CONNECT UNIVERSITY

Strengthening the EU's backbone connectivity – submarine cables & international connectivity

Introduction on CEF Digital

Mr Franco ACCORDINO

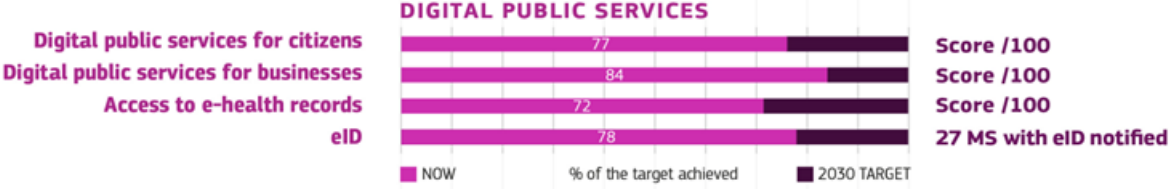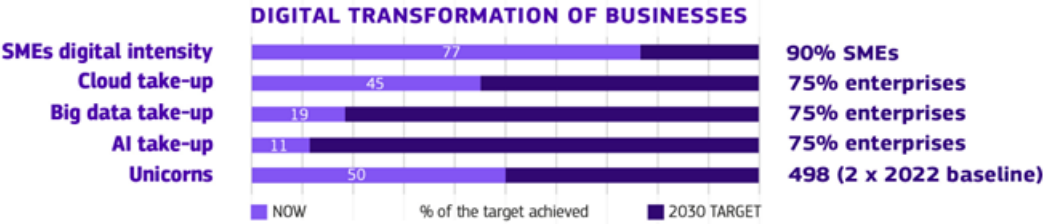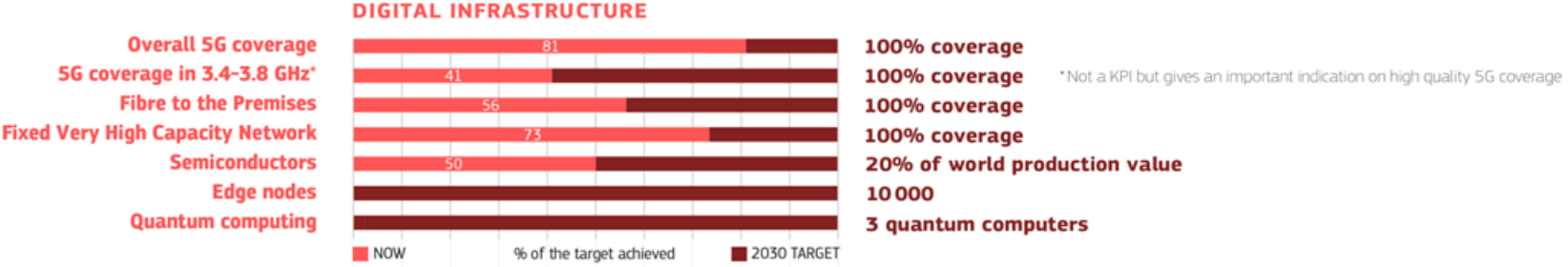*Head of Unit B.5, Investment in High-Capacity Networks*

DG CONNECT, European Commission

Connectivity is key for EU's leadership in the digital transition
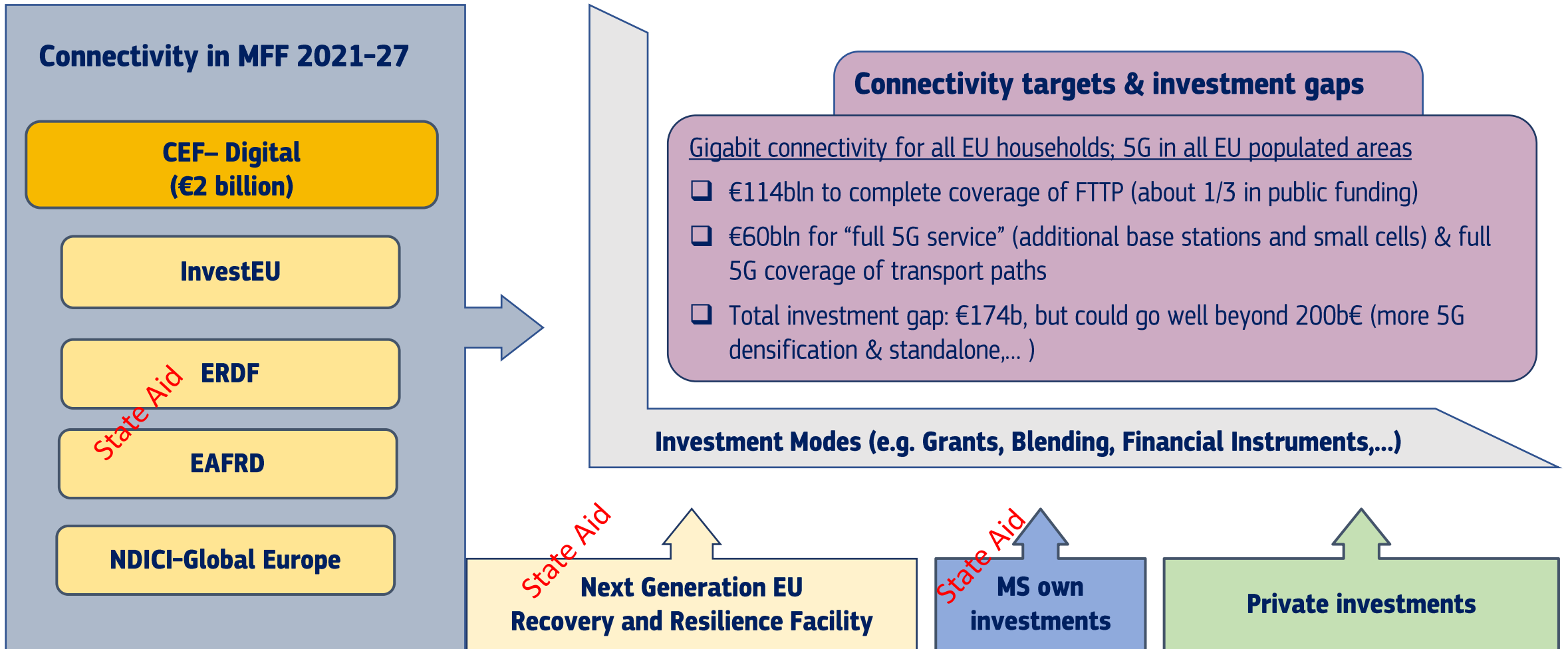
- Inclusiveness: DD targets highlight the "ubiquitous character" of gigabit and 5G

- Connectivity brings new competitiveness opportunities across the digital value chain:

  - Boost innovation via digitalisation of verticals (bundle deployment with take up!)

  - Stimulate new business models for EU telcos beyond "consumer-centric"

  - Reinforce EU supply in the Connected Collaborative Computing ("3C") continuum

- Security and resilience of connectivity infrastructure

- Connectivity ↔ Digital transition ↔ Green transition

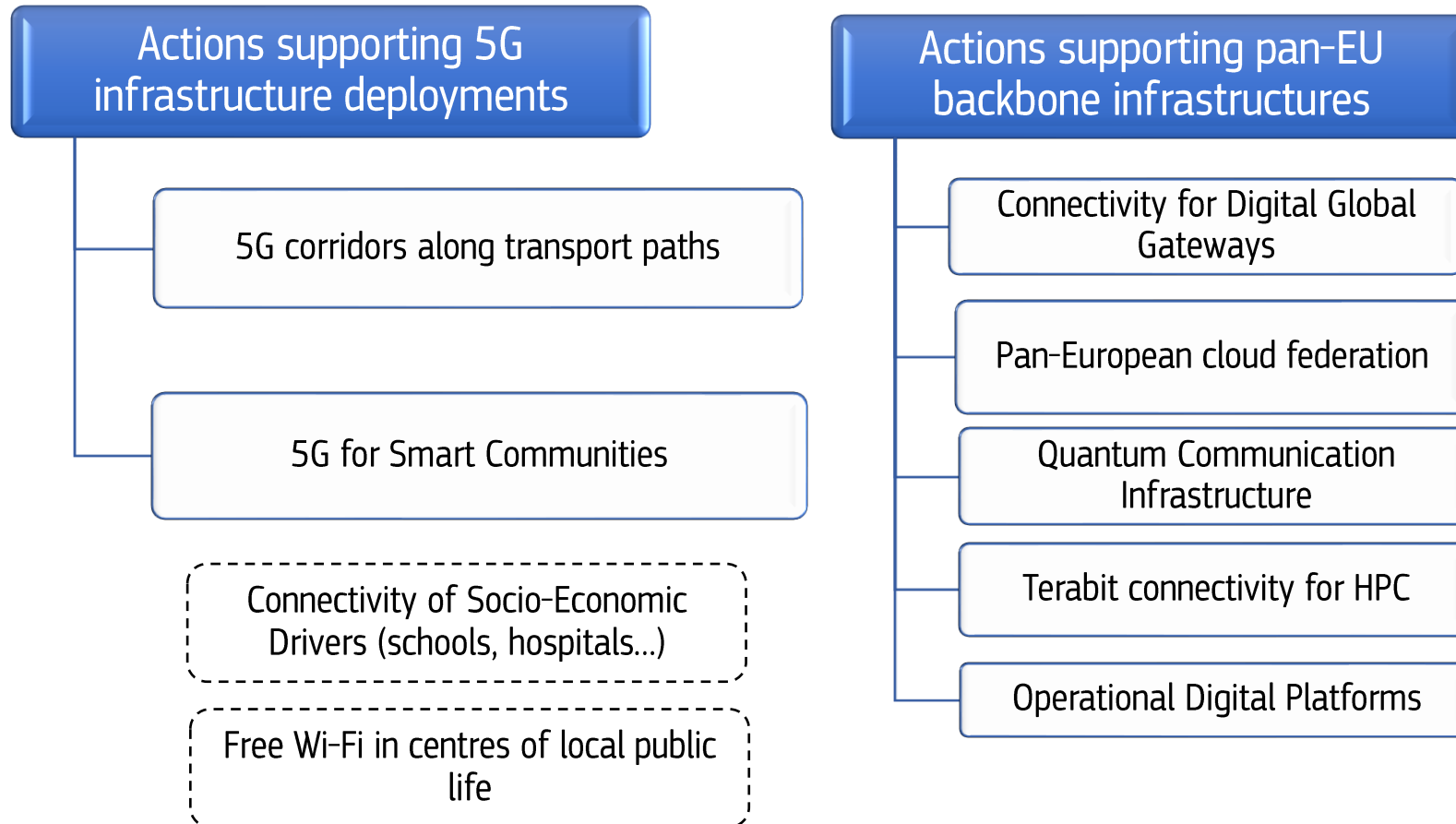# EU Digital Targets: Status of Digital Decade Report 2023

DIGITAL INFRASTRUCTURE

	% of the target achieved	Target
Overall 5G coverage	81	100% coverage
5G coverage in 3.4–3.8 GHz*	41	100% coverage
Fibre to the Premises	56	100% coverage
Fixed Very High Capacity Network	73	100% coverage
Semiconductors	50	20% of world production value
Edge nodes		10 000
Quantum computing		3 quantum computers

*Not a KPI but gives an important indication on high quality 5G coverage

■ NOW   % of the target achieved   ■ 2030 TARGET

DIGITAL TRANSFORMATION OF BUSINESSES

	% of the target achieved	Target
SMEs digital intensity	77	90% SMEs
Cloud take-up	45	75% enterprises
Big data take-up	19	75% enterprises
AI take-up	11	75% enterprises
Unicorns	50	498 (2 x 2022 baseline)

■ NOW   % of the target achieved   ■ 2030 TARGET

DIGITAL SKILLS

	% of the target achieved	Target
Basic digital skills	68	80% individuals
ICT specialists	47	20 million employed

■ NOW   % of the target achieved   ■ 2030 TARGET

DIGITAL PUBLIC SERVICES

	% of the target achieved	Target
Digital public services for citizens	77	Score /100
Digital public services for businesses	84	Score /100
Access to e-health records	72	Score /100
eID	78	27 MS with eID notified

■ NOW   % of the target achieved   ■ 2030 TARGET

Backbone networks are key enablers for all DDPP targets!

European Commission

Investment gaps and funding programmes

Connectivity in MFF 2021-27

CEF– Digital (€2 billion)

InvestEU

ERDF

EAFRD

NDICI–Global Europe

State Aid

Connectivity targets & investment gaps

Gigabit connectivity for all EU households; 5G in all EU populated areas

- ❑ €114bln to complete coverage of FTTP (about 1/3 in public funding)
- ❑ €60bln for "full 5G service" (additional base stations and small cells) & full 5G coverage of transport paths
- ❑ Total investment gap: €174b, but could go well beyond 200b€ (more 5G densification & standalone,…)

Investment Modes (e.g. Grants, Blending, Financial Instruments,…)

Next Generation EU Recovery and Resilience Facility

State Aid

MS own investments

State Aid

Private investments

40b€ public fund (**23.5b** from EU and **16b** from National)

European Commission

Connecting Europe Facility – CEF DIGITAL

Actions supporting 5G infrastructure deployments

- 5G corridors along transport paths
- 5G for Smart Communities
- Connectivity of Socio-Economic Drivers (schools, hospitals…)
- Free Wi-Fi in centres of local public life

Actions supporting pan-EU backbone infrastructures

- Connectivity for Digital Global Gateways
- Pan-European cloud federation
- Quantum Communication Infrastructure
- Terabit connectivity for HPC
- Operational Digital Platforms

Investments addressing a certain degree of market failure or target areas where suboptimal investments are observed

European Commission

Backbone connectivity for the EU – Submarine cables

Objective: building a smart, performant and resilient EU backbone infrastructure, ensure EU sovereignty on critical EU assets, reinforce the EU footprint in the global context

- ❑ Strengthen intra-Union links and connections to 3rd countries
- ❑ Synergy with NDICI, IPA III, ERDF
- ❑ Blending operations and financial instruments
- ❑ EU ownership and EU controllership of supply
- ❑ State of the art technology (SMART cables)

European Commission
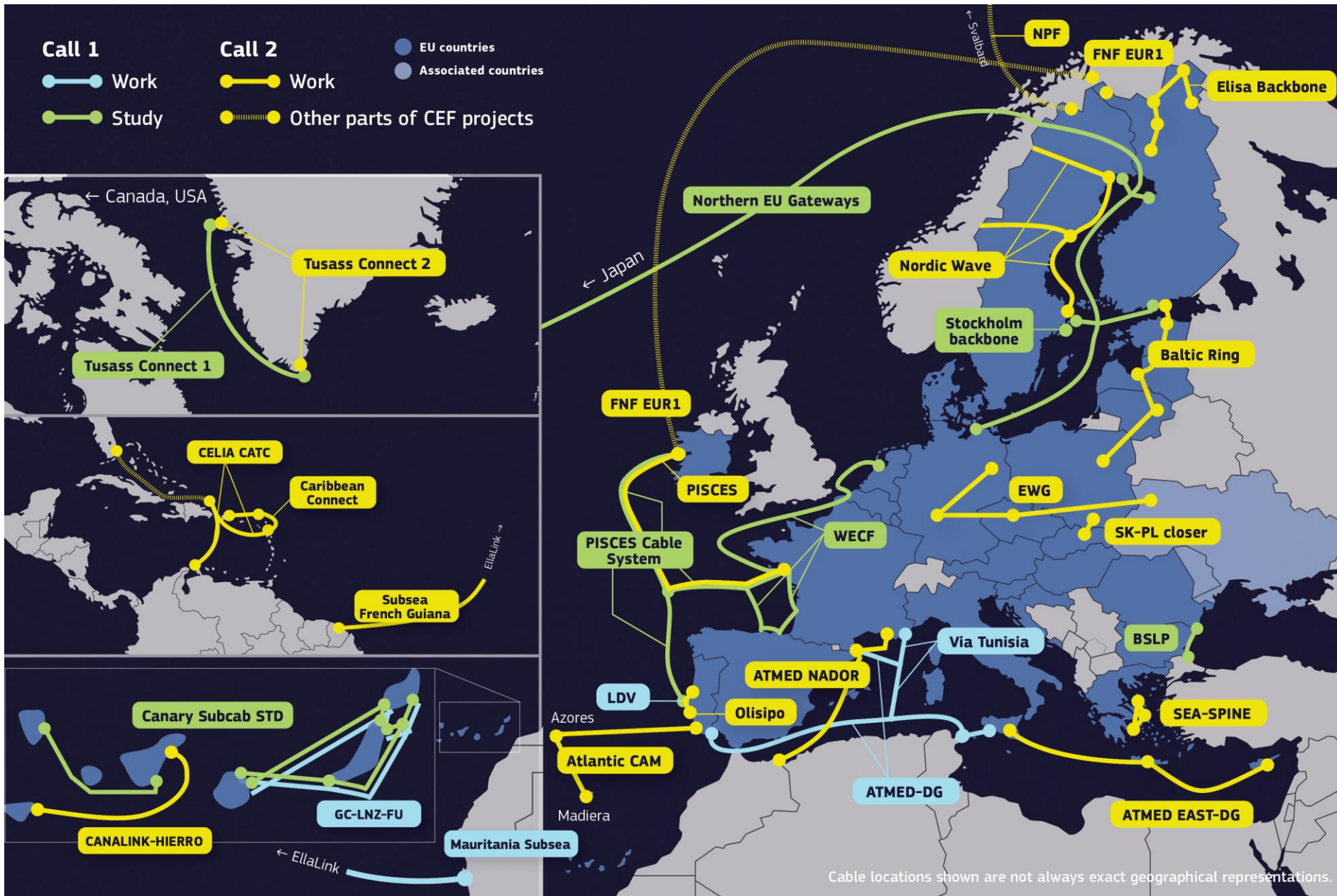
- **30** Projects
- € **277** million
- Wide coverage
- OMRs & OCTs

Budget allocated in Work Programme (WP) 2021-23

Topic	Consumed 2021-23 – call 1, call 2, call 3 forecast(*)
5G Corridors	148.9
5G Smart Communities (+ Edge Cloud)	101
EuroQCI	0
Cloud federations	3.8
Global Gateways	408.5
Operational Digital Platforms	4
Support Actions + procurement	15.5
Total	681.7

(*) Actual consumed budget will depend on the outcomes of call 2023

European Commission

White Paper – Europe's digital infrastructure needs – Pillar III: Creating secure and resilient digital infrastructures for Europe

o Reinforcement of advanced **R&I activities** for new fibre and cable technologies

o **Joint EU governance system** on submarine cable infrastructures

o **Harmonised security requirements** in international fora, potentially dedicated EU certification scheme

o **Delegated Act under the Connecting Europe Facility** on CPEI list and related labelling system

o Review of available funding and financing instruments, incl. **possible equity instrument**

EU Connectivity

What is happening today in terms of backbones, worldwide and especially in the EU?

(1) The importance of backbones
We live in a connected world

Mr Georgios TSELENTIS,

Policy Officer, Unit B.5, Investment in High-Capacity Networks,

DG CONNECT, European Commission

European Commission

We live in a connected world: How this is happening?

*Interactive map from infrapedia.com
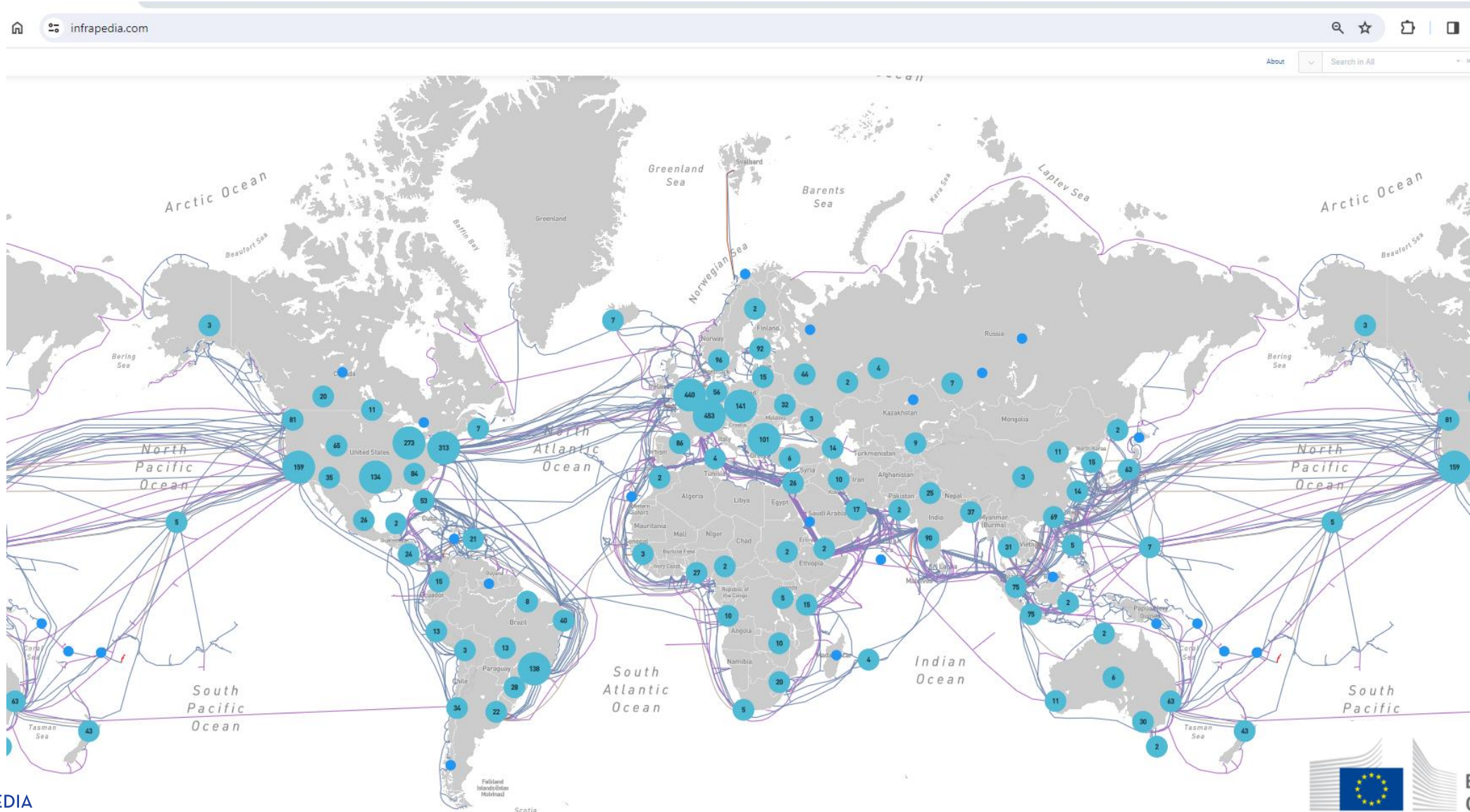
We live in a connected world: History of submarine communications

Samuel Morse's idea, (1840): a telegraph submarine line across the Atlantic Ocean.
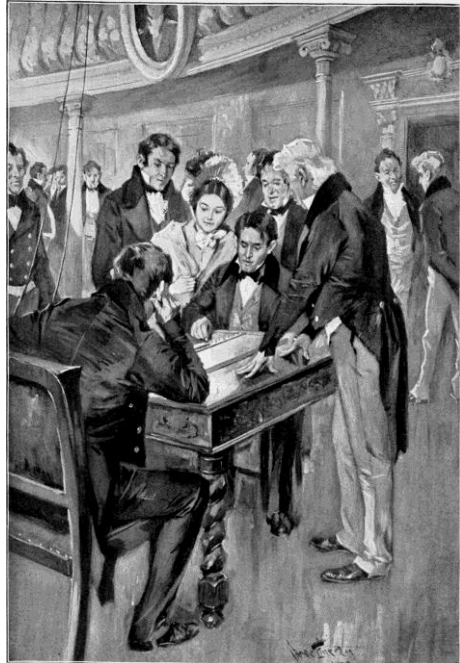
Tested the idea in the water of New York Harbor.

(1845) First commercial cable across the East River in New York.
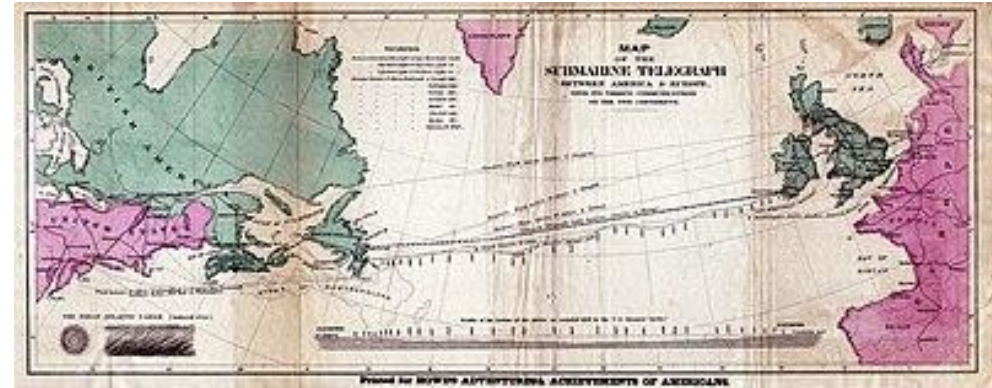
The Atlantic Telegraph Company constructed the first transatlantic telegraph cable.
1854 From Valentia Island off the west coast of Ireland to Bay of Bulls, Trinity Bay, Newfoundland.

First communications: 1858
The first transoceanic fibre-optic system, TAT-8, became operational in 1988 (280 Mbit/s ~40,000 telephone circuits between the US, UK and France).

European Commission

We live in a connected world:
Facts and Figures of submarine communications

>**97%** of total data traffic flows on submarine cables (about 1.4 million km length).

The last 5 years capacity on major routes like the transatlantic reached ~**13%** growth rate (some projections reach **75%** increase in capacity by 2025).

The industry attracted ~**21b$** investments 2021-2023.

670000km last decade.
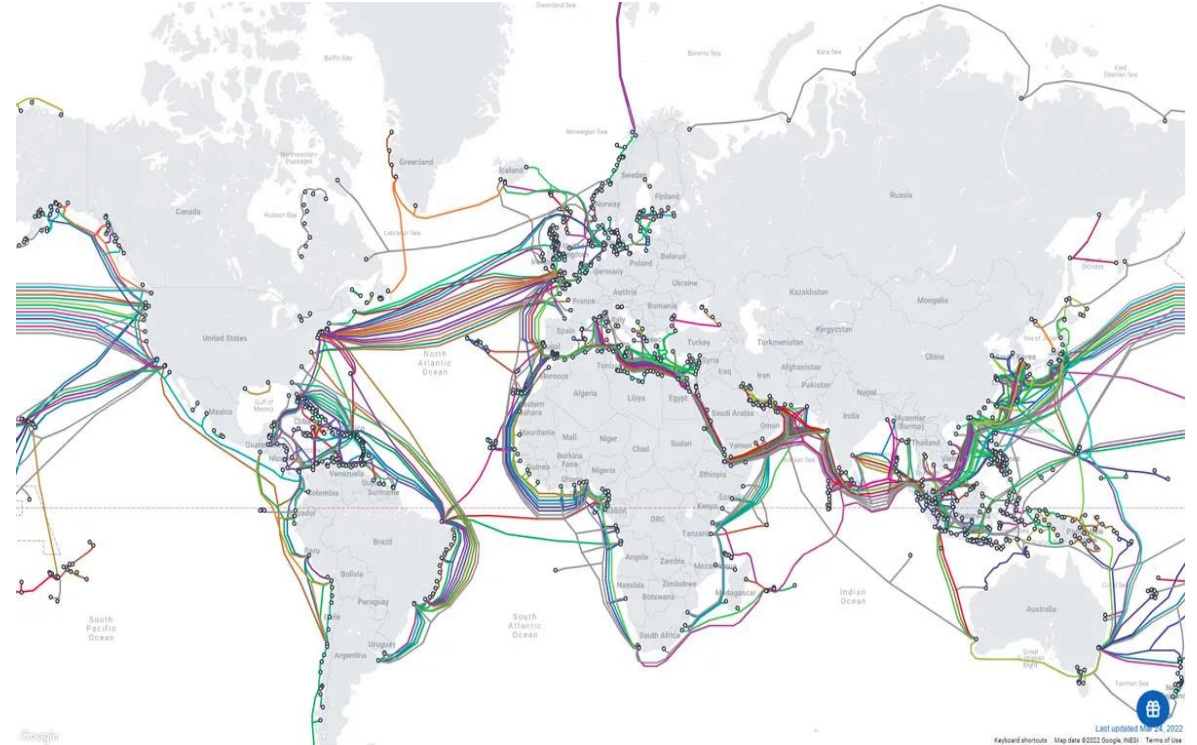
We live in a connected world: Capacity Forecast

Capacity was calculated in the old dates in terms of circuits for the Telcos.

Technical evolution (fibre, VoIP, Internet) made design for max capacity.

How new trends (AI, Quantum Computing etc.) will influence capacity demand?

Resilience?

Unforeseen incidents (e.g. COVID19 influence).
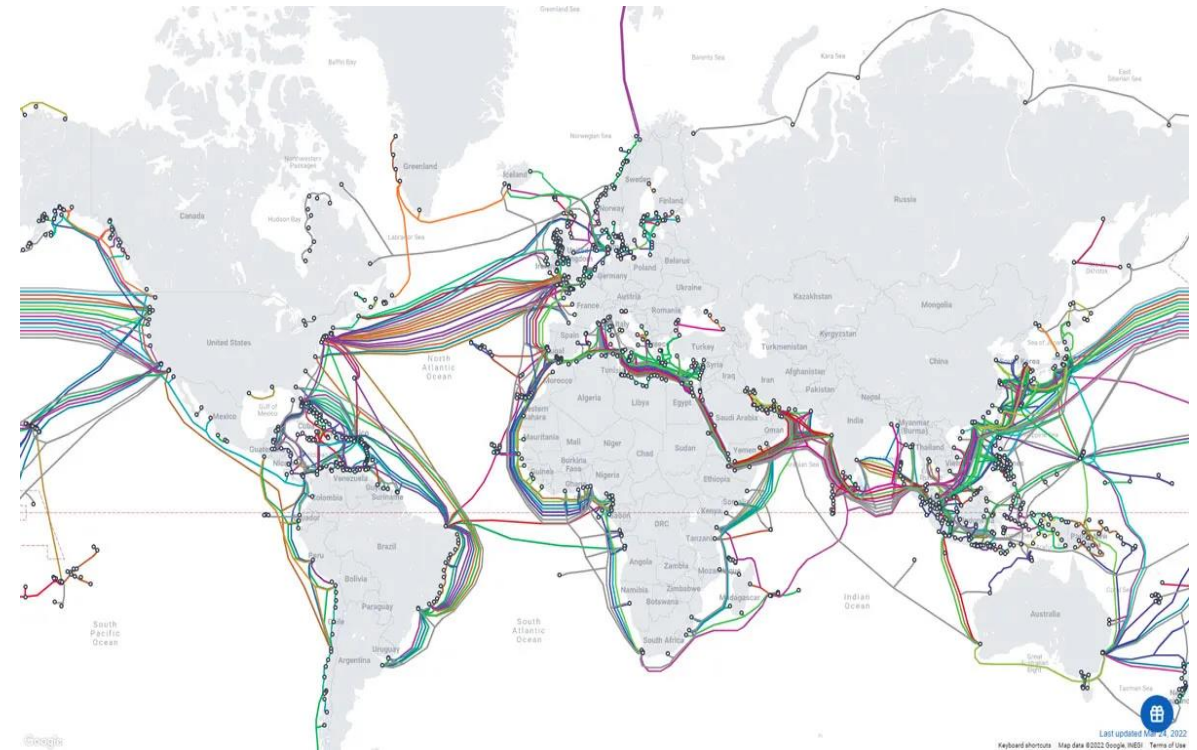
End of Service: estimated 20-25 years

We live in a connected world: Suppliers

ASN
SubCom
NEC
HMN
Prysmian
Nexans
Hexatronic
Xtera
Optic Marine

...
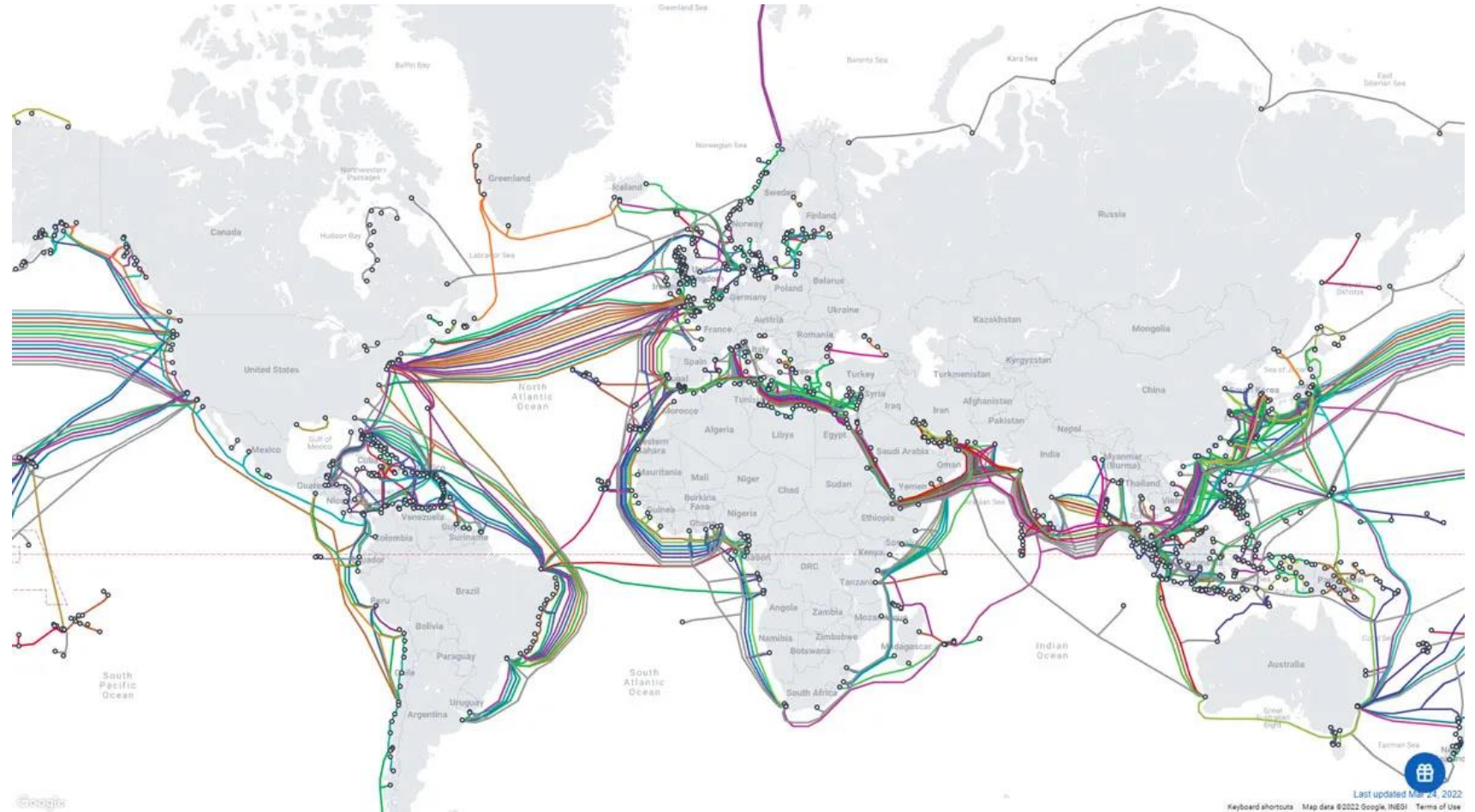
Specialised Ships to install/repair: Their role and the need to keep a fleet

We live in a connected world: Hyperscalers

Amazon, Facebook, Google, Microsoft
shift model:

- From purchasing capacity to possess their own cables
- Spearheading innovation
- City-to-City vs. DataCenter-to-DataCenter
- Hyperscalers capacity demand became out of proportion challenging Telcos (the old model of purchasing capacity became inefficient)
- Hyperscalers are expected to account for an increasing portion of the systems
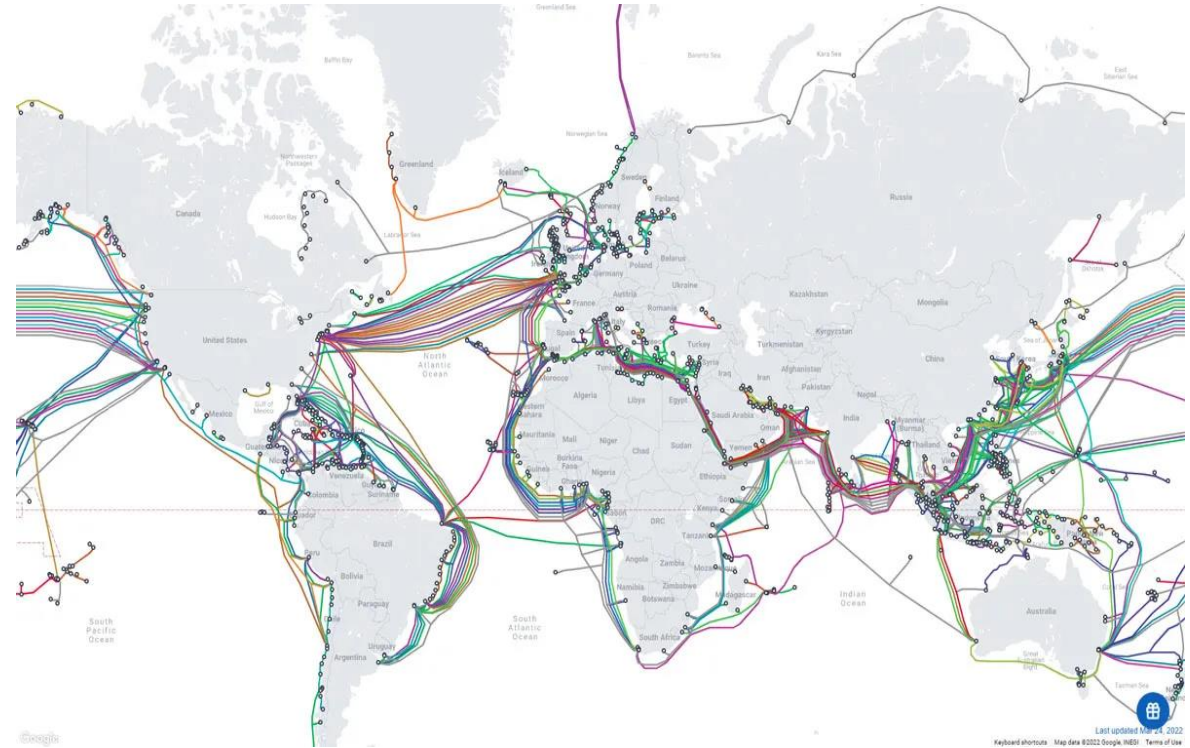
Hypescalers have liquidity allowing self-owned systems (vs. equity/loan)

We live in a connected world: Data Centres X Submarine cables

Strategically collocate data centres and landing stations to optimise interconnection (IXPs), cashing, etc.

Landings with many interconnections are attractive for further connections.

Bridging terrestrial and submarine cables is also essential for resilience.

Technological improvements and interconnection services/agreements will boost network efficiency.
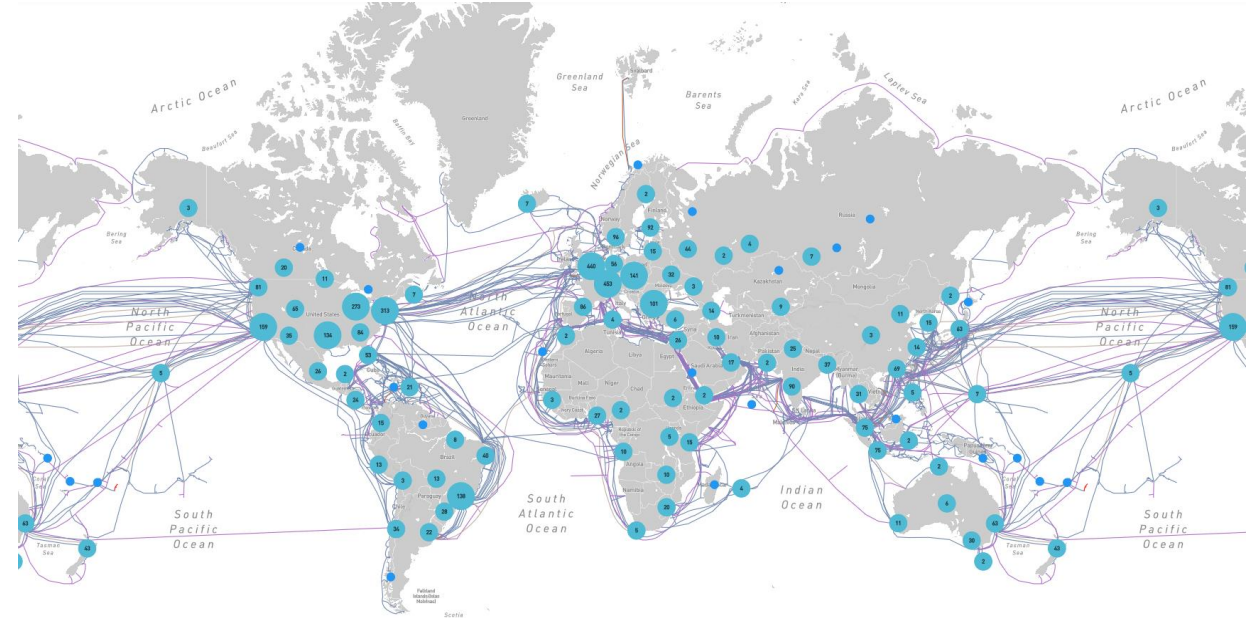
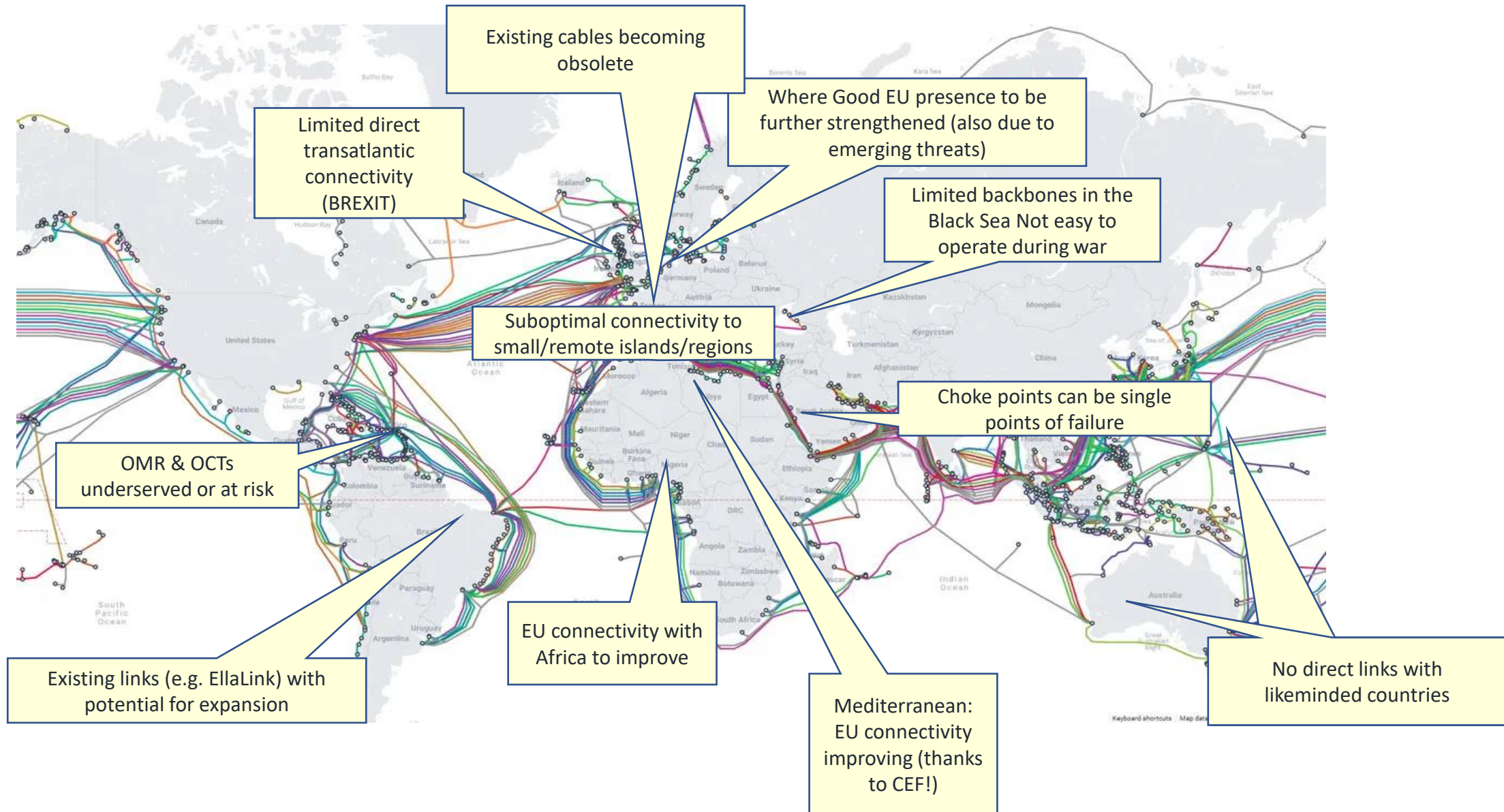Marseille: 14 cables land there!
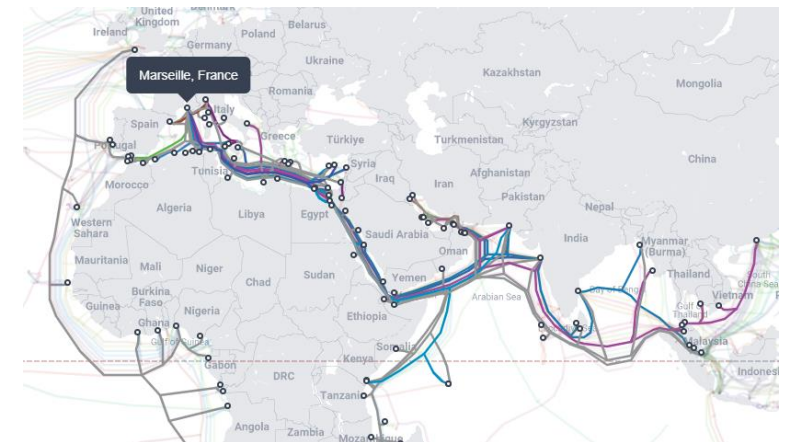
(2) Connecting technology

Mr Georgios TSELENTIS,

Policy Officer, Unit B.5, Investment in High-Capacity Networks,

DG CONNECT, European Commission

Technology: Submarine Communications Cable

Operate in harsh environment (pressure, salt, etc.)

Main cause for cuts:
- Fishing
- Natural Disasters
- Anchoring
- Ocean currents
- Sabotage
- Wear and Tear

Steel Armour   Insulator   Mu-metal loading wire

Copper core conductor

European Commission
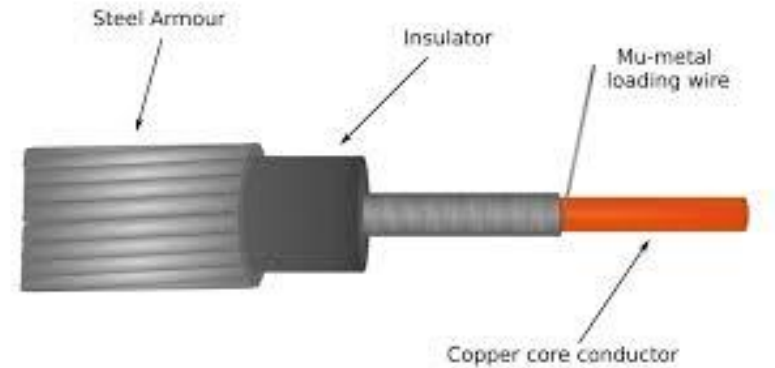
Technology: "SMART" Cables

Smart Cable (optic fibre) Systems can use the actual length of the cable either by attaching sensors, or by other probing techniques at the edge, to observe and monitor displacement and/or acoustic signals a.k.a. Distributed Acoustic Sensing – DAS.

Applications of "smart" cables may include:

a) Early warning systems for seismic, volcanic eruptions and tsunamis.

b) Monitoring of critical energy and digital infrastructure which can be disrupted by natural cause, involuntary activity or sabotage

c) Monitoring traffic (roads, railways, paths)

d) Check of borders' crossing/unusual activity

e) Research activities close to the seabed for monitoring environmental conditions (e.g. temperature, currents) and marine fauna
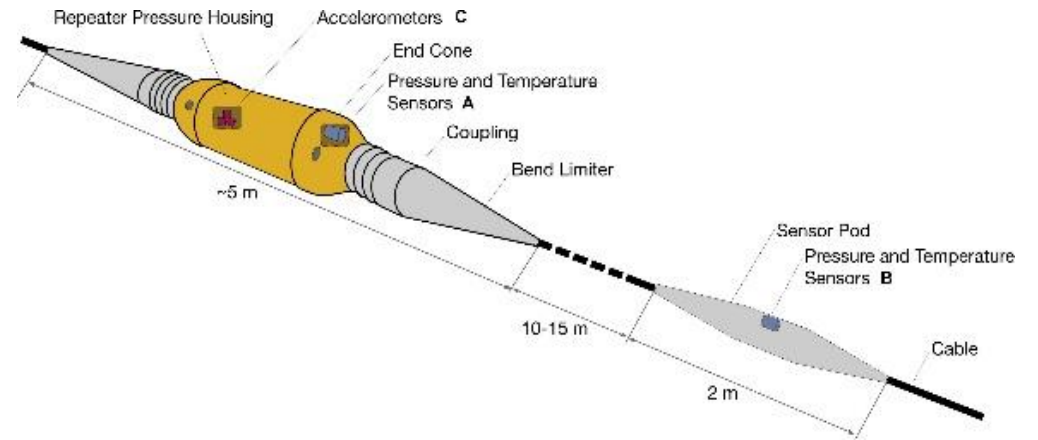
CEF Digital Global Gateways

Mr Georgios TSELENTIS,

Policy Officer, Unit B.5, Investment in High-Capacity Networks,

DG CONNECT, European Commission

Today: a global vulnerable submarine cable infrastructure – how to improve?

- Existing cables becoming obsolete
- Where Good EU presence to be further strengthened (also due to emerging threats)
- Limited direct transatlantic connectivity (BREXIT)
- Limited backbones in the Black Sea Not easy to operate during war
- Suboptimal connectivity to small/remote islands/regions
- Choke points can be single points of failure
- OMR & OCTs underserved or at risk
- EU connectivity with Africa to improve
- Existing links (e.g. EllaLink) with potential for expansion
- Mediterranean: EU connectivity improving (thanks to CEF!)
- No direct links with likeminded countries

Secure Connectivity

Secure Connectivity = Secure communications and resilience of terrestrial submarine and satellite communications.

Submarine cables particularly important for three insular EU Member States, Cyprus, Ireland and Malta (also for islands in other Member States and outermost regions).

Russia's war of aggression against Ukraine revisit security assumptions.

Though Europe has global leaders in backbone industry, non-EU companies (mainly hyperscalers) have been increasingly investing in those infrastructures, leading to strategic dependencies.

Secure Connectivity (2022)

- The Nevers Call of 9 March 2022:

Recognise the importance of critical infrastructures such as telecommunications networks providing critical functions to our societies which can be threatened by cyberattacks.

- At the October 2022 EP Plenary, President von der Leyen presented a 5-point plan:
1) Enhance our preparedness
2) Stress-test our infrastructure
3) Increase our capacity to respond through the Union Civil Protection Mechanism
4) Make better use of our satellite surveillance capacity, and
5) Strengthen cooperation with NATO and other likeminded countries.

- The Council, in its Conclusions on the EU's Cyber Posture of 23 May 2022 and on the EU Policy on Cyber Defence of 22 May 2023, requested risk evaluations and scenarios to be undertaken.

- The Council in its Critical Infrastructure Resilience Recommendation of 8 December 2022 set out targeted, voluntary actions at EU and national level for enhanced preparedness, response and international cooperation with a focus on critical infrastructure (incl. digital). These actions focus on critical infrastructure, including those with significant cross-border relevance and in the identified key sectors energy, transport, space, and digital infrastructure.

Secure Connectivity (2023)

State of the Digital Decade report 2023: EC underlined the importance of more resilient and sovereign networks and to limit the vulnerability of the EU's key infrastructure, including submarine networks. Recommendation to Member States: boost the investments necessary for the security and resilience of such critical infrastructures.

Member States have committed to reinforce Internet connectivity between Europe and its partners, in the **Ministerial Declaration** on "European Data Gateways as a key element of the EU's Digital Decade".

EU-NATO Task Force on the resilience of critical infrastructure discussed on how to improve the monitoring and protection of critical infrastructure in the maritime domain by relevant authorities and discuss ways to enhance maritime situational awareness. Establishment of the **NATO Critical Undersea Infrastructure Coordination Cell** to address the security of inter alia submarine cables.

The **European Council** on 27 October 2023 consequently stressed "the need for effective measures to strengthen the resilience and ensure the security of critical infrastructure", while underlining "the importance of a comprehensive and coordinated approach."

EC procured **studies** and **consulted relevant stakeholders** and experts on appropriate measures in relation to possible significant incidents regarding submarine infrastructure.
Still lacking elements: accurate mapping, assessment of risks vulnerabilities and dependencies, ensuring rapid and secure repair and maintenance of cables, identification and funding of critical intra-EU and global cable projects.

European Commission

CEF Calls: Backbone connectivity for Digital Global Gateways

Objective

Support the deployment of strategic networks as part of the Digital Global Gateway Strategy of the EU by addressing connectivity needs, such as:

(1) Connecting **territories** of the EU including its **Outermost Regions**.
(2) Supporting the specific connectivity needs of the Member States which are **islands** themselves or have islands as part of their territory.
(3) Intermeshing **backbones** to interconnect major connectivity points in the EU.
(4) Addressing the specific needs of **Overseas Countries and Territories** in the EU.
(5) Ensuring **international connectivity** to EU partners worldwide as a basis for European strategic autonomy.
(6) Promoting **synergy** projects addressing other objectives of CEF Digital, including sector specific considerations encompassing the connectivity of large-scale digital capacities such as HPC or cloud.

European Commission

CEF Calls: Backbone connectivity for Digital Global Gateways

Scope

Support the deployment of backbone connectivity for routes **within** Member States, **between** Member States, and between the EU **and third countries**, including to remote territories where :

(1) there is a lack of **redundancy**, or
(2) existing infrastructure cannot satisfy **demand**, or
(3) the users in the territories suffer from suboptimal **services** and **prices**.

Security requirements

- Exclusion of **non-EU** controlled entities (art. 11.4 CEF regulation).
- No **security sensitive equipment** or services will be procured from third country suppliers.
- For infrastructure connecting EU with third countries: **exception** for legal entities in that third country where their participation is indispensable for the achievement of the objectives and subject to security guarantees approved by the third country.

European Commission

CEF Calls: Backbone connectivity for Digital Global Gateways

Technology neutral call

Digital Global Gateways can be provided with the technology best suited including e.g.:

- **Submarine Cable Systems,**
- **Satellite Infrastructure,**
- **Connectivity to internet exchange points**, and
- **Inter-Connection of Backbones** with networks inside of the supported territories

What will be co-financed

- For **works**, total project costs required to construct and deliver the described networking solution for the foreseen system lifetime, from end to end, including cable landing station and connectivity towards them. Operating costs, and costs for the land ownership excluded.
- For **studies** , all preparatory work required prior to signing a contract with a supplier such as marine ground surveys for submarine cables, and the application for required permits.

(3) Walking the talk: CEF Portfolio
Call 1 and 2: Union and International projects

Ms Karina MARCUS

Project Adviser,

European Health and Digital Executive Agency (HaDEA)

Call 1 and 2:
Union and International projects

Connecting the Union's territories

Some examples

European Commission

PISCES (studies and works)

PISCES

PISCES Cable System
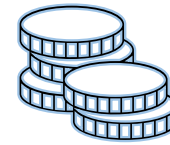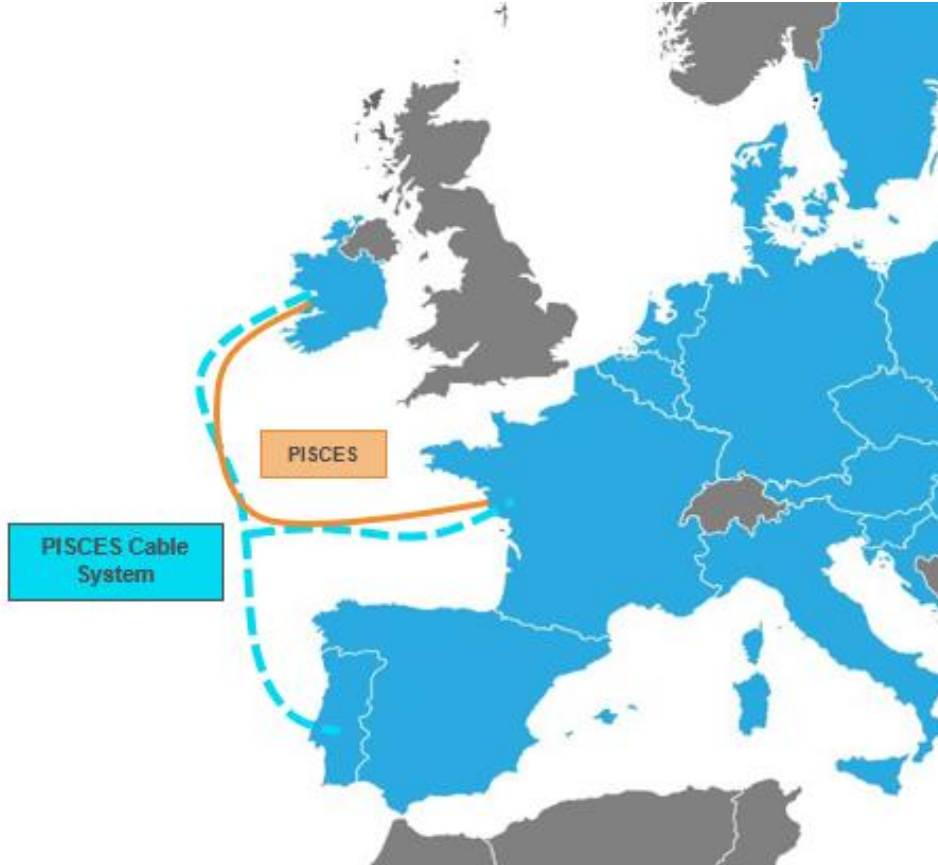
Cost: ≈ 66 M €
EU Contribution: ≈ 33 M €
≈ 50% of the total cost
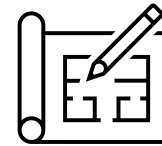
Landing points:
Ireland
France

Duration: 34 months

Coordinator: McMahon Design and Management Limited **Partners**:
- Orange (FR)
- Deep Sea Fibre Networks Limited (IE)

SEA-SPINE
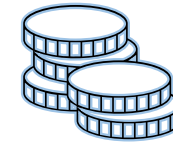
Cost: ≈ 24.4 M €
EU Contribution: ≈ 7.8 M €
≈ 32% of the total cost
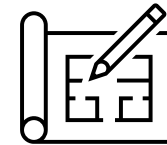
Landing points:

11 Greek islands: Amorgos, Astypalea, Kos, Sifnos, Folegandros, Euboea, Chios, Lesvos, Limnos, Thasos, and Skyros

Duration: 36 months

Coordinator: Wings (EL)
Partners:
- OTE (EL)
- Ministry of Digital Governance (EL)

Tusass Connect (studies and works)
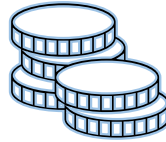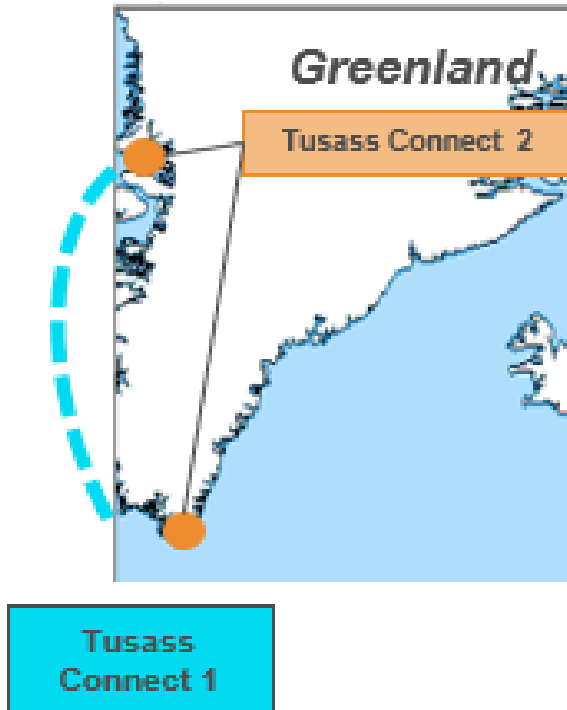
Cost: ≈ 28.2 M €

EU Contribution: ≈ 12.2 M €

≈ 43% of the total cost
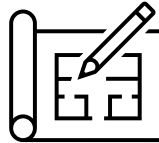
Landing points:
- Aasiaat (GL)
- Qaqortoq (GL)

Duration: 36 months

Coordinator: TUSASS AS

CANARY-SUBCAB-STD, GC-FU-LNZ Ring and CANALINK-HIERRO (studies and works)

GC-LNZ-FU ring

CANALINK-HIERRO

Canary Subcab STD
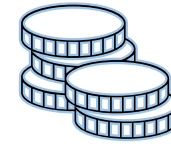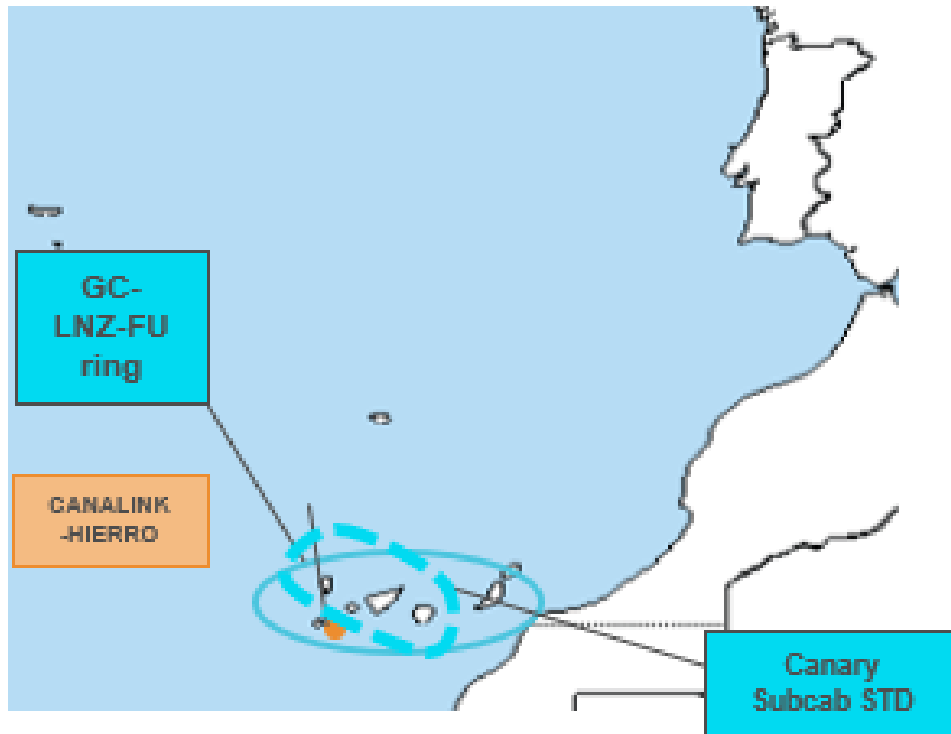
Cost: ≈ 53 M €
EU Contribution: ≈ 36.7 M €
≈ 69% of the total cost
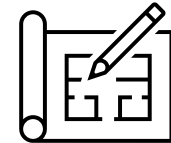
Landing points:
Tenerife, Grand Canaria, Fuerteventura, Lanzarote, El Hierro

Duration: 36 months

Coordinator: CANALINK

Connecting the Union with other countries

Some examples

European Commission

ATMED NADOR-DG
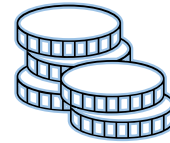
Cost: ≈ 29.5 M €

EU Contribution: ≈ 14.8 M €
≈ 50% of the total cost
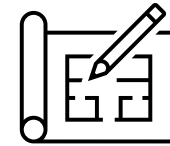
Landing points:
Lisbon (PT)
Marseille (FR)
Barcelona (ES)
Nador (MA)

Duration: 36 months

Coordinator: AFR-IX Telecom

ViaTunisia
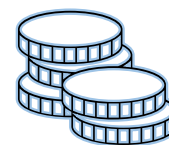
Cost: ≈ 31.9 M €

EU Contribution: ≈ 9.5 M €

≈ 30% of the total cost
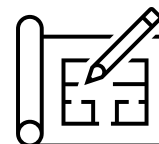
Landing points:
- Marseille (FR)
- Bizerte (TN)

Duration: 32 months

Coordinator: Orange

Northern EU Gateways (study)
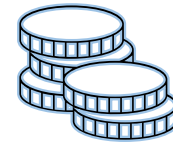
Cost: ≈ 7.3 M €
EU Contribution: ≈ 3.65 M €
≈ 50% of the total cost
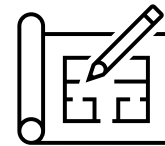
Landing points:
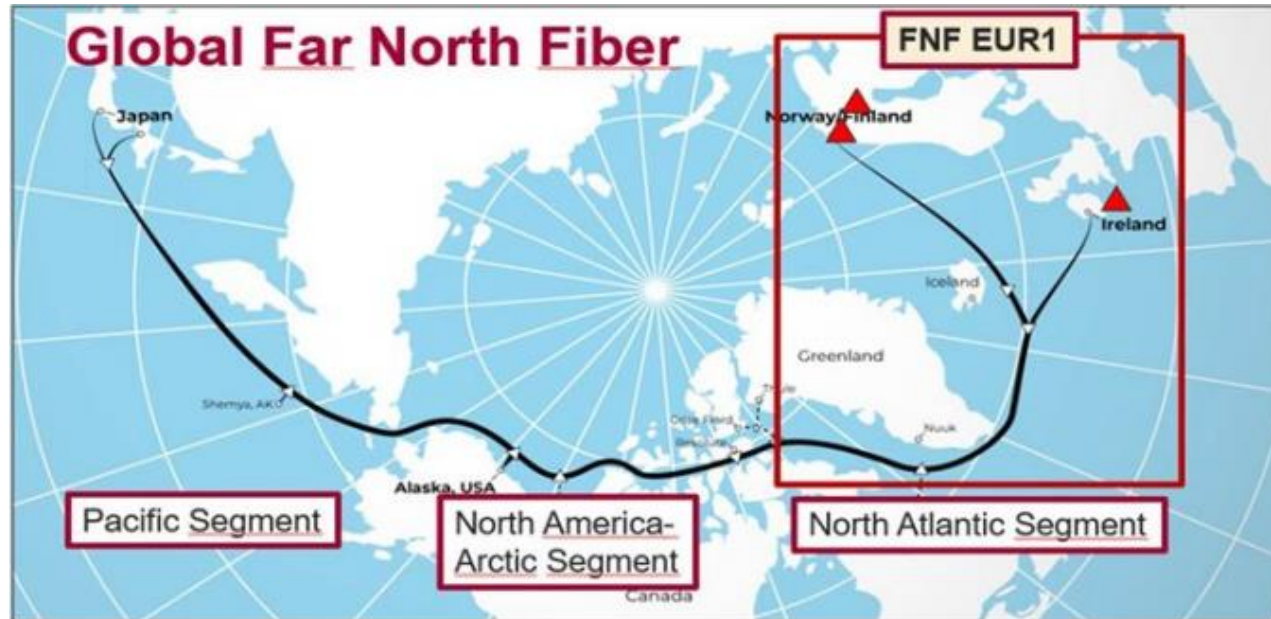Several locations in the Nordic countries

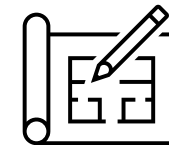**Duration**: 20 months

Coordinator: Cinia OY (FI)
Partners: Nordunet A/S (DK)

Far North Fibre (FNF) EUR1
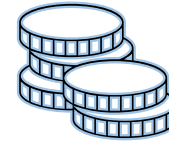
Cost: ≈ 48 M €
EU Contribution: ≈ 19.3 M €
≈ 40% of the total cost

Landing points:
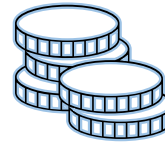- Norway
- Finland
- Ireland

Duration: 36 months
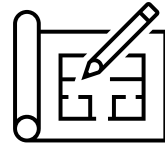
Coordinator: Cinia OY (FI)

NPF (North Pole Fibre)

Cost: ≈ 5.7 M €

EU Contribution: ≈ 1.8 M €

≈ 30% of the total cost

Landing points:
Several locations in Sweden

Duration: 36 months

Coordinator: Vetenskapsrådet – Swedish Research Council

Partners:

- Polarforskningssekretariatet (SE)
- Nordunet A/S (DK)

For more information

- [EU Funding & Tenders Portal](#)

- [HaDEA's Connecting Europe Facility](#)
- **Follow us** [LinkedIn](#) **and** [X](#)
- HADEA-CEF-DIGITAL-CALLS@ec.europa.eu

Other programmes funding connectivity
International Connectivity

Mr Peter Koren,

Policy Officer - Digitilisation for Development, Unit F.5, Technology, Innovation and Digitalisation,

DG INTPA, European Commission

Global Gateway Investment priorities

Global Gateway will mobilise **up to €300 billion** in investments in global infrastructure between 2021 and 2027

Digitalisation

Climate & energy

Transport

Health

Education & research

Global Gateway for Digital

A sustainable offer to meet infrastructure needs

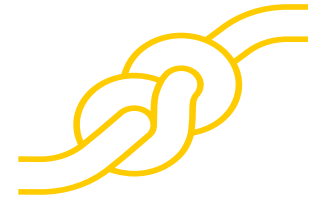**Inclusive expansion of digital Connectivity**

Resilience and Security of digital Connectivity

An open, global, and interoperable internet

Contributing to « twin transition »

International cooperation on R&I and the Green Deal

Team Europe approach: MS & DFIs
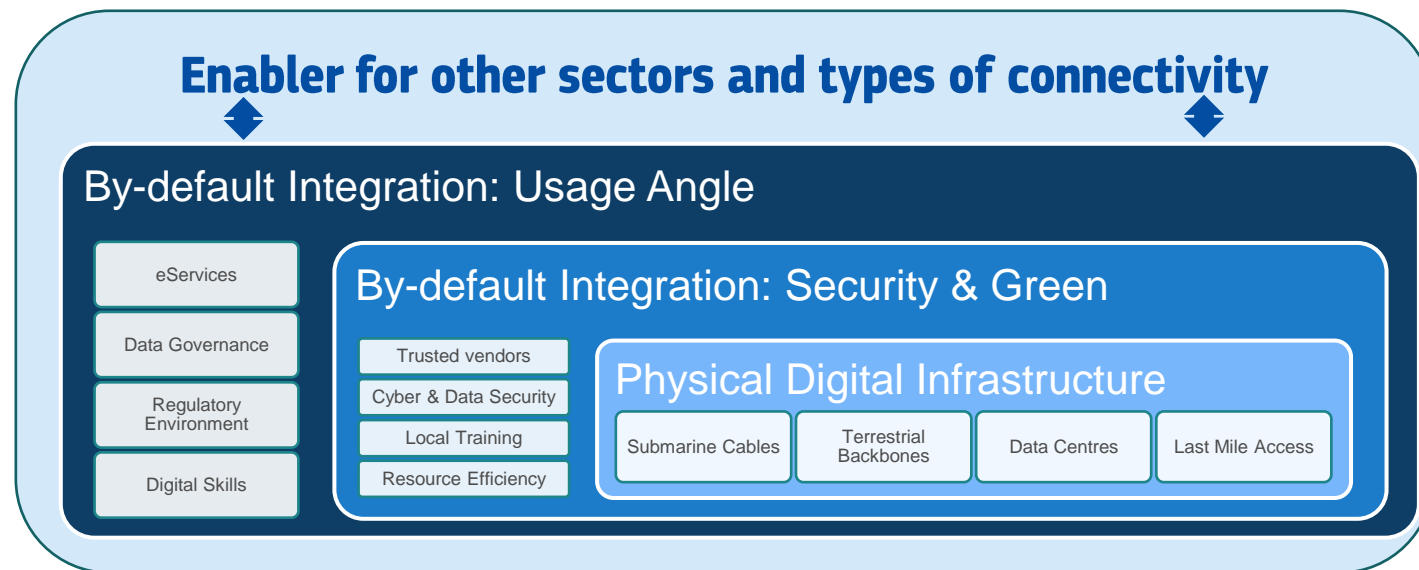
Private sector

International, like-minded **partners**

EU Modus Operandi of Digital Connectivity

- **International Connectivity** – connecting continents (submarine cables and satellite connectivity)

- **Regional Connectivity** – tackling the digital divide and fostering traffic volumes (terrestrial backbones)

- **Data Infrastructures and Open Internet** – ensure secure, green and free internet connectivity (data centres, IXPs, CDNs)

- **National Connectivity** – serving the underserved and fostering socio-economic growth and competitiveness through secure and resilient networks (e.g., satellite, 5G, FTTH)

Enabler for other sectors and types of connectivity

By-default Integration: Usage Angle

- eServices
- Data Governance
- Regulatory Environment
- Digital Skills

By-default Integration: Security & Green

- Trusted vendors
- Cyber & Data Security
- Local Training
- Resource Efficiency

Physical Digital Infrastructure

- Submarine Cables
- Terrestrial Backbones
- Data Centres
- Last Mile Access

BELLA

- **Reduce the digital divide** with and within Latin America and **enhance cooperation on research and innovation** between the EU and Latin America.

- **BELLA-S:** Ella link submarine cable from Sines (PT) to Fortaleza (BR)

- **BELLA-T:** A terrestrial cable network circling South America

- **BELLA II**: Future links towards Central America and the Carribean + EU-LAC Digital Alliance.
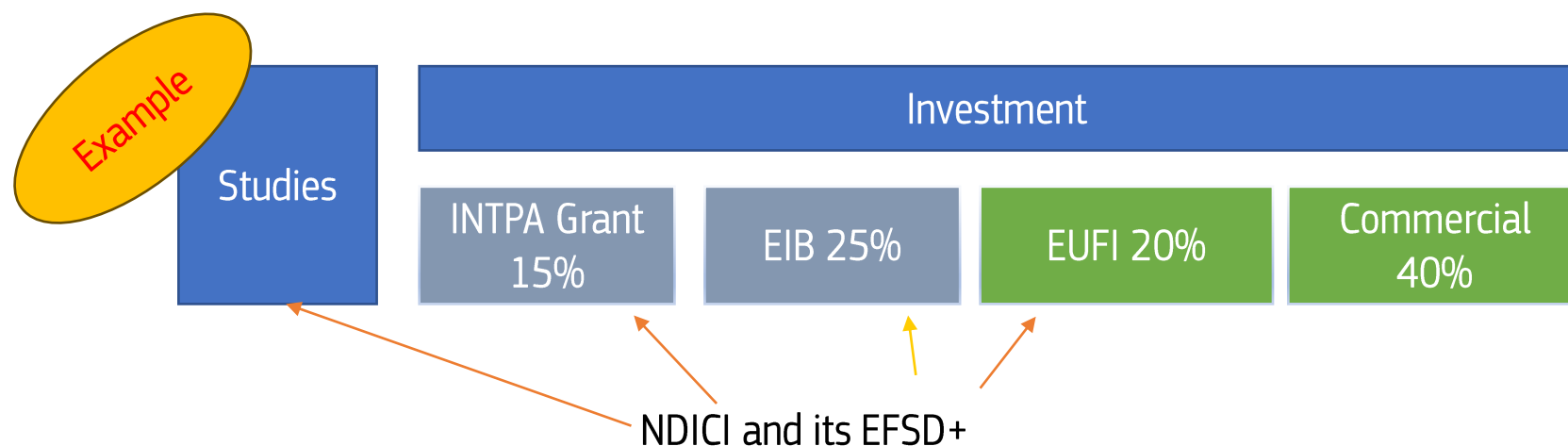
MEDUSA MEDITERRANEAN

Financing Digital Infrastructures

EU/INTPA finances digital infrastructures through NDICI – Global Europe

- Leveraging investments grants

- Blended financing (EIB and EDFIs)

- Financial tools such as **EFSD+** guarantees (EIB and FIs)

Other programmes funding connectivity
Outermost Regions (ORs)

Ms Eva Zandonella

Policy Coordinator, Unit A.1, Outermost regions,

DG REGIO, European Commission

Mr LINARTAS Ramunas,

Policy Analyst, Unit G.1, Smart and Sustainable Growth,

DG REGIO, European Commission

SO1.5 logic and policy context: Strategy Towards a "European Gigabit Society" (2016) and 2030 Digital Compass (2021)

3 strategic connectivity objectives for 2025

2030

1. **All main socio-economic drivers (SED)** should have **access to gigabit connectivity:** schools, business parks, universities, research centres, hospitals, etc.

2. **All urban areas and major roads and railways** should have **uninterrupted 5G coverage;** 5G should be commercially available in at least one major city in each EU Member State by 2020

3. **All European households**, rural or urban, should have access to connectivity offering **a download speed of at least 100 Mbps,** upgradable to gigabit speed

NBP
Review and Update

Investment gap of € 155 billion over 10 years

Post-2020 Multi-Financial Framework (MFF)

Fast forward to 2021, level of ambition revised by 2030: *All European households to be covered by a Gigabit network (*59% in 2020), *with all populated areas covered by 5G* (14% in 2021).

European Commission

ERDF SO1.5 logic and policy context: 2030 Digital Compass: a European way for the digital decade (March 2021)

Overlaying Digital Compass main points with the cohesion policy framework.

- 1) **Digital capacities in infrastructures SO 1.5**;
- 2) Education & **skills PO 4** (mostly/primarily);
- 3) Digital transformation of **business – SO 1.2**;
- 4) Digital transformation **public services SO 1.2**.

European Commission

ERDF intervention fields linked to VHCN (CPR Regulation 2021/1060)

- **032:** Very High-Capacity broadband network (backbone/backhaul network)

- **033:** VHCN (access/local loop with a performance equivalent to an optical fibre installation up to the distribution point at the serving location for multi-dwelling premises)

- **034:** VHCN (access/local loop with a performance equivalent to an optical fibre installation up to the distribution point at the serving location for homes and business premises)

- **035:** VHCN (access/local loop with a performance equivalent to an optical fibre installation up to the base station for advanced wireless communication)

- ***036:** Other types of ICT infrastructure (including large-scale computer resources/equipment, data centres, sensors and other wireless equipment)*

- ***037:** Other types of ICT infrastructure (including large-scale computer resources/equipment, data centres, sensors and other wireless equipment) compliant with the carbon emission reduction and energy efficiency criteria*

Connectivity in the Outermost Regions (ORs)

- Article 349 of the Treaty of the Functioning of the European Union (TFEU)

- Communication <u>Putting people first, securing sustainable and inclusive growth, unlocking the potential of the EU's outermost regions</u> adopted in May 2022

- Includes recommendations and commitments on digital infrastructure roll-out, and digital skills development

EU Support to Connectivity in the ORs

- Higher co-financing rates (e.g., up to 70% under CEF); special attention to Outermost Regions' connectivity needs

- Assistance to seizing opportunities under competitive EU programmes (e.g., CEF Digital, DIGITAL)

- Exchange of information and good practices (e.g., BCO network)

- Examples:
  - Jointly funded CEF (EUR 30 million) and ERDF (EUR 10 million) project to connect French Guiana to the EllaLink ; DIGITAL funding for CIDIHUB in the Canary Islands and EDIH of Réunion
  - Targeted thematic workshops on CEF Digital and DIGITAL

CONNECT UNIVERSITY