Mapping of Terrestrial Broadband

Po-Wen Liu

The views expressed are the opinion of the presenter and might no correspond to that of the EIB Group.

EIB is the EU Bank

ABOUT EIB

The European Investment Bank, the EU Bank

- Financing partner for the EU Member States and institutions since 1958;
- More than 90% of lending is within the EU;
- Financial support to projects outside the EU amounted to 10% of EIB lending;
- Shareholders: 28 EU Member States;
- The EIB contributes to the realisation of investment projects that further the economic, social and political priorities of the EU;
- More than 60 years of experience in financing projects;
- Around 3 000 staff – not only finance professionals, but also engineers, sector economists and socio-environmental experts.

EIB Group financing was 64.2bn channeled in these key areas in 2018

Innovation	Environment	Infrastructure	SMEs
			
€ 13.5bn	€ 15.2bn	€ 12.3bn	€ 23.3bn

We deliver **impact** where it is needed

JOBS
5 million jobs in small businesses

HEALTH
27.3 million people with access to improved health services

WATER
20 million people benefiting from safer drinking water

TRANSPORT
290 million additional passengers

ENERGY
34.3 million households powered by EIB projects

DIGITAL
29 million people with new or upgraded connections

CHALLENGES IN THE INVESTMENT IN DIGITAL INFRASTRUCTURE

Investment gaps in EU

- Mission to tackle insufficient investment in policy goals
- Digital sector is suffering from large underinvestment in Europe (market failures):
  - R&D: accounts for R&D/GDP gap with US
  - **Infrastructure: Economic growth constraints due to lack of very high capacity networks**
  - Manufacturing and services: KET argument
  - Education and skills: lack of ICT experts
  - Data security: EU is lagging (NSA …)

There exist a number of challenges involving financing FTTH networks in Europe

CHALLENGES

High cost and low viability of deployments

- The required investments to reach the targets of the DAE and the EGS amount to 384 bn€ until 2025
- 80% of this cost is needed in rural and suburban areas which lack financial viability

Market mechanisms alone are unable to deliver the envisaged coverage targets of the DAE.

Access to finance

- Currently operators suffer to secure financing with tenors exceeding 10 years
- Governments are scaling back planned subsidies for FTTH build-outs

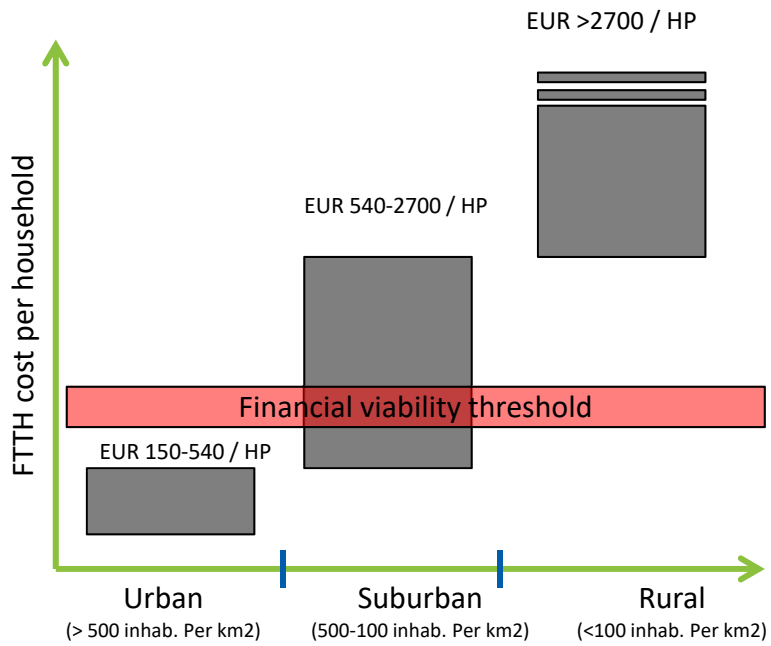
Significant public sector support is required in form of subsidization and long-term debt finance.

Uncertain regulatory environment

- The EU-wide and national FTTH regulations are under development and to large extent untested → operators are cautious to commit to investments in an uncertain environment

Regulation remains one of the crucial aspects for future investments

The cost per home passed and financial viability threshold



- In urban areas, the cost per home passed with FTTH is between EUR 150-540
- In suburban areas, the cost varies between EUR 540-2700
- In rural areas, the cost is beyond EUR 2700 per home passed
- The financial viability threshold lies somewhere in the range of EUR 600-700 per home passed

- Although this represents 55-60% of the European population, it represents only 20-25% of the total required investment cost

Estimates based on market benchmarks and EIB experience

INVESTMENT NEEDED TO REACH THE DAE AND EGS GOALS

Selected EU regulation/policy for broadband

Digital Agenda	State Aid[1]	Gigabit Society	ECC
100% coverage >= 30 Mbps By 2020	*White areas*: **No** coverage NGA (>= 30Mbps)	100% schools, transport hubs, public services, digitally intensive enterprises >= 1Gbps By 2025	*Very high capacity Network:* «fibre elements» or equivalent
50% up-take >= 100 Mbps By 2020	*Grey areas*: One operator NGA		*Designated areas*: < 100 Mbps
	Black areas: >= Two operators NGA	100% coverage >= 100 Mbps Upgradable Gbps By 2025	

1: 2013/C 25/01

Main assumptions

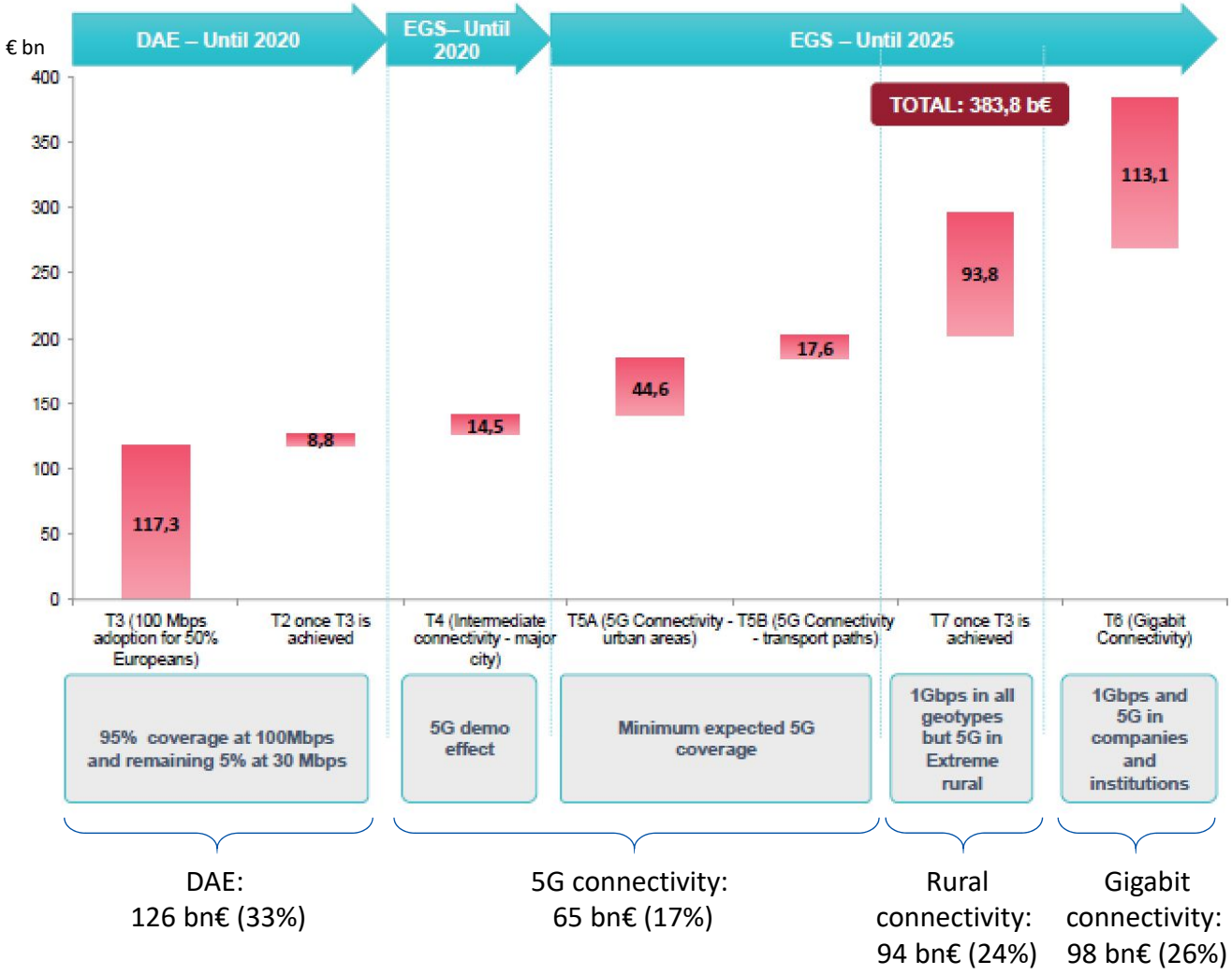
Choice of technology of new deployments	Digital Agenda for Europe (DAE)		European Gigabit Society (EGS)			
			5G Connectivity		Gigabit Connectivity	Rural Connectivity
	T2 – 100% coverage with 30 mbps	T3 – 50% penetration of 100 mbps	T4 – 5G in major city	T5 – 5G in urban and transport paths	T6 – 1 Gbps for socio-economic drivers	T7 – 100% coverage with 100 mbps (1 Gbps)
Urban	FTTB	FTTH	5G	5G	FTTH	FTTH
Suburban	FTTB	FTTH	5G	5G	FTTH	FTTH
Semi-rural	FTTC	FTTH	5G	5G	FTTH	FTTH
Rural	FTTC	FTTC	5G	5G	FTTH	FTTH
Extreme-rural	LTE-A	LTE-A	5G	5G	FTTH	5G

1. Technologies suitable for:
    - 1 Gbps: FTTH, FTTB, DOCSIS 3.1.
    - 100 mbps: above + FTTC with advanced DSL, DOCSIS 3.0, LTE-A (in extreme-rural).
    - 30 mbps: above + FTTC, VDSL, LTE (in extreme-rural).
2. If any existing infrastructure could be re-used, it would be upgraded.
3. All new fixed-network deployments are based on fiber.

Target-specific assumptions:

- T2, T3 and T7: “households” + “business offices” = “premises” were covered (more representative for actual operator roll-outs.)
- T4: As major city, the NUTS 3 area of the capital was taken.
- T6: The number of socio-economic drivers and digitally intensive enterprises were estimated to be 28.5m.

The required investments to reach the targets of the DAE and the EGS amount to 384 bn€ until 2025.



Further analysis of the required investment:

Geotype	% Invest.	% Pr*
Urban	20%	32%
Suburban	25%	36%
Semi-rural	30%	21%
Rural	21%	10%
Extreme-rural	4%	1%

*Pr = Premises

- 72% for wired connections (premises, excl. companies)
- 36% in cohesion regions

The investment gap for public funding to reach the targets of the DAE and the EGS is ca. 254 bn€.

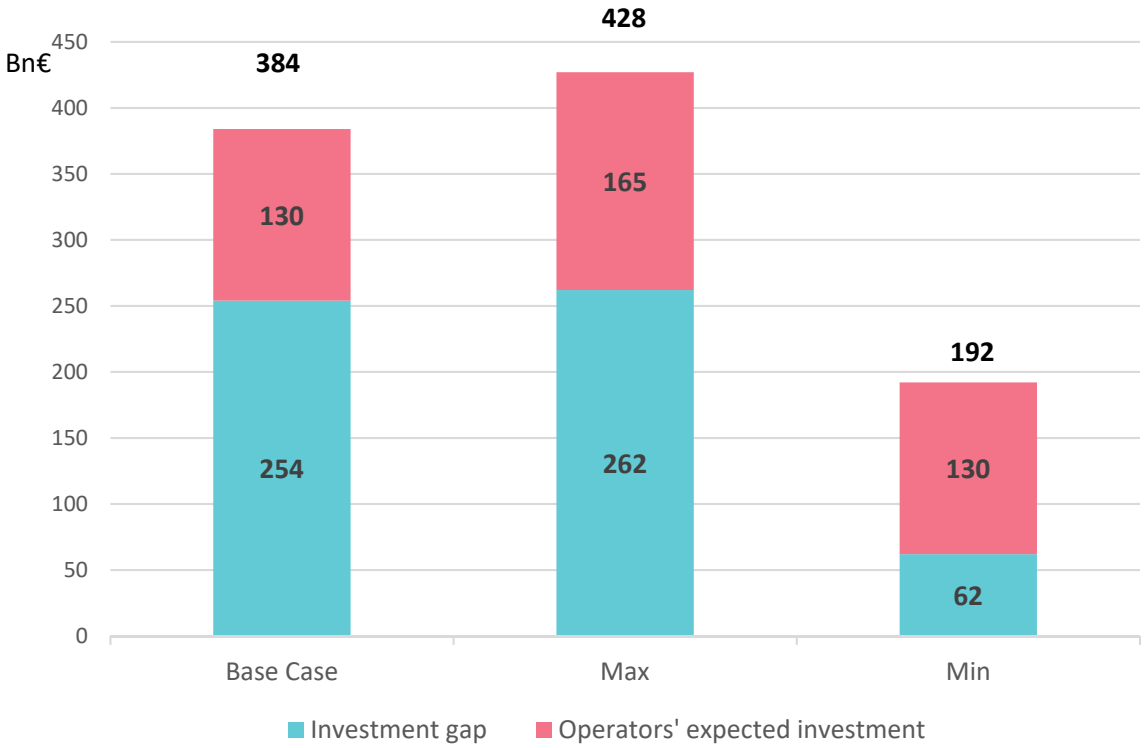
Expected private investments relevant for the DAE and EGS targets until 2025 amount to ca. **130 bn€.**

→ **Cover (only) 33% of total investment needs**

→ **Investment gap: ca. 254 bn€**

Alternative scenarios:

1. **Max:**
   - FTTC in extreme-rural + max 5G quality
   - Investment need: **+15% to 428 bn€**
   - Private investments: **39%**
   - Investment gap: **262 bn€**
2. **Min:**
   - Wireless technologies in all 3 rural geotypes + only 1m socio-economic drivers/enterprises
   - Investment need: **-53% to 192 bn€**
   - Private investments: **68%**
   - Investment gap: **62 bn€**

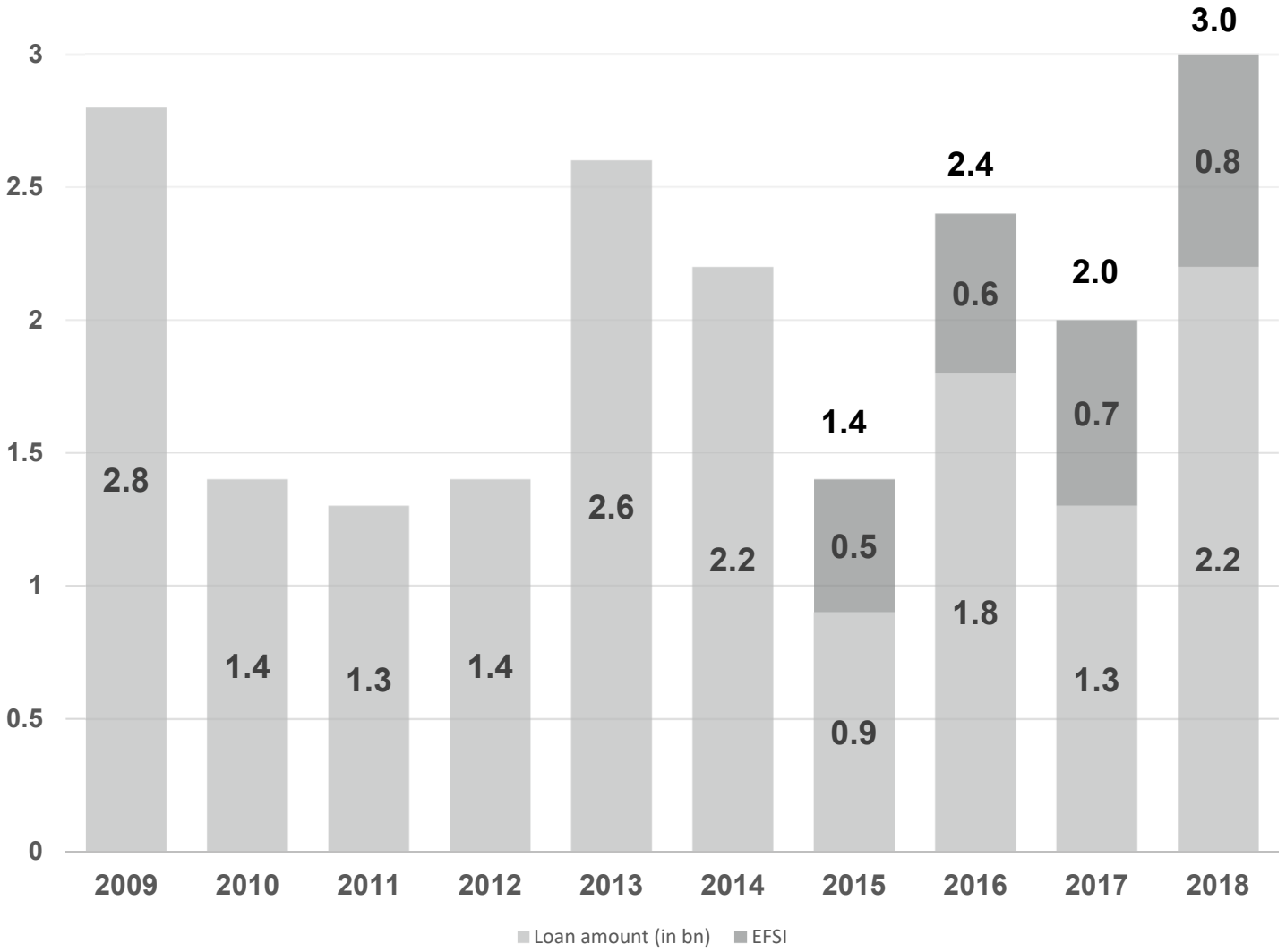


MAPPING AND EIB INVESTMENT

Importance of mapping for broadband investment

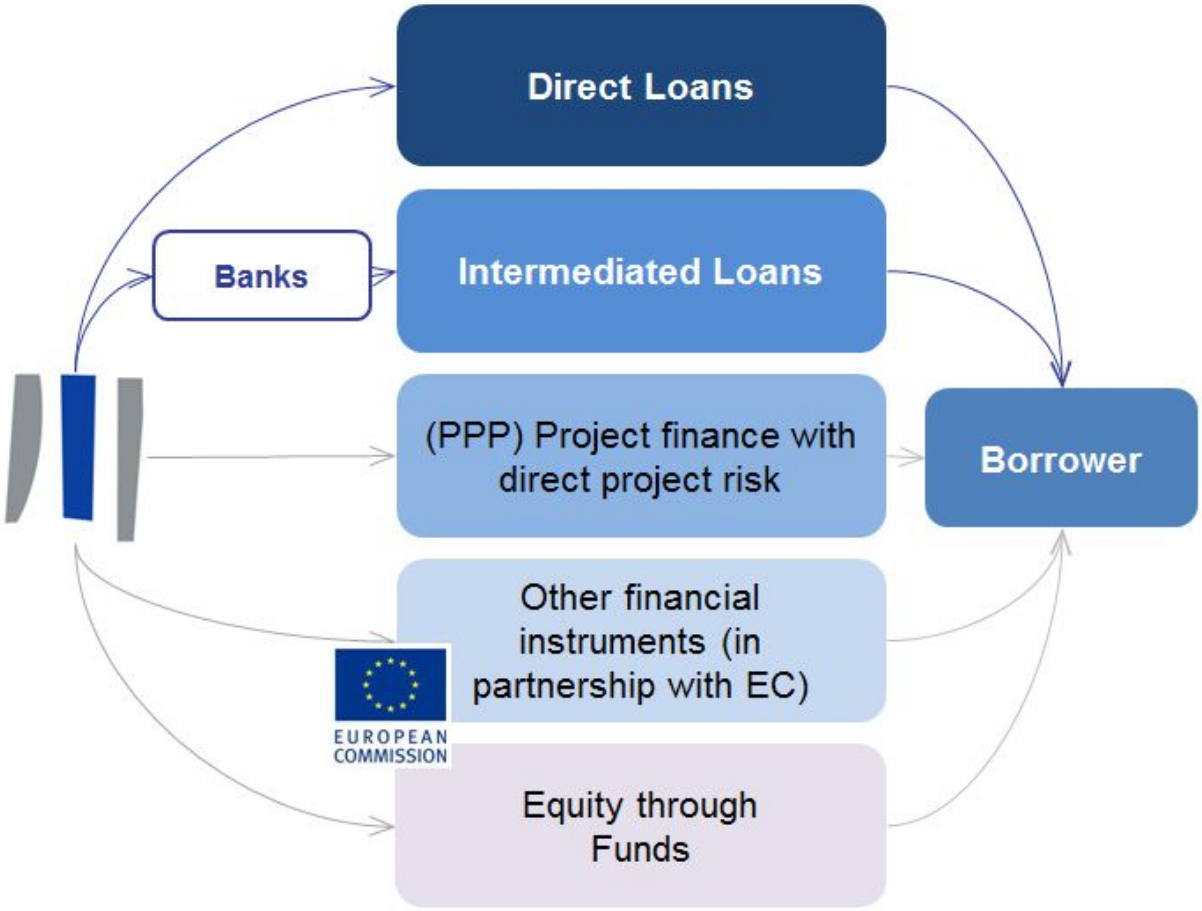
- Inform about availability of broadband services in the regions
- Show the operators providing services in the regions
- Identify the regions uncovered with very high capacity networks
- Illustrate the population density
- Assess the demand for very high capacity networks
- Identify the areas covered by private investments
- Map the planned investments of the operators
- Tagging areas with market failures
- Support the channeling of investment

EIB Lending in telecommunication infrastructure from 2009-2018



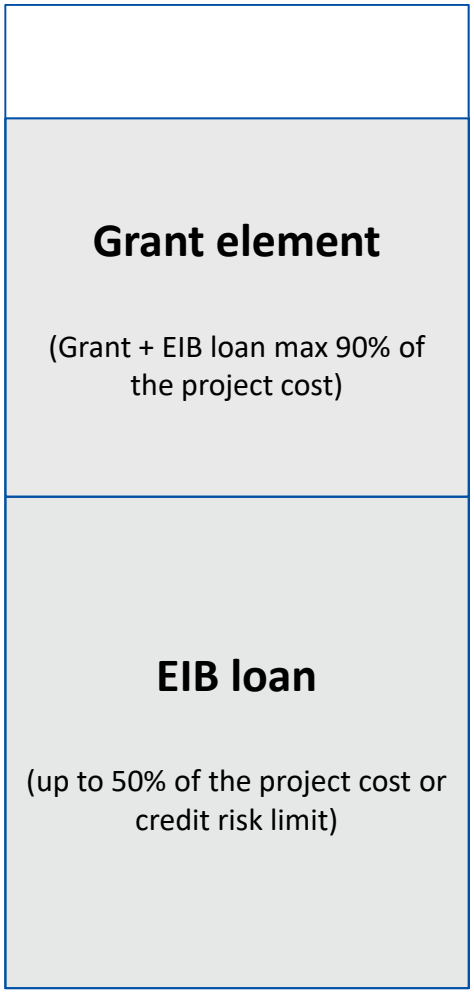
Lending to EU Member States, signed loans

Types of EIB financing

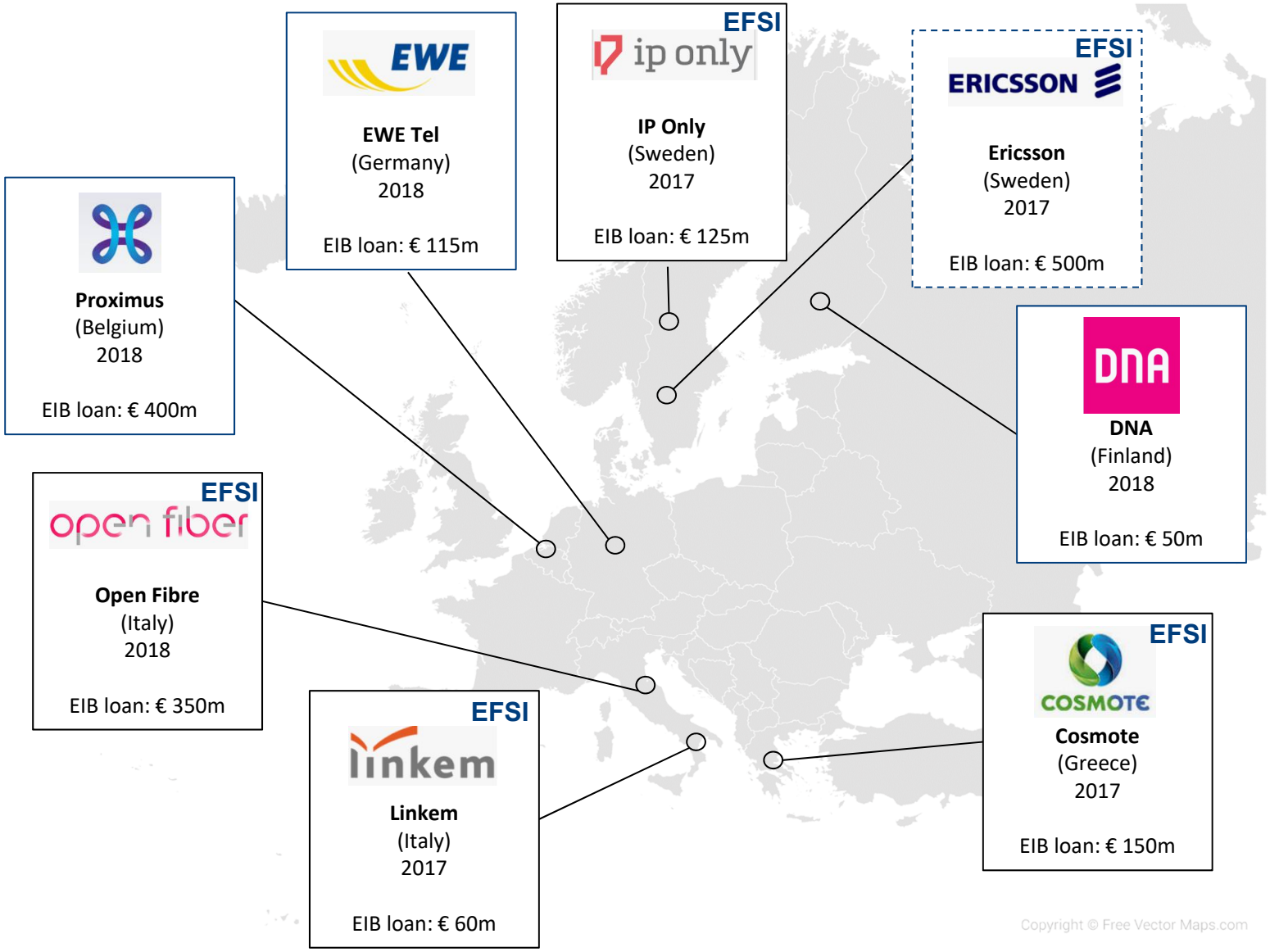


EIB finance instruments for broadband financing

- Corporates
  - Financing to telecommunications operators, utilities companies etc. to deploy broadband infrastructures
- Project finance
  - Financing to ring-fenced projects of a special purpose vehicle (SPV) formed by a private and/or public sector (joint ventures, off-balance sheet etc.)
- Public sector
  - Financing for public sector initiative typically together with EU and/or national grants
- Others
  - Intermediated loan structures and framework loans to financial institutions, local governments and other 3rd parties
  - Investments into infrastructure funds
  - New instruments
    - Risk sharing - InnovFin
    - Project bonds – First loss piece
  - Advisory services



Examples of broadband lending



Mapping of Terrestrial Broadband

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