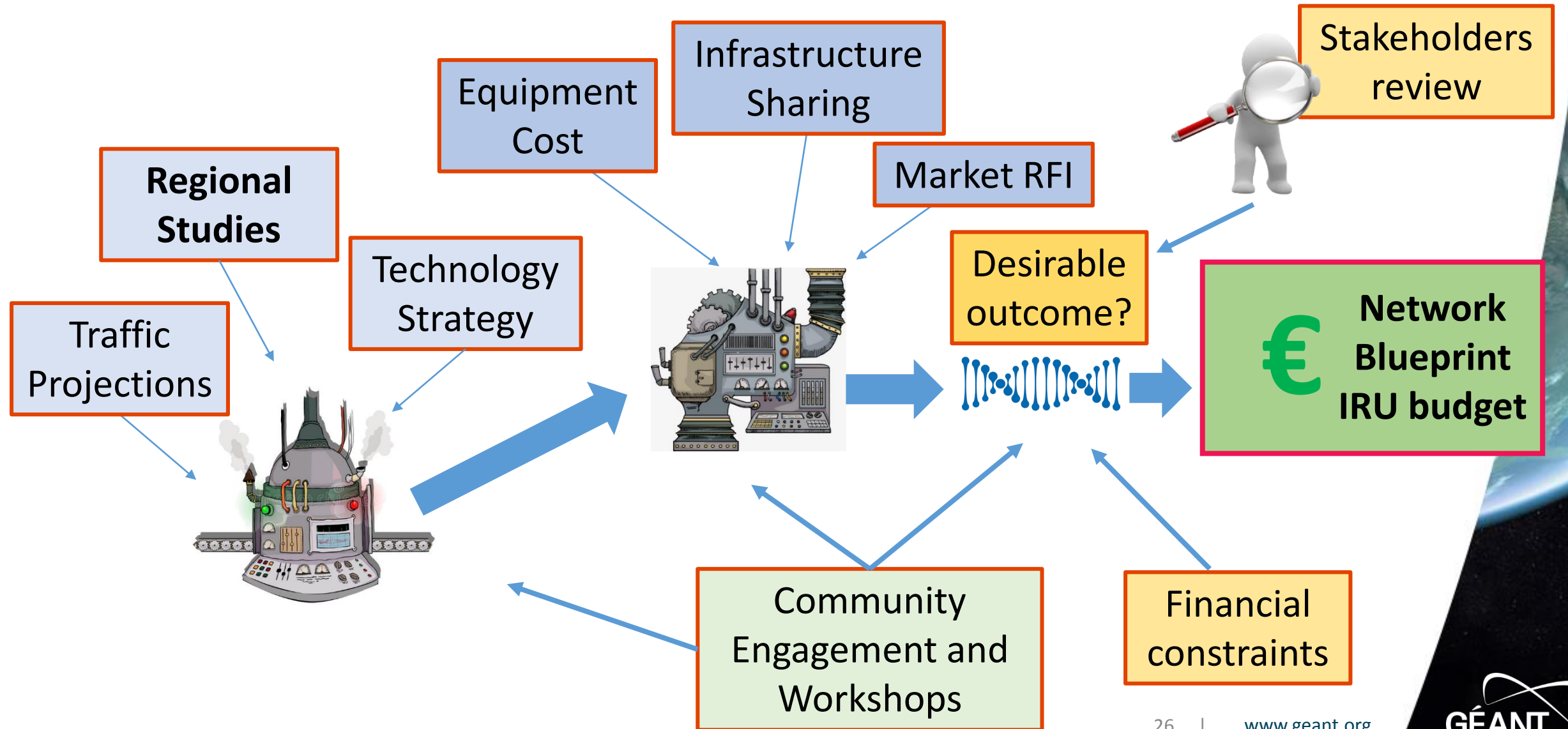
# Community Challenge: Define the Size of the Investment

*Distribute 128 M€, but.....* IRU budget can only be used for infrastructure spend

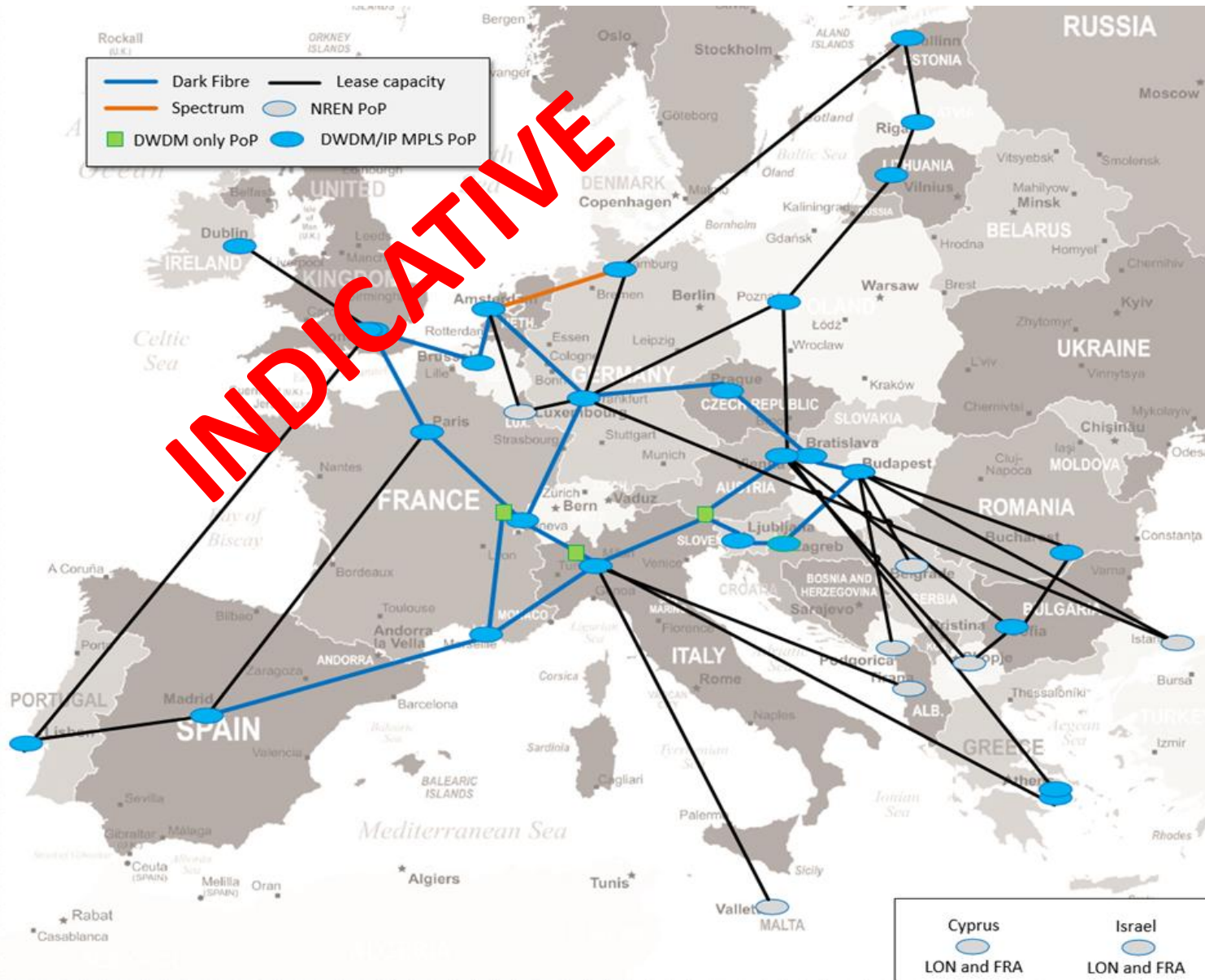




# How to decide...



# GÉANT future topology (in progress)



Based on the information provided:

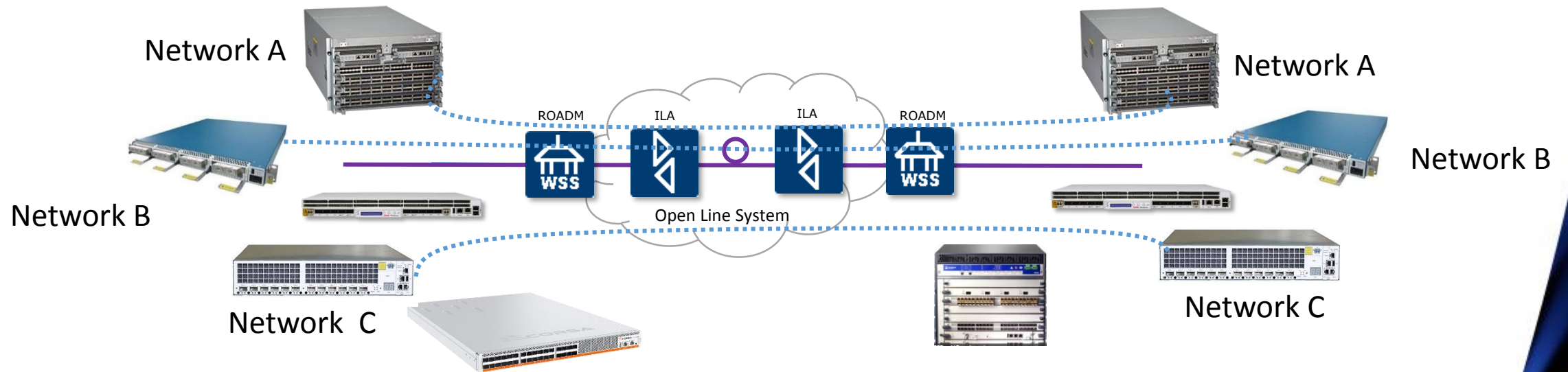
24 countries are targeted for the initial phase: UK, IE, PT, ES, FR, BE, NL, DE, EE, LV, LT, PL, AT, CZ, SK, CRO, SI, HR, RO, BG, GR, RS

- UK, BE, FR, CH, DE, AT, NL, HU, HR, PT, SI, SK, CZ, ES: For the remaining countries:
- standard leased capacity (minimal 10GE, might be 100GE by end of project)
- or additional DF/spectrum as part of regional extension

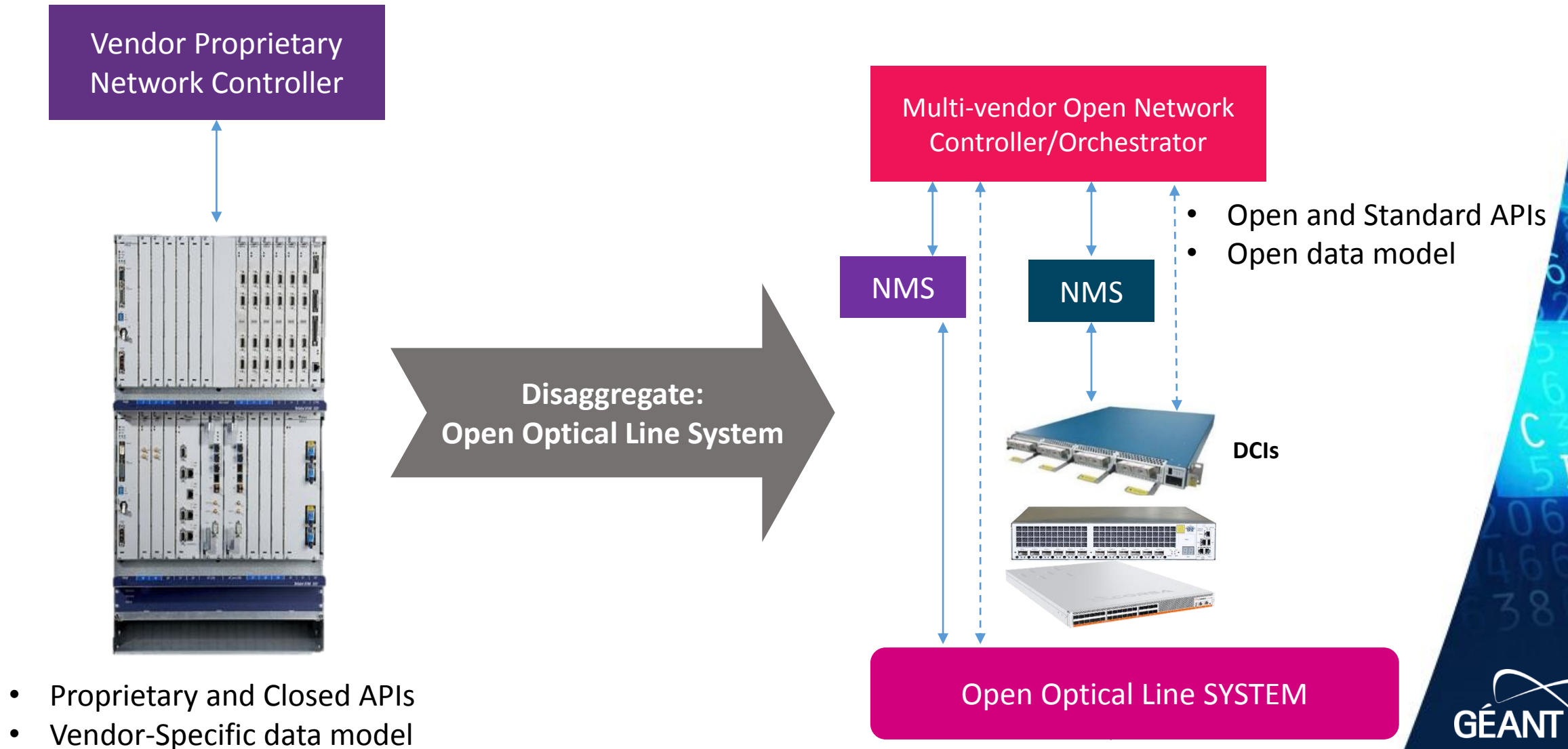
**Estimated NRC: 48 M€**



# Technological Enabler – Open Line System



# Revolution of the transport





# Options for the packet layer

## Option 1

Keep using the existing platform in large PoPs and deploy high-density line cards



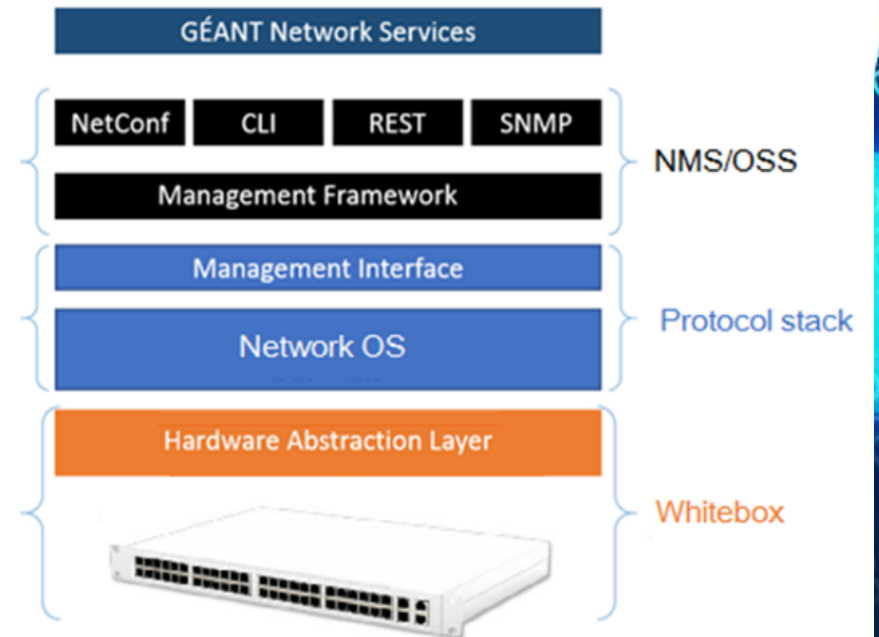
## Option 2 ✓

More traditional vendors rightsize  
Replace medium-sized MX-480 devices in smaller PoPs with MX-204s



## Option 3 ?

White/Brite Boxes: Open Hardware and Open Network Operating System  
Fully decoupled evolution  
New Ecosystems



# Bigger is not always better

Enter the MX204



4x QSFP – 1x100G or 4x10G

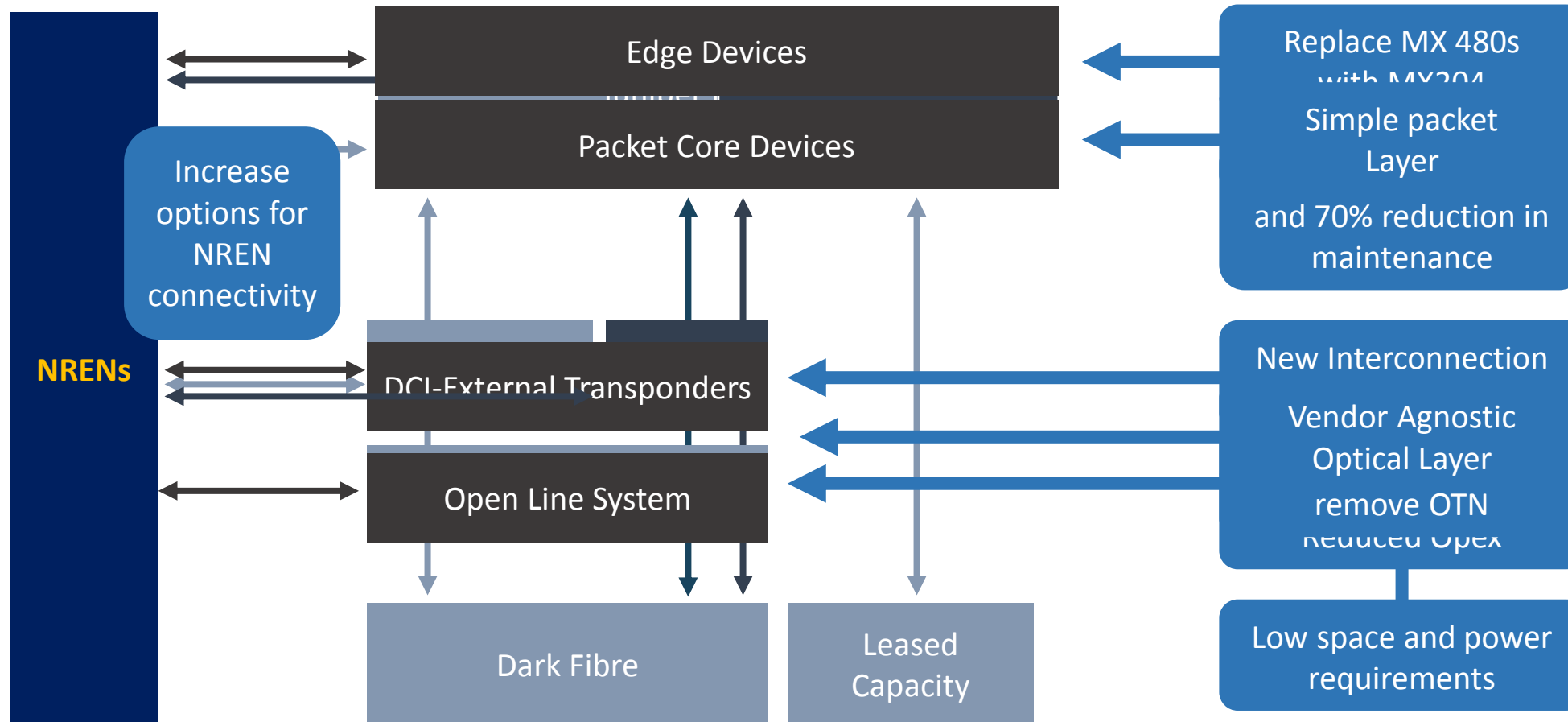
8x SFP – 1G or 10G

400G total switching capacity  
Enhanced QoS  
PTP support  
Dual PSU  
Single routing engine

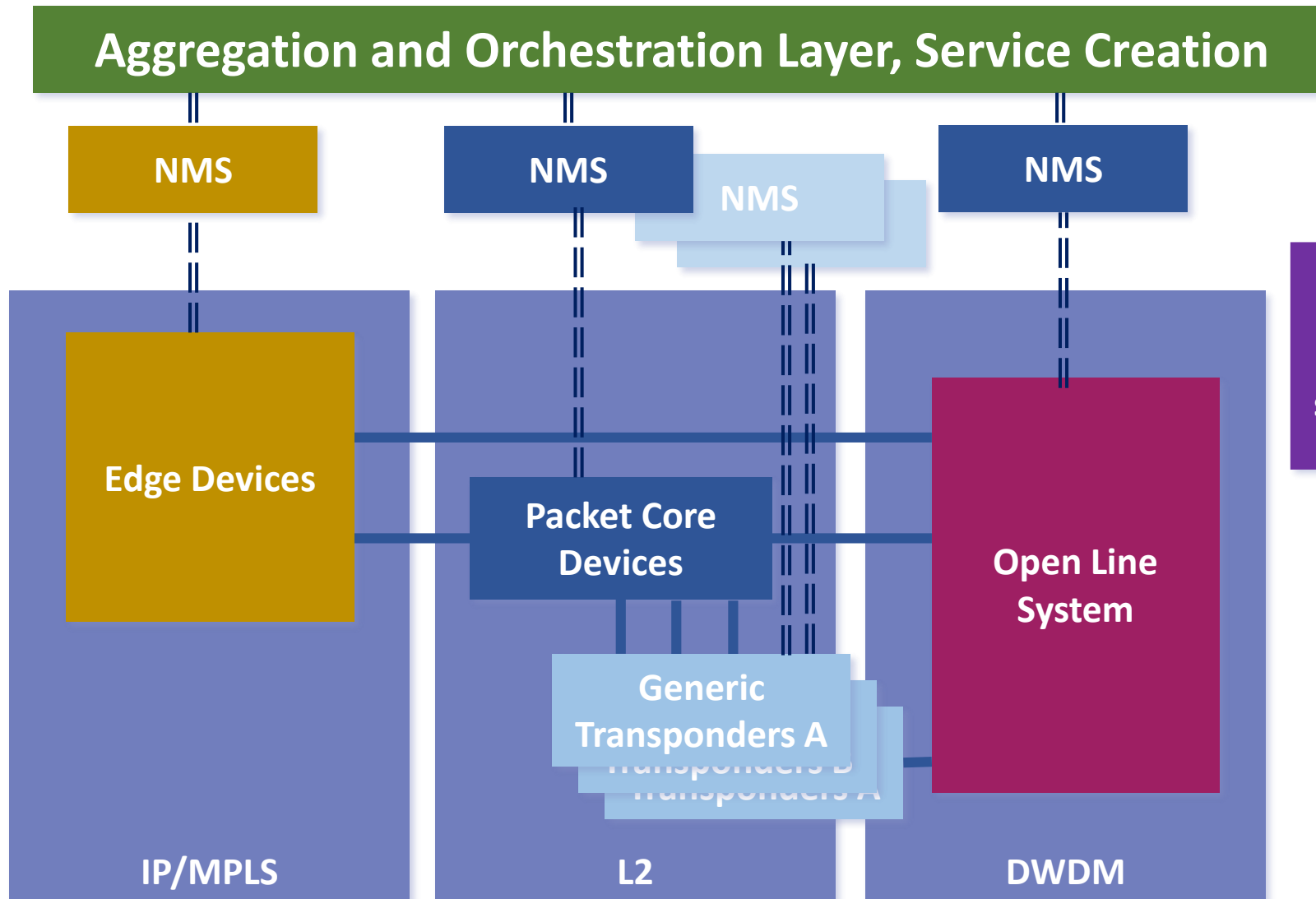
~80% OPEX  
reduction  
~70% less  
power



# Putting it all together

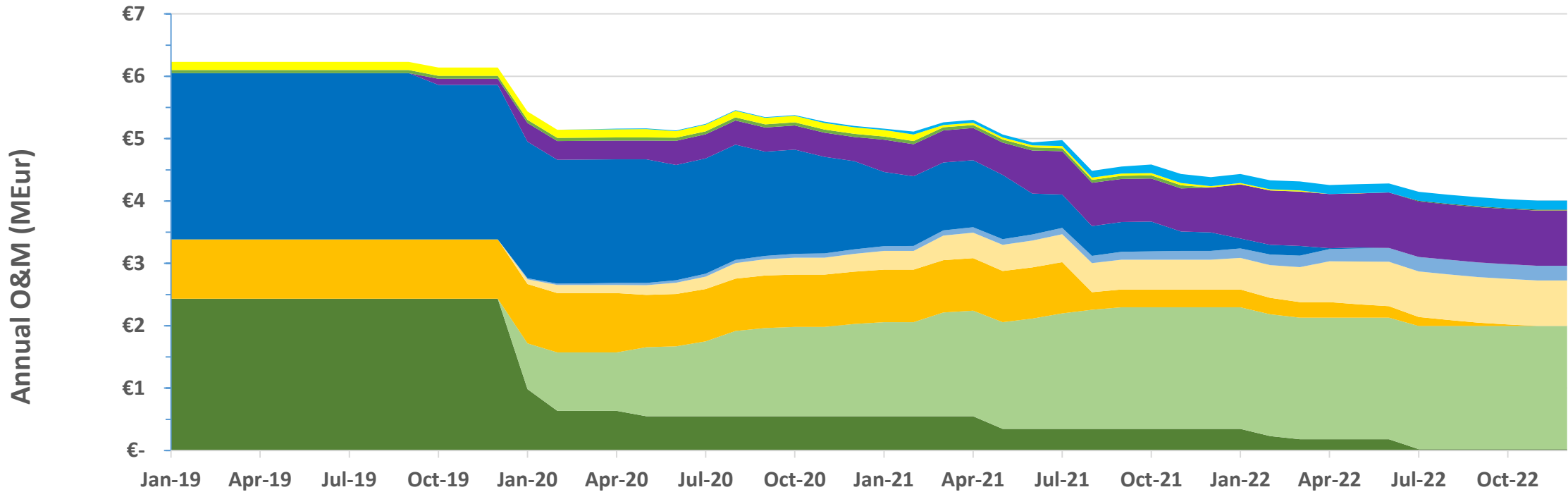


# Managing a Disaggregated Network



This network is only one part of the service supply chain...

# Costs projection



OLD Commercial DF

NEW Commercial DF

OLD Line System

NEW Line System

NEW DCI

OLD Commercial Leased

NEW Commercial Leased

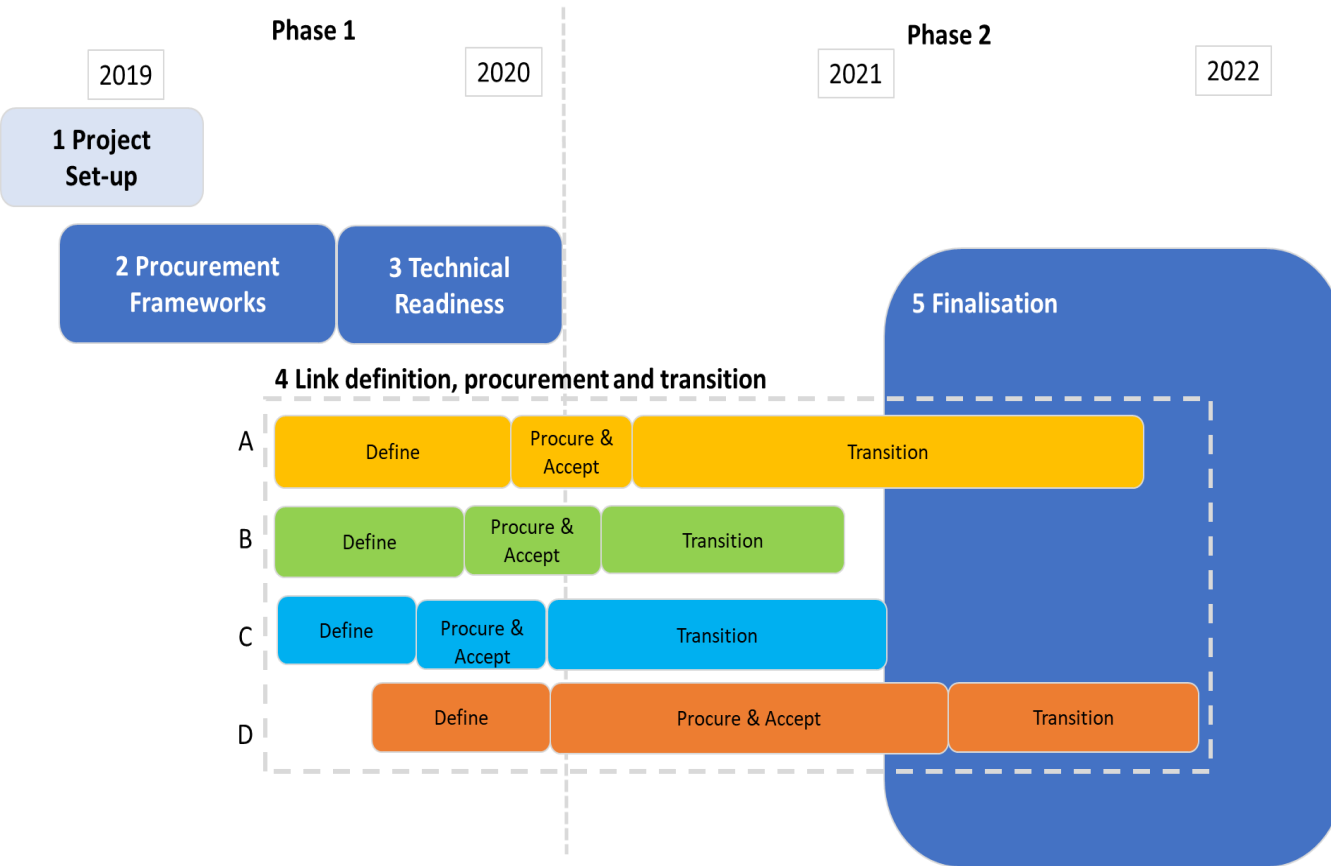
OLD NREN Spectrum

OLD NREN Leased

NEW NREN DF

NEW NREN Spectrum

# GN4-3N: Planning (according to the Proposal)





# Thank you!

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