



# **GÉANT intercontinental connectivity – overview and outlook**

**Helga Spitaler**

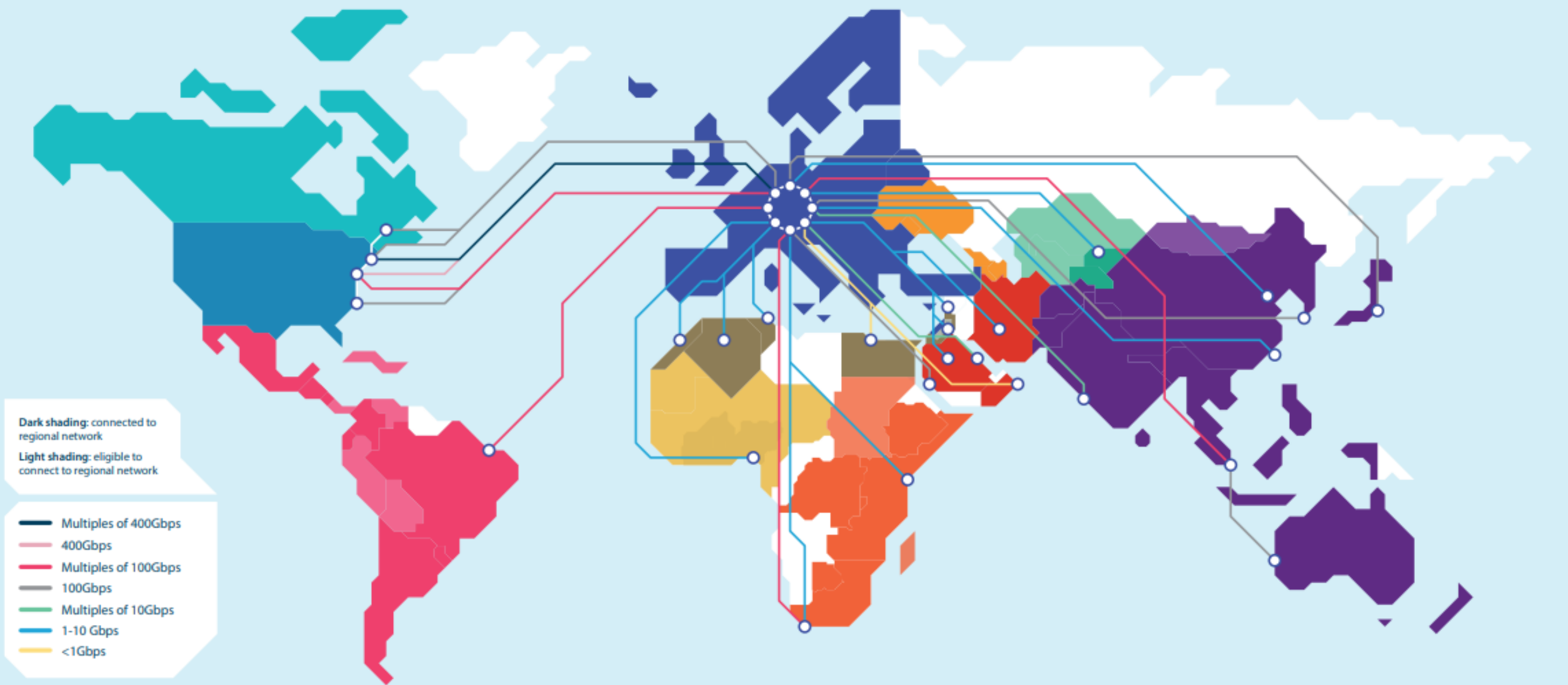
Sr. International Relations Project Manager

GÉANT

LHCOPN-LHCONE meeting #53

IHEO, Beijing, China

09/10/2024



Dark shading: connected to regional network  
Light shading: eligible to connect to regional network

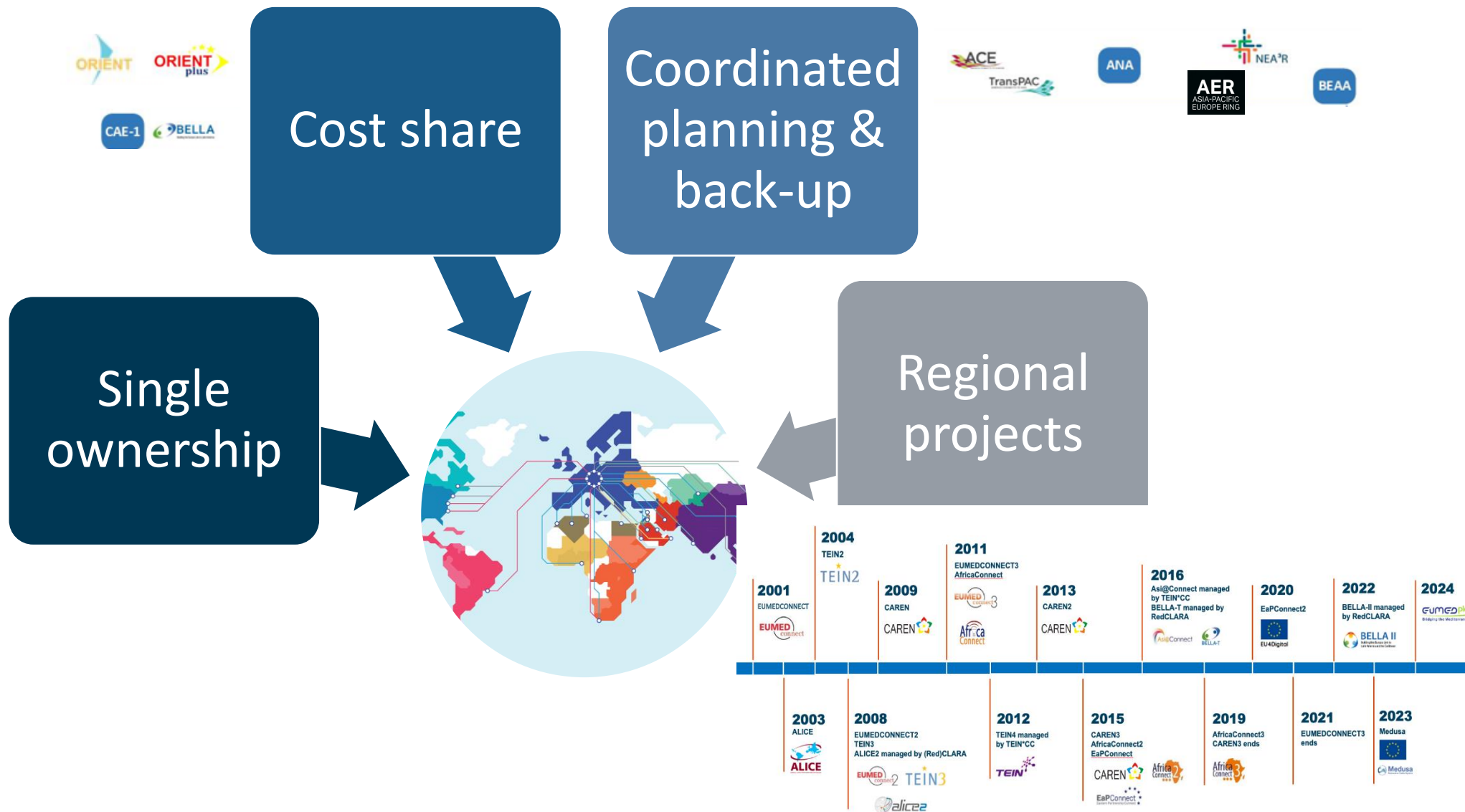
- Multiples of 400Gbps
- 400Gbps
- Multiples of 100Gbps
- 100Gbps
- Multiples of 10Gbps
- 1-10 Gbps
- <1Gbps

March 2024

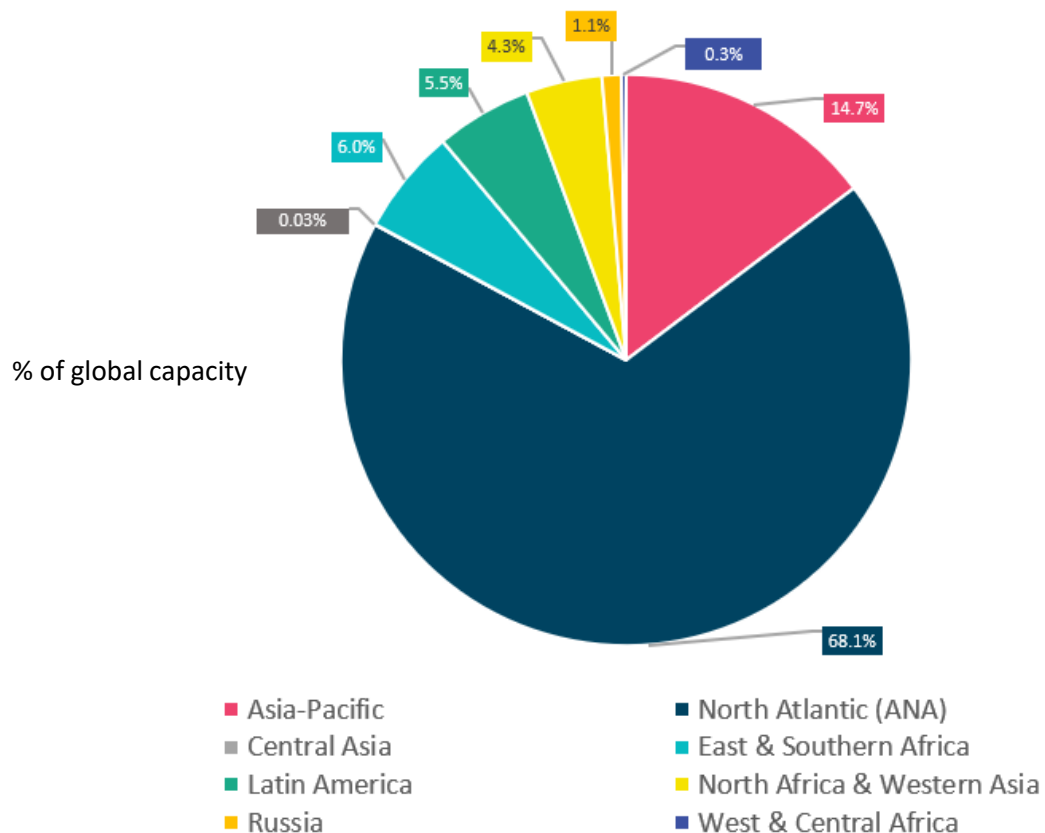
~ 3.6 Tbps

25% of GÉANT traffic is intercontinental

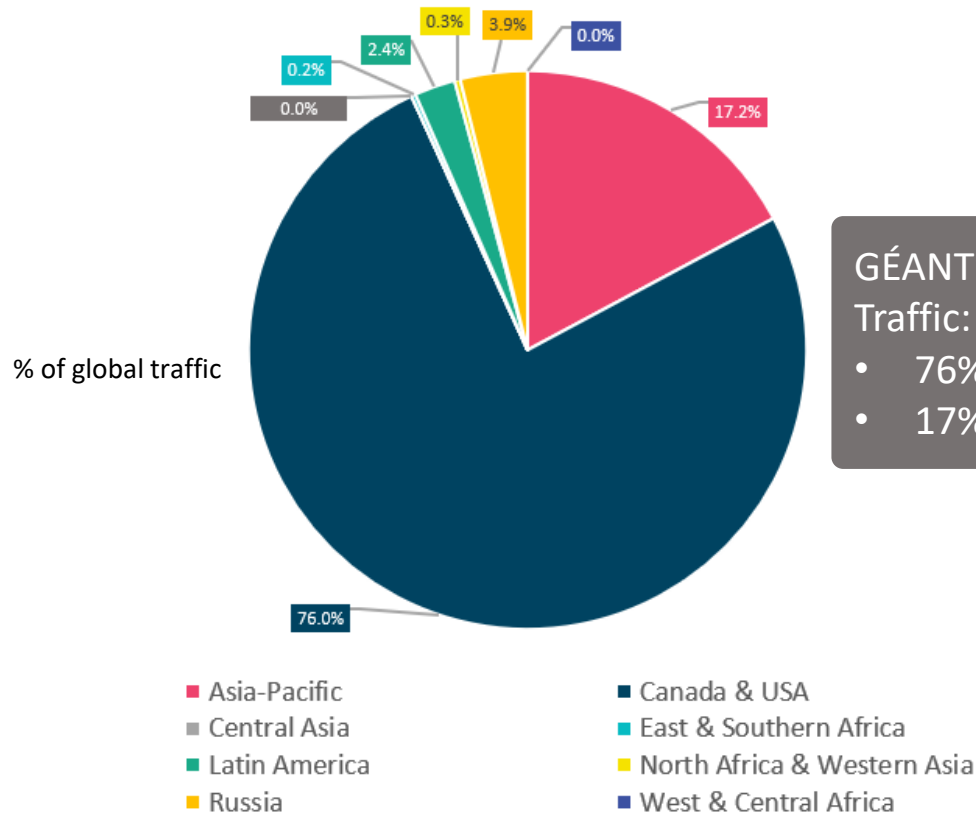
# Intercontinental connectivity delivery



## Regional Distribution of Global Connectivity and Global Traffic



Global Capacity today  
~ 3.6 Tbps



Average Global Traffic (2023)  
187.5 Gbps

GÉANT's Intercontinental Traffic:

- 76% Canada & USA
- 17% Asia-Pacific region

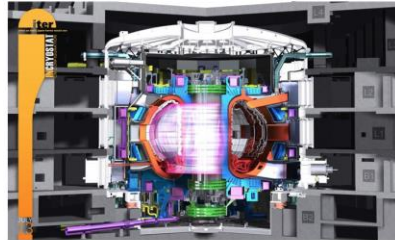
## Global traffic forecast – driven by big data movers

### LHC

- 200 sites across the globe
- 50% of GÉANT global traffic
- High Luminosity HLC from 2029



Map courtesy of Google.com



### ITER – Fusion Research

- Several PBs of data per year
- To be copied from France to multiple locations globally



### Astronomy

- Square Kilometre Array
  - Detectors in 100 Gbps capacities required
- Chile:
  - Cherenkov Telescope Array
  - ESO – Very Large Telescope



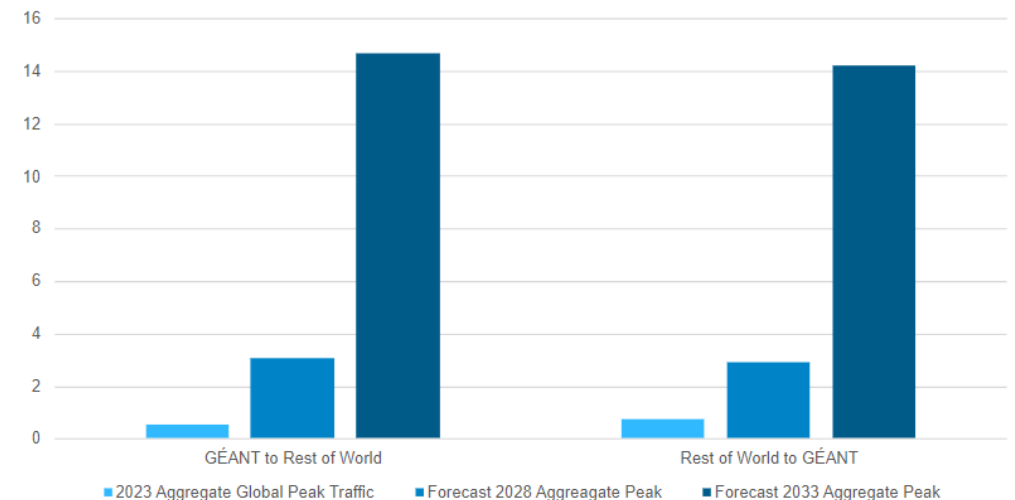
### Earth Observation

- Distributing Copernicus data worldwide

## Global traffic forecasting allows for:

- Average growth of general-purpose R&E traffic at 35% per annum and corresponding peaks
- Significant “step changes” in traffic due to major science collaborations and science infrastructures

Forecast Aggregate Peak Intercontinental Traffic Growth (Tbps)





## External factors to consider

- Key submarine cables reaching end of life
- Changes in connectivity markets and technologies
- Geopolitics in crucial transit locations
- Stronger appetite for long-term stability
- New EU policies (e.g. Global Digital Gateways)



More strategic & systematic approach to intercontinental connectivity required



## Meeting the needs

**Collaborative approach with R&E networking organisations**



**Harness new funding streams & infrastructure opportunities**

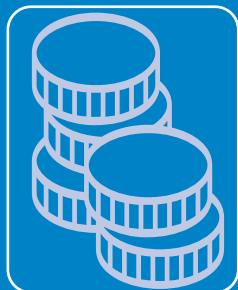


Intercontinental Connectivity – GN5-IC1



EC's flagship infrastructure investment programme (2021-27) – to “connect Europe to the world”

## IC1 – renewing and expanding GÉANT’s intercontinental connectivity



1st dedicated EU-funded project for intercontinental connectivity

Part of 7-year GN5 FPA under Horizon Europe  
€15M – 3 years (start 1 Dec 2022)



1) Deliver long-term connectivity to at least 2 continents where immediate expansion is required (min 7 years)

2) Long-term planning for future activities



### IC1 immediate investment focus

#### Asia-Pacific

- 100Gbps leased link from Marseilles to Singapore
- Operational since 2023

#### North Atlantic

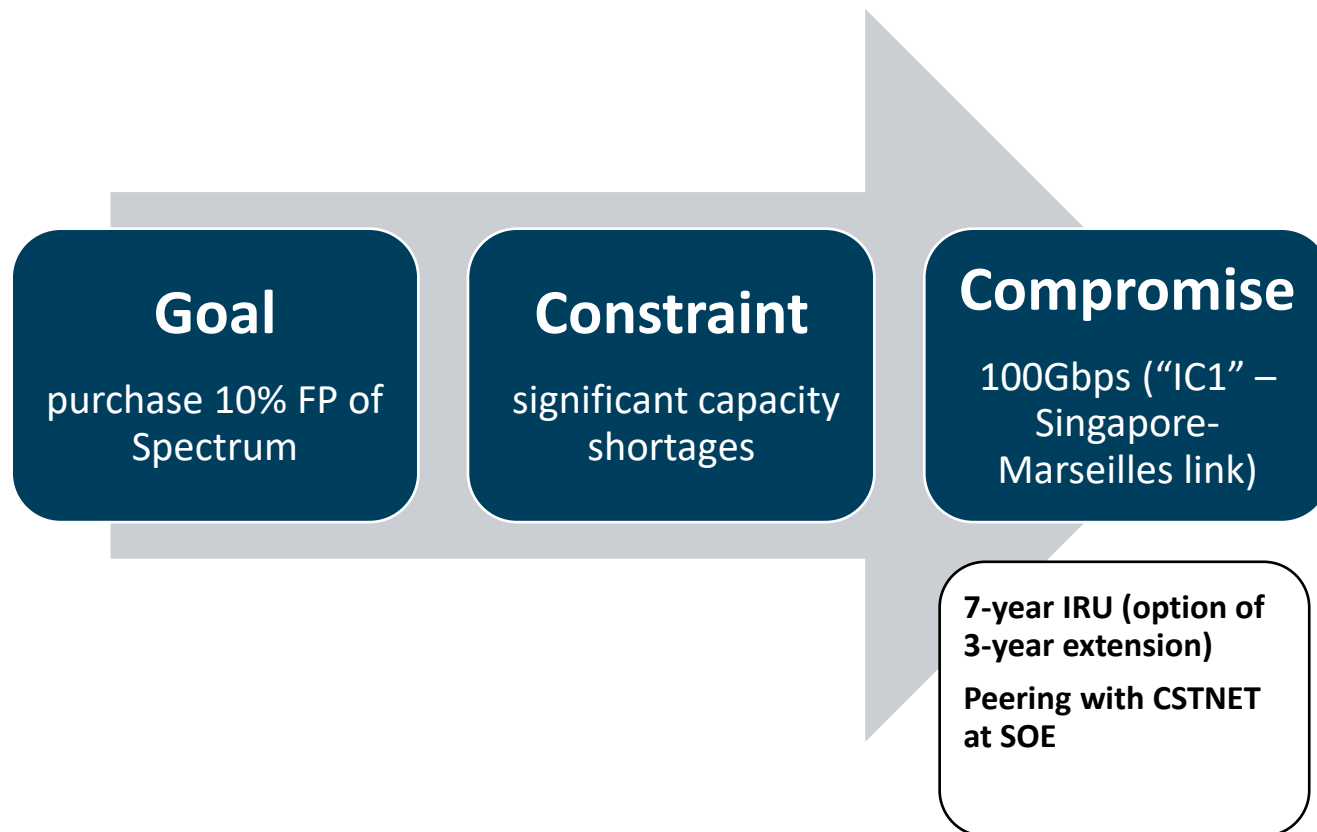
- Upgrade to Terabit capacity - preferably via spectrum solution
- Following market engagement tender to start in autumn 2024 – implementation Q1/2 2025

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## Reality check: connectivity investment into Asia

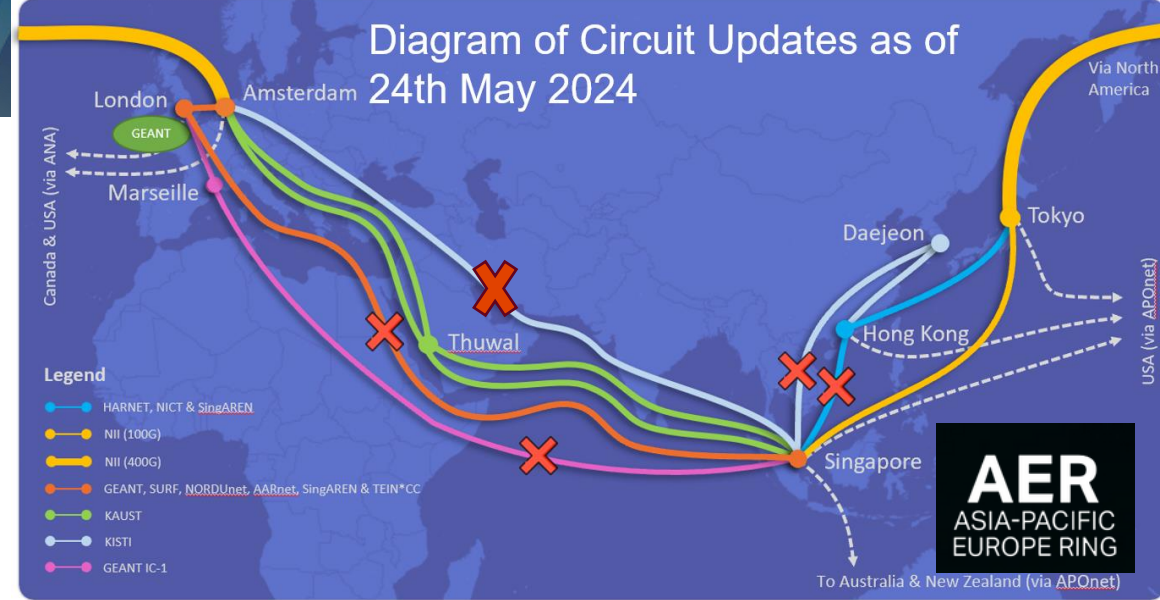


Signing of CSTNET/GEANT Interconnection Agreement, TNC23



# Stronger (and more resilient) together!

- Cable system cuts in Red Sea in spring 2024 led to outages of CAE-1 and IC1 links to Singapore (with long lead times to repair)
- Thanks to **Asia-Pacific-Europe Ring (AER)** mutual back-up collaboration traffic continued to flow via links provided by KAUST



Primary IC1 link (SG-Marseilles)



Secondary path: CAE1 link (SG-London)



Tertiary path: KAUST link (SG-Amsterdam)



- Additional resilience through **East Asia Resilience Backbone (EARBN)**
- **CSTNET (IHEP) LHCOPN/LHCONE traffic** also re-routed over alternative paths



# IC1: Long-term international capacity planning and investment plan

Systematic collection and analysis of intelligence and data  
Liaison with GÉANT Membership, International RENS & users

## User Needs

- Big science infrastructure & collaborations
- Traffic analysis and projections

## Connectivity Sustainability

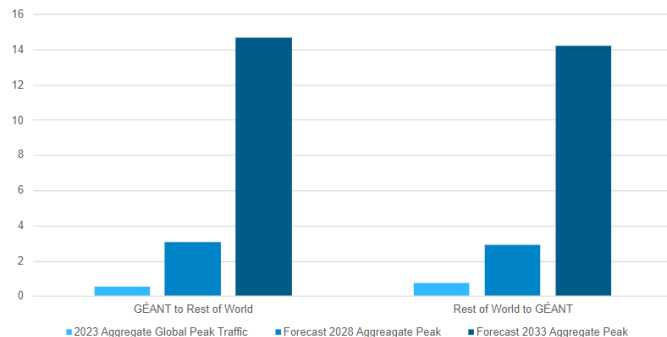
- Link ownership
- Contract duration
- Performance
- Geopolitical risks
- Resilience

## Infrastructure Availability

- Existing infrastructure
- Planned infrastructure

To inform prioritisation for future planning and investments

Forecast Aggregate Peak Intercontinental Traffic Growth (Tbps)



# EU Global Gateways: harnessing new infrastructure opportunities

EC's flagship strategy to invest in infrastructure across the world  
(€300bn 2021-27)  
to "connect Europe to the world"



## Digital sector:

Investment in submarine & terrestrial fibre-optic cables

"Team Europe" approach:  
mobilising private sector investment  
through EU grants and loans from EU  
financial institutions (e.g. EIB)

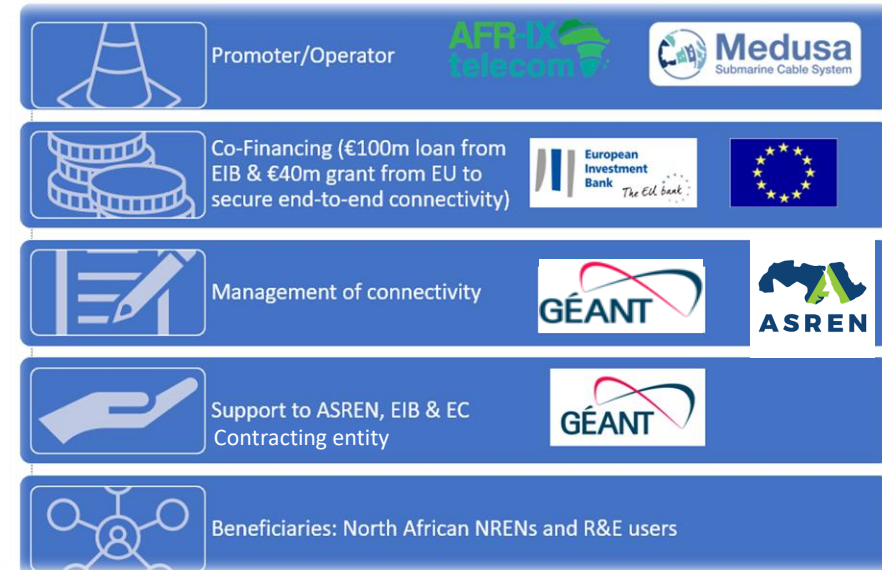
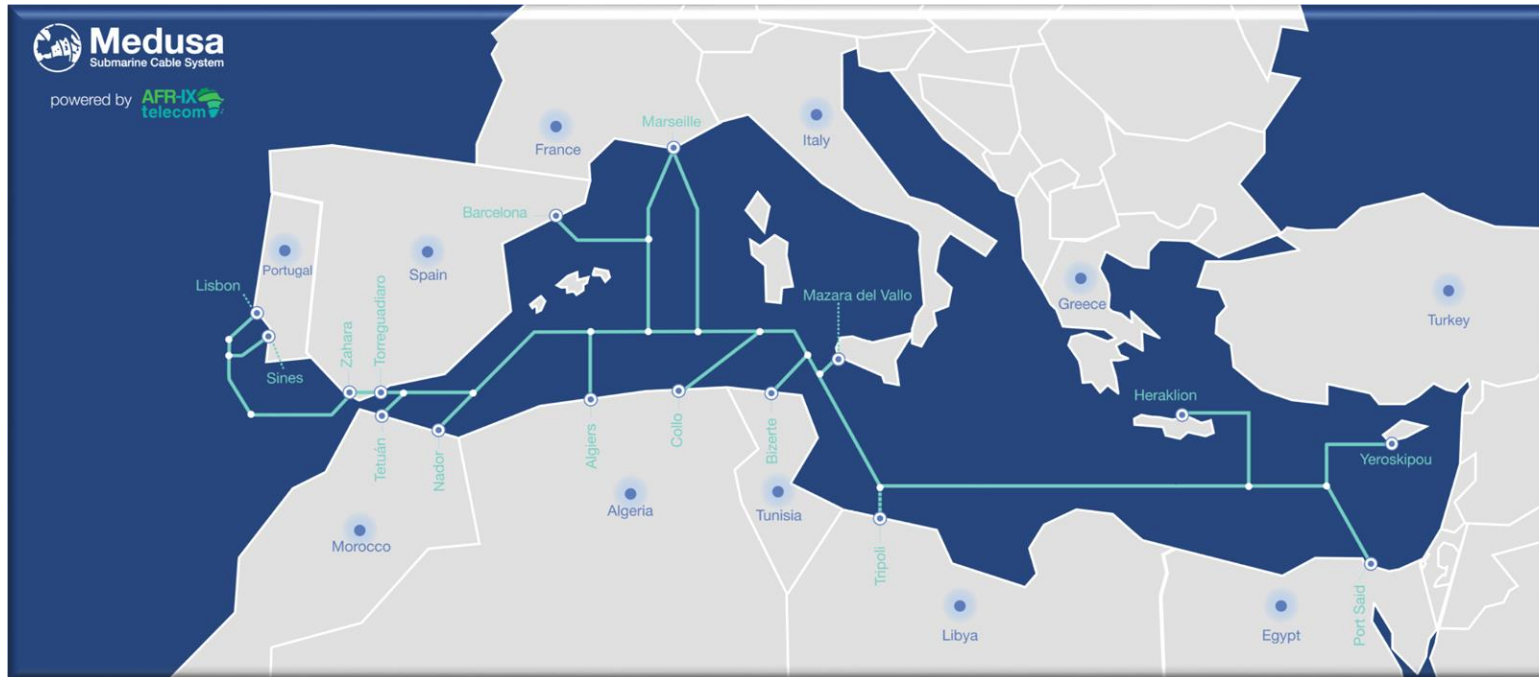
Priority data  
gateways  
(as per EC Communication  
March 21)



- EU-Latin America
- EU-Mediterranean
- EU-Atlantic
- EU-North Sea & Arctic
- EU-Baltic-to-Black Sea



# Medusa – the 1<sup>st</sup> Digital EU Global Gateway project underway... EU-Mediterranean



## Phased implementation:

- Morocco, Tunisia RFS: Q1 2026
- Algeria, Egypt RFS: Q3 2026

## €40M EU-funding:

- 200Gbps end-to end connectivity deployed for Algeria, Egypt, Morocco and Tunisia.





## Other Global Gateway initiatives

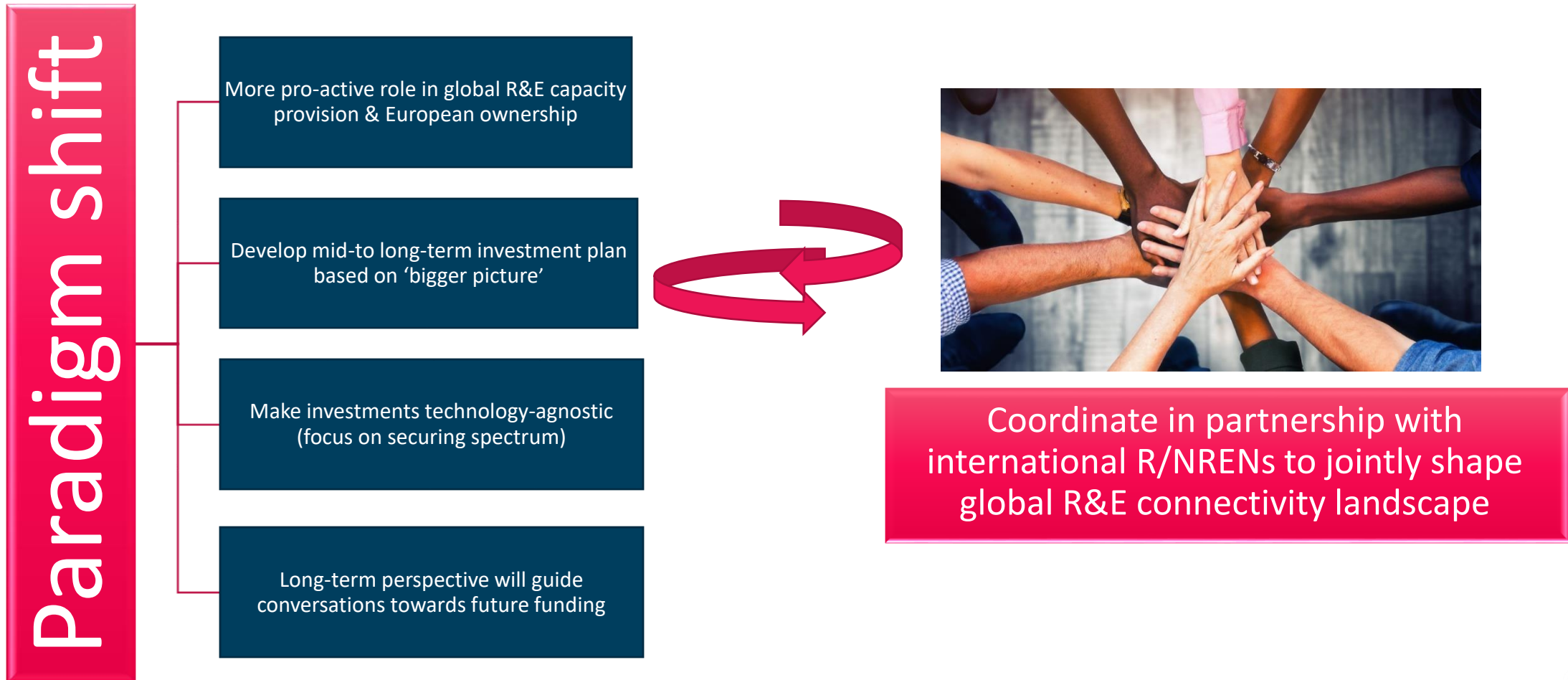
- Polar Connect (led by NORDUnet): to investigate shorter route options to Asia (Japan) and North America through the Arctic
- Extension of Medusa system to Jordan under investigation
- Discussions on connectivity options on Blue Raman cable system to India and Djibouti



Blue Raman cable system



## Going forward...





# Thank You

Any questions?

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