Connect Europe

State of Digital Communications 2026

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Executive summary

European Connectivity: Strategic Importance, Structural Fragilities

2026 is crunch time for European telecoms. The industrial and political consensus is that digital networks are the backbone of our societies and economies. Citizens demand access to the latest technologies, businesses show increased appetite for sovereign data capacity and homegrown tech services, while governments become increasingly aware of the geostrategic value of the sector. With the Draghi Competitiveness report showing the way, will policy reform in Europe be able to finally meet the moment? This year's State of Digital Communications Report shows the huge efforts of the sector in network deployment and innovation, but it also points to continued underinvestment and fragmentation that need urgent fixing.

Europe's digital communications ecosystem is worth 5% of the GDP, as telecoms operators become leaders of European innovation

- The European 'digital communications ecosystem – comprising telecoms services, network equipment and content and applications in Europe – was worth **EUR1.09 trillion** total value of market in 2024, which represents 5% of the Europe's GDP. For comparison, the agriculture and the automotive sectors represent 1.5% and 7% of the GDP respectively.

- In the past year, the report shows that telecoms operators heavily invested in **networks**, encompassing FTTH and other gigabit capable networks as well as 5G coverage. However, investment in digital infrastructure by the sector also extended to data-centre capacity, edge and AI cloud infrastructure, as well as international subsea cables.

- Progress was also evident on the **service innovation** front: more AI solutions for enterprise, development of sovereign clouds, launch of additional edge cloud services, development of authentication services based on APIs, and work towards the introduction of D2D satellite services.

FTTH, gigabit-capable networks and 5G: coverage improves y-o-y, but Europe still lags global peers on most key metrics, with implications for competitiveness

- By the end of 2025, **5G** in Europe reached 94.9% of the population, a continued improvement on the 87% of 2024. Nevertheless, Europe remains behind others; coverage reached 96% in China, 98.4% in the USA, 97% in Japan and a whopping 99.9% in South Korea.

- **Adoption** remains the lowest in Europe compared to all global peers: in 2025, the 5G share of all mobile connections stood at 73.4% in the USA, 70.4% in China, 60.2% in South Korea, 51.3% in Japan, and only 43% in Europe.

- When it comes to **5G Standalone** – the most advanced type of 5G coverage – Europe also lagged behind: 93% of the population is covered in China, 81% in the USA, 75% in Japan and 63% in Europe.

- 5G coverage came at great expense in Europe. The annualised cost of **spectrum** licences to operators has stood at over EUR8 billion each year for the past five years, and over EUR30 billion has been spent on 5G spectrum licences. for a total of almost EUR50bn spent in spectrum auctions since 2020.

- On the fixed side, by the end of 2025 **FTTH** reached 77.2% of the European households, up from 70.9% in 2024. Similarly, for all gigabit-capable networks, coverage will reach 86.2% in 2025, as opposed to 83.1% in 2024. On FTTH, Europe is ahead of the USA, but behind China and Japan. On gigabit-capable networks, Europe is behind all peers.

- In terms of median fixed **download speeds**, Europe remains behind all global peers with 171 Mbit/s, as opposed to 289Mbit/s in the USA, 206Mbit/s in China, 219Mbit/s in Japan and 234Mbit/s in South Korea

The European digital communications ecosystem represents 5% of the GDP, with fresh innovation in cloud and AI segments as well as in 5G and gigabit networks.

Investment in European connectivity continues declining, as the revenues of operators are stuck in the past decade and markets remain highly fragmented

- For the past decade and more, our annual report consistently found that European telecom operators suffer from low investment and low revenues compared to their global peers. This chronic situation has not changed.

- The total sector **investment** continued decreasing: capEx in European telecoms went down by 2%, as it stood at EUR64.6bn in 2024 compared to EUR65.8bn in 2023.

- This is due mainly to slowing FTTH investment. This happens as the report also finds – alarmingly – that in absence of increased investment capacity, 41.8 million Europeans will still be left unserved by FTTH in 2030.

- A silver lining for Connect Europe: our members lead the pack among telcos with EUR17.2bn investment in FTTH in 2024, or 54% of the total **FTTH capEx**.

- Also this year, the overall telecom **investment per capita**, in Europe, is behind that of global peers, with EUR118 per person in Europe, EUR217 in the USA, EUR173 in Japan and EUR151 in South Korea.

- This happened against flat telecom **revenues**. In 2024, the mobile ARPU adjusted by GDP was EUR14.9 (-2.4% vs the previous year) in Europe, as opposed to EUR26.1 in the USA, EUR21.7 in South Korea, EUR21.3 in Japan, and EUR18.3 in China.

- For reference, European **mobile ARPU** stood at EUR15.3 in 2015, meaning that the current value is effectively lower than a decade ago.

- Fragmentation remains one of the key drivers of **this situation**. The number of MNOs with over 500k subscribers in Europe is 44, compared to 8 in the USA, 4 in Japan, 4 in China, and 3 in South Korea. Fragmentation is also a reality when it comes to fixed operators: the number of fibre network operators with over 500k premises passed is 70+ in Europe, 28 in the USA, 6 in Japan, 5 in South Korea and 4 in China.

European telecoms operators are going big on network and service innovation, as AI redefines connectivity

- On the service layer, European telcos are working more and more to support their customers with **cybersecurity** solutions: cybersecurity revenues stood at EUR5.3bn in 2025, up from EUR3.2bn in 2020.

- Similarly, the report found that telcos are now offering a range of **AI services**: from AI infra to AI models, data management, data insights, AI applications and AI professional services.

- All of this is empowered also by fundamental **network innovation:** European operators are ahead of their global peers both in terms of open RAN trials and deployments (57 in 2025 alone), and on the number of active network APIs (38% of all of the API announcements globally came from Europe).

- Operators are also getting into the **cloud** game: in 2025, telecom operators owned around 19% of the European data centres (i.e., 600 data centres over a total of 3177). When it comes to edge cloud, European operators alone are estimated to have deployed around 750 edge nodes by the end of 2024, up from around 320 in 2023.

- When it comes to **network usage**, data traffic has continued increasing steadily, reaching 1104 exabytes on fixed networks in 2025, compared to 989 exabytes in 2024. Mobile traffic also grew, reaching 169 exabytes in 2025, compared to 149 in 2024.

- **AI-related traffic** is also expected to contribute to filling up networks in the future. Connect Europe: Data centre interconnect traffic is expected to grow by up to 50% per year between 2025 and 2030.

Connect Europe members are market leaders in FTTH investment, but overall Europe is lagging behind global peers on all key connectivity competitiveness metrics.

01

A snapshot of the digital communications market landscape in Europe

Turnover in the telecommunications services market accounted for EUR407 billion of the digital communications market, which was worth EUR1.09 trillion.

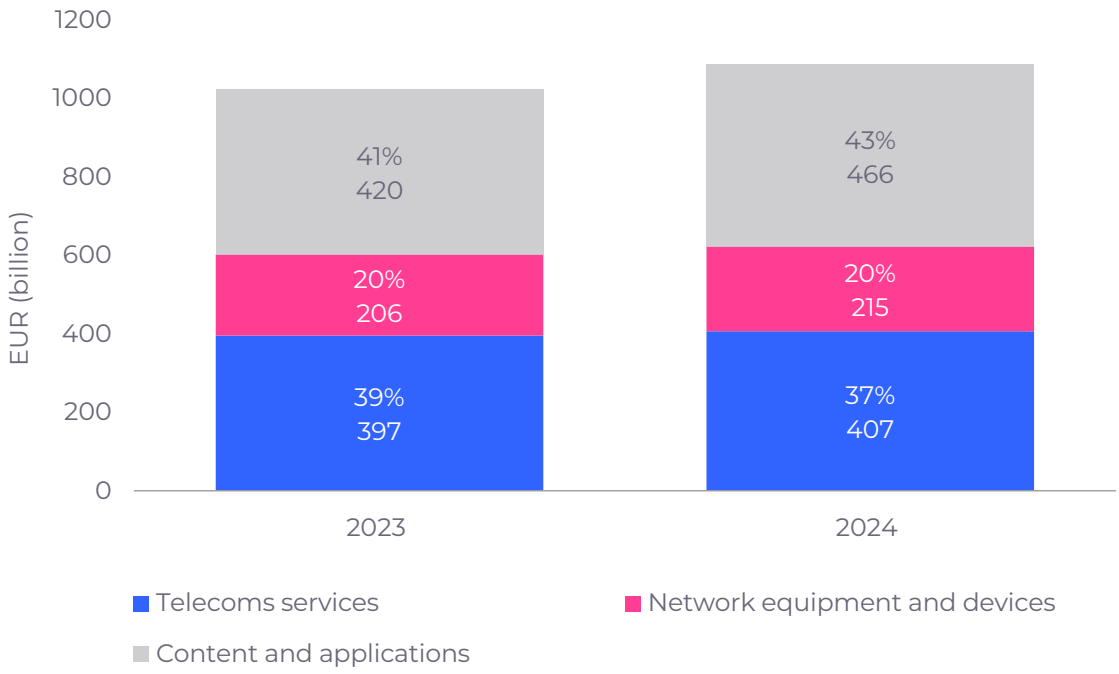
The digital communications market is crucially important for European businesses as a whole. It represents a substantial share of GDP, and the main actors invest billions of euros per year in tangible assets and research and development.

The digital communications market is here defined as including:

- telecoms services;
- telecoms equipment and communications devices;
- content and applications including media (film, TV, and music), software publishing, data centre services and web portals.

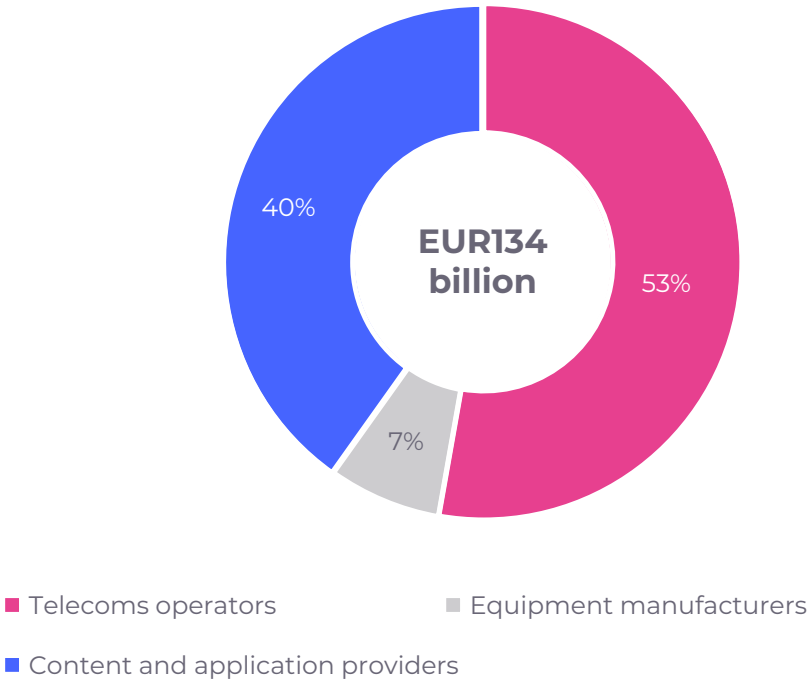
The market was worth just over EUR1.09 trillion to the European economy in 2024 - around 5% of European GDP and up compared to 2023. Turnover in the telecoms services market accounted for 37.4% of that figure at EUR407 billion, up in actual terms, but down in terms of share of digital communications as other segments grew faster.

FIG 1.1 : Aggregate turnover by digital communications market player type, Europe, 2023 and 2024 [Source: Eurostat and Analysys Mason estimates]



Companies in Europe's digital communications market invested around EUR135.3 billion in 2024 including investment in tangible fixed assets and in R&D. The majority of this (53%) was invested by the telecoms operators. These figures exclude investment in TV, video and music content.

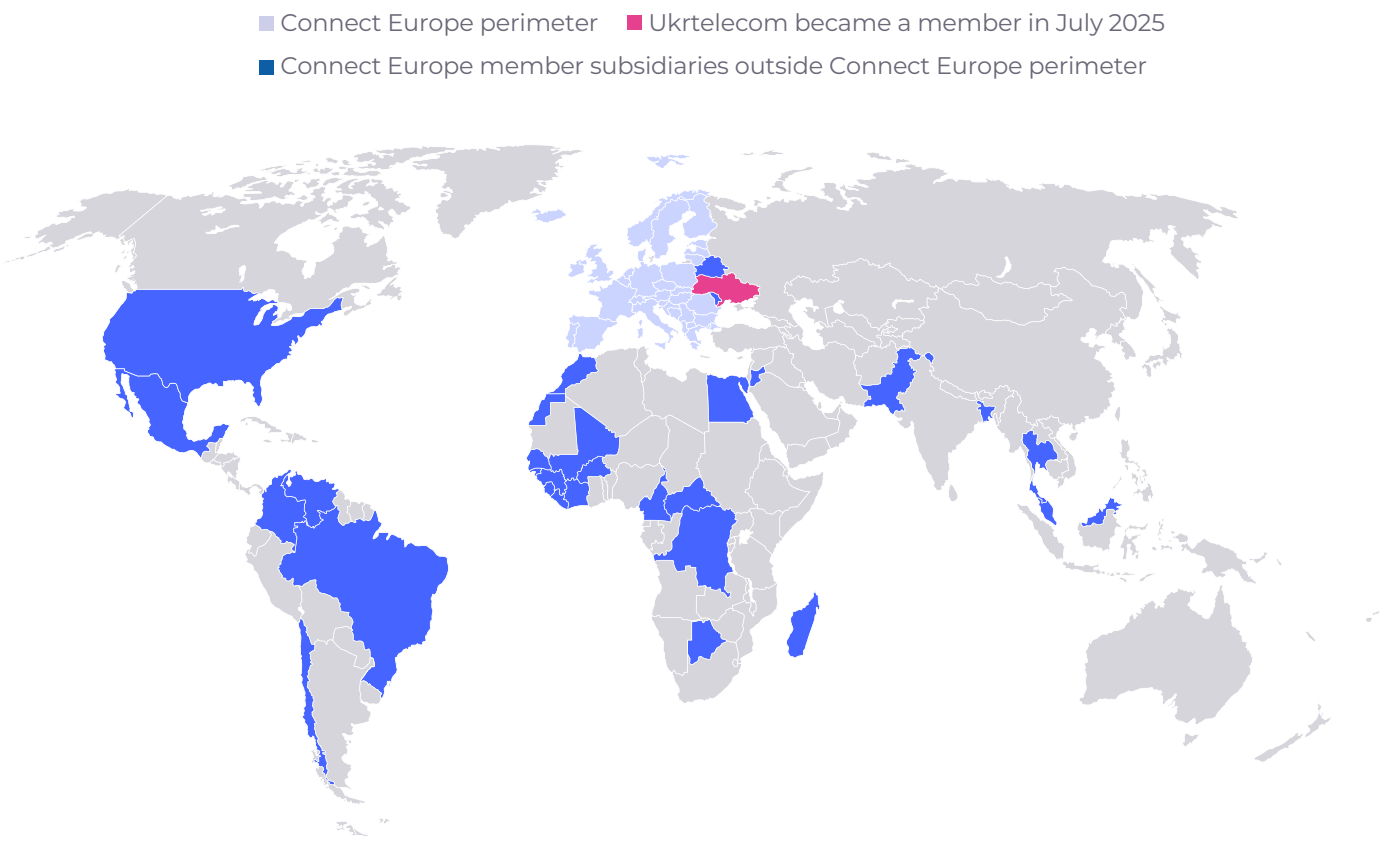
FIG 1.2 : Investment in tangible fixed assets and investment in R&D in Europe, by communications market player type, 2024 [Source: Eurostat and Analysys Mason estimates, 2025]



THE GEOGRAPHICAL PERIMETERS USED IN THIS REPORT

FIG 1.3 shows the countries where Connect Europe members have at least one operating company. These countries form the Connect Europe perimeter, which we label 'Europe'.

FIG 1.3 : Map of world showing Connect Europe member operating businesses outside Europe [Source: Analysys Mason, 2025]



Czech infraco CETIN joined Connect Europe in 2025, but the Czech Republic was already included in the Connect Europe perimeter. Ukrtelecom also joined Connect Europe as a member in 2025, and for the purposes of the statistical analysis in this report, Ukraine is not included. 'Europe', for the purposes of this report, therefore means geographical Europe minus Belarus, Moldova, Russia, Turkey and Ukraine, and not the European Union, which we split out separately for a subset of metrics.

02

Operators' investment decisions create tangible benefits for Europeans

PROGRESS TOWARDS AMBITIOUS EU TARGETS SHOWS DELAY AND FULL ACHIEVEMENT BY 2030 IS UNLIKELY

The European Union's Digital Decade Policy program sets out a range of targets designed to propel the region along the road towards "a successful digital transformation for people, businesses and the environment". The targets are aligned along four key themes:

- digital infrastructure,
- digital transformation of businesses,
- digital skills,
- digital public services.

Provision of new fixed and mobile broadband networks underpin the entire program, but the EU has also set its sights on the next generation of digital applications and services – those that very high-speed broadband networks were specifically designed to enable.

The overall picture by 2025 was mixed. Some areas - availability of e-Health, the digitalisation of public services and basic 5G coverage - demonstrate high levels of target achievement. Some, like the deployment of fibre to the premises shows solid progress but not enough to meet the 2030 targets. What is of particular concern, though, is the unsatisfactory progress in the adoption of foundational digital technologies such as AI, cloud, data analytics, and the limited progress in growing the pool of home-grown ICT specialists and in nurturing basic digital skills. According to the EU's latest update on outcomes, the results demonstrate the EU's weakness in digital innovation, particularly the limited scale of investment in R&D and the insufficient focus on breakthrough innovation. The report cites the lack of a critical mass of top-performing players, reflecting a fragmented ecosystem with limited specialisation.[1]

- **Digital infrastructure.** The program indicates that there should be universal access to FTTH and 5G services, with 100% coverage by 2030. In its latest report (published June 2025) the EU stated that according to the latest available data (no specific time given but assumed to be close to year-end 2024), 94% of the EU's households had 5G coverage and 69.2% had FTTH coverage. In the 2025 report, the EC however noted that deployment of fibre is progressing, but not rapidly enough to reach 100% by 2030. A higher proportion of households (82.5%) were covered by a fixed very high capacity network. The digital infrastructure program also targets deployment of 10 000 edge nodes, but by 2024 the edge node target had been only 23% met (over 2200 nodes).

[1] State of the Digital Decade 2025: Keep building the EU's sovereignty and digital future, 2025, Annex 1, page 2.

- **Digital transformation of businesses.** 2030 targets for business include 75% of firms using cloud computing and AI; 90% of small and medium-sized enterprises (SMEs) to be using automated, digital processes for operations; and the number of 'unicorns' doubling (equalling 500). 69% of the cloud computing target, 24% of the AI target, and 90% of the SME digital process target had been met. In 2024 there were 284 unicorns in the EU, 57% of the target.

- **Digital skills. By 2030 there should be 20 million ICT specialists in Europe.** In 2024, 52% of this goal had been reached (10.4 million). These targets specify a higher proportion of female ICT specialists, as in 2021 81% of ICT specialists were male. Additionally, 80% of the population should have basic digital skills – 70% of this target had been achieved.

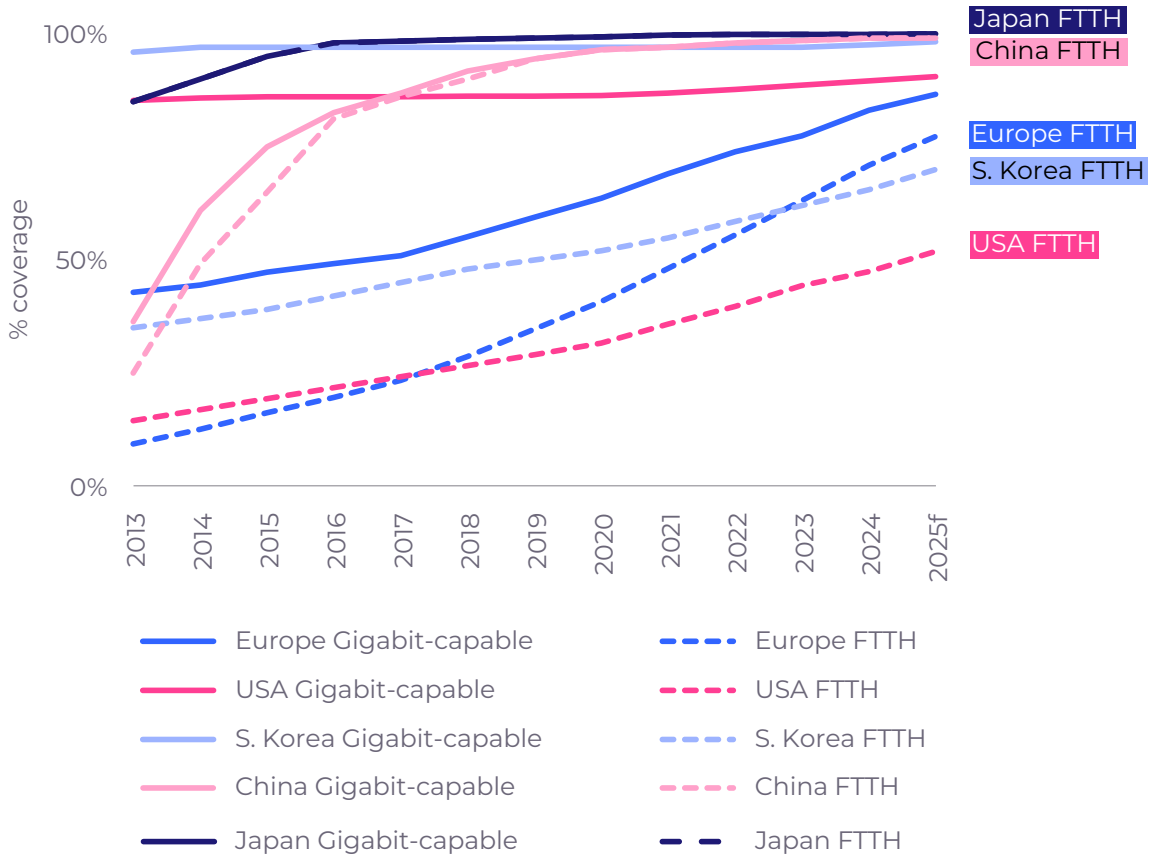
- **Digital public services.** The EU has a target of 100% of key public services for citizens and businesses being accessible online by 2030; the scores were 82.3% for citizen-relevant services and 86.2% for business-relevant services in 2024. In addition to this, all medical records should be accessible online by 2030 and 80% of European citizens should have their ID online. By the end of 2024, 82.3% of the medical target had been met, and the availability of online ID reached 89% and had therefore reached the target.

Progress is reviewed biannually to advise member states on their trajectory. Progress has been made on many fronts, but the EU is still far from reaching its targets.

FTTH coverage and speeds

Fixed broadband networks are the workhorse of the digital ecosystem, carrying about 87.5% of internet traffic in Europe in 2024. They also account for the largest single line in capex, accounting for about 46% of all capex in telecoms networks. This means that improving fixed broadband connectivity is key to achieving the European Commission's targets for achieving gigabit-capable networks. While certain variants of 5G fixed-wireless access (FWA) hold the potential for gigabit connectivity, few existing FWA services offer such high downlink speeds. By far the largest share of new investment in fixed connectivity has, however, been in FTTH.

FIG 2.1 : Gigabit-capable and FTTH population coverage, China, Europe, EU27, Japan, South Korea and the USA, 2014-2025f [Source: Analysys Mason, 2025][2]



Fiberising fixed access networks is a huge undertaking and represents the largest single investment in networks for a century. The pace of FTTH build has far outstripped that in the USA. By the end of 2024 premises coverage of FTTH alone in Europe had reached 70.9% and for all gigabit-capable networks 83.1%, and we estimate that by the end of 2025 these figures will reach 77.2% and 86.2% respectively.

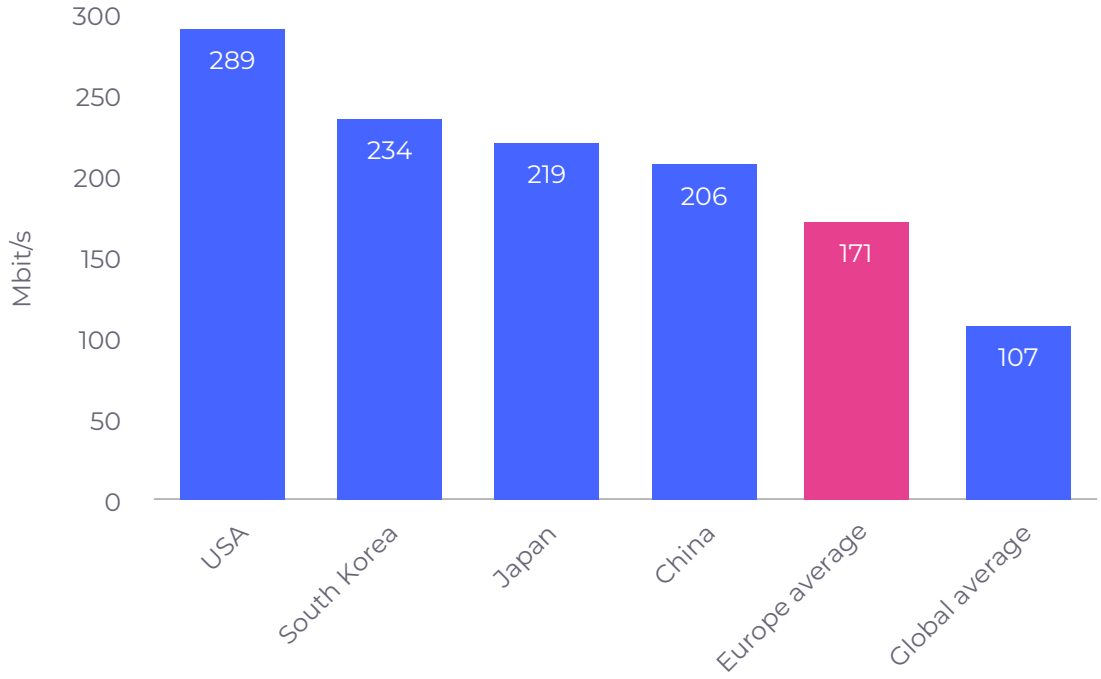
Several FTTH investment models have developed over the recent past. This has included operators developing vertically-integrated models, joint-ventures, co-investments as well as wholesale-only ventures.

Europe still trails behind its peer countries in terms of median fixed broadband speeds, although it is rapidly catching up with the levels in China, Japan, South Korea and USA, where the median speed has changed less over the past year. There are two main reasons for the historical lag.

- A higher proportion of Europeans is still reliant on xDSL than in comparator Asian markets;
- Cable network infrastructure, originally installed to deliver multichannel TV, can be upgraded to deliver gigabit internet access, and a larger proportion of European households (59%) are not covered by cable network infrastructure than in the USA (15%).

[2] Our means of calculating FTTH coverage in the USA has been changed to include all postal addresses. Hence the denominator is in keeping with calculations for Europe, and is larger than in our previous calculation.

FIG 2.2 : Median fixed downlink speeds, China, Europe[3], Japan, South Korea and the USA, September 2025 [Source: Ookla Speedtest Global Index, 2025]



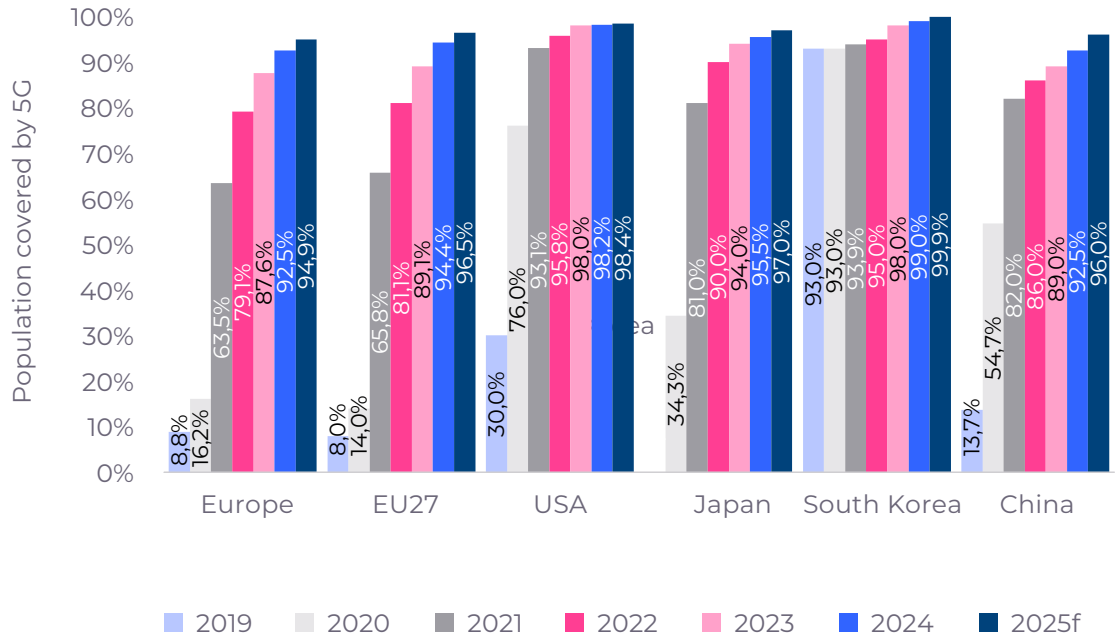
Note that the speeds recorded here reflect the speeds that subscribers have chosen to take, and do not correspond to the maximum speeds they could take..

5G coverage and speeds

By the end of 2025 it is forecast that around 95% of the population of Europe will live within outdoor range of at least one 5G non-standalone network, up from 92.5% at the end of 2024. The equivalent coverage figure for the population of EU member states at the end of 2024 was 94.4%, and we predict that this will rise to 96.5% by the end of 2025. The EU is estimated to have caught up with China, and has closed the gap on other comparator countries - although as they all approach 100% coverage the rate of network expansion inevitably slows down.

[3] See Ookla Speedtest Global Index. Data extracted for September 2024. The Europe figure is a calculated as an average weighted by population.

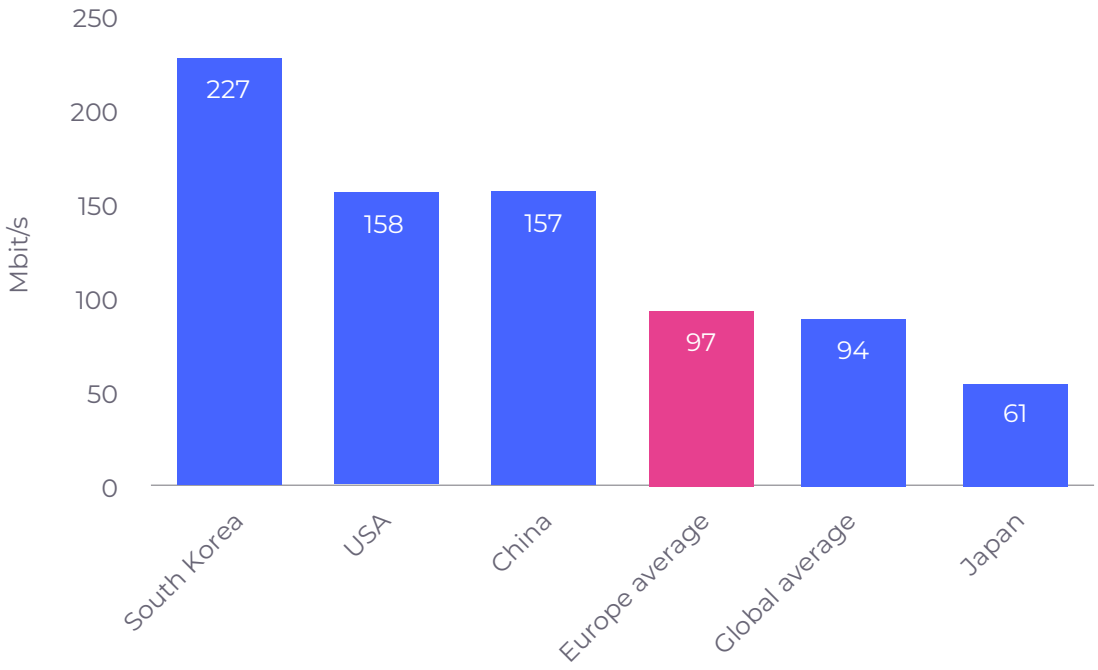
FIG 2.3 : Percentage of the population covered by at least one 5G mobile operator, China, Europe, EU27, Japan, South Korea and the USA, 2021–2025f [Source: Analysys Mason, 2025]



It is important to add nuance to coverage figures, as they should also be viewed in the context of the spectrum used. Low-band spectrum (600 MHz in North America but 700 MHz elsewhere) enables rapid roll-out of networks to provide basic 5G coverage. However, capacity on low-band spectrum is limited, and a 5G non-standalone network based on low-band spectrum on its own offers only marginal improvements in end-user experience when compared with LTE networks. Dynamic spectrum sharing (DSS), which allows 4G and 5G services to be provided simultaneously from the same infrastructure, has a similar effect because it delivers a 5G service, but provides only for a broadly 4G experience. 5G networks using mid-band spectrum offer substantially improved capacity and experience, and mid-band spectrum deployment is now the focus of most 5G operators worldwide. Where deployment of 5G in mid-band spectrum follows 5G in low-band spectrum, the overall coverage figure will not change, whereas the customer experience changes significantly.

The average end-user speeds delivered on mobile networks broadly reflect the state of roll-out of mid-band 3.5 GHz 5G networks, without which the performance enhancement of 5G would be modest.

FIG 2.4 : Median mobile downlink speeds, China, Europe, Global average, Japan, South Korea, and the USA, September 2025 [Source: Ookla Speedtest Global Index, 2025]

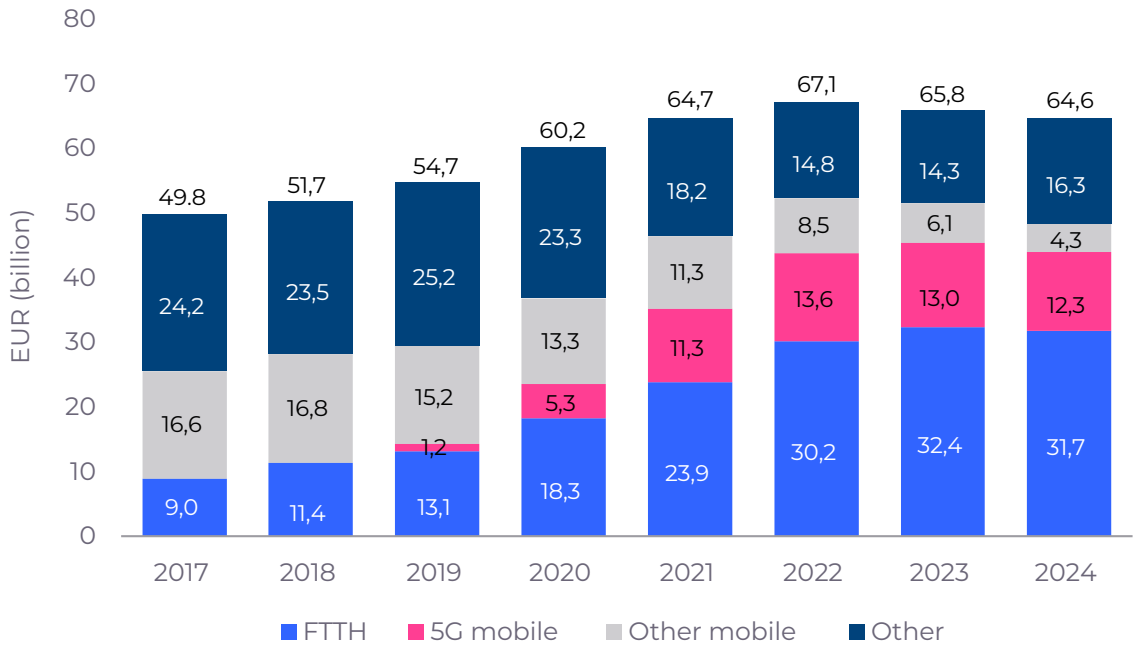


Median European mobile downlink speeds are higher than the global average, but they are lower than those in South Korea, China and the USA. These median scores can fall as well as rise over time because on mobile networks, achieved speeds are a complex interplay between available spectrum, which in turn is a constraint on installed capacity, and usage.

CAPEX HAS BEEN IN SLIGHT DECLINE SINCE 2022, BUT REMAINS HIGH

Total capex in Europe fell around 2% in 2024.[4] The overall level of capex is determined to the greatest extent by fiberisation of the local loop – which is the most capital-intensive endeavour for telecoms operators. A downward trend in capex appears to have set in since 2022 in many markets, except in those where FTTH coverage is still relatively low, where rising FTTH capex has offset steeper declines elsewhere. Thus, looking forward, we would expect that downward trend to continue, notwithstanding the higher unit costs of reaching the final 10% of premises for FTTH; and this notwithstanding the fact that, as projected by the European Commission, full fibre coverage at the current pace of investment will only be realised in 2051[5].

FIG 2.5 : European telecoms capex, FTTH, 5G, 4G and other, 2017-2024
[Source: Analysys Mason, 2025]



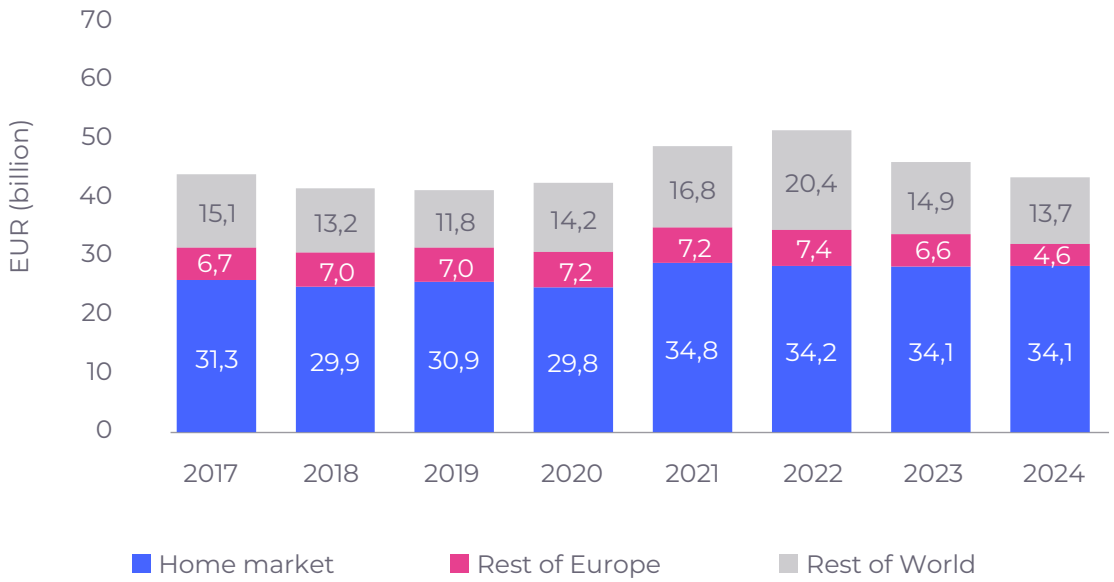
[4] At the time of writing, not all relevant data for 2024 was available, largely owing to limited reporting by altnets and JVs in FTTH. We collate capex data from various commercial and non-commercial sources, and the data is subject to major retrospective revisions. Capex includes expenditure on assets in the course of construction.
[5] Reference State of the Digital Decade, 2025, European Commission.

In 2024 about 49% of capex went on FTTH (unchanged from 2023), and a further 19% on 5G including investments in multi-RAT network equipment (slightly down from 2023). In other words, almost two thirds of investment is going on new, faster and more reliable access networks.[6] The main components of the 'Other' category are metro and transport networks and IT and cloud infrastructure, as well as maintenance capex on legacy fixed networks, but it also includes capex attributed to new services and capabilities for the digital ecosystem such as cloud, AI and cybersecurity. The rise in the proportion of spend on 'Other' in 2024 may indicate that operators are beginning to invest more in other parts of the digital sphere that may deliver better growth prospects than pure connectivity.

CONNECT EUROPE MEMBERS INVESTED EUR38.7 BILLION IN EUROPE IN 2024 PLUS EUR13.7 BILLION OUTSIDE EUROPE

Investments in 'home markets' (i.e. where the member is the former incumbent operator) were maintained at historically high levels.

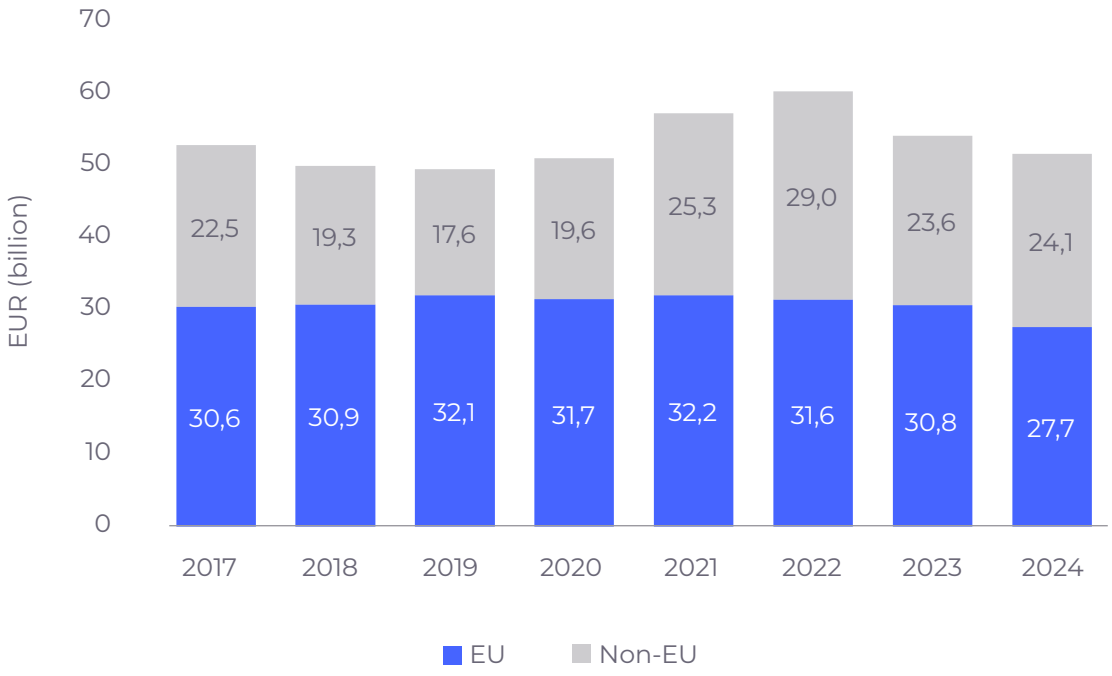
FIG 2.6 : Connect Europe member capex (excluding spectrum costs), home markets, rest of Europe and rest of the world, 2017–2024 [Source: Analysys Mason, 2025]



[6] The figures exclude payments for spectrum and other licences.

Much of the decline in 2024 in the 'rest of Europe' category can be attributed to divestments (particularly in Spain and Switzerland). The decline in rest of the world capex since 2022 is largely attributable to a single factor: capex at Deutsche Telekom group company T-Mobile USA has fallen as basic 5G coverage nears completion. **FIG 2.7** shows that EUR27.7 billion of Connect Europe members' capex was invested within the EU, representing about 53% of Connect Europe group capex.

FIG 2.7 : Connect Europe member capex (excluding spectrum costs), EU and non-EU, 2017-2024 [Source: Analysys Mason, 2025]



CONNECT EUROPE MEMBERS ACCOUNTED FOR OVER TWO THIRDS OF OPERATOR INVESTMENT IN 2024

Connect Europe members' capex in Europe stood at EUR38.7 billion in 2024. Total operator capex in Europe stood at EUR57.2 billion. Total capex for all European telecoms networks (including non-operator capex) stood at EUR64.6 billion. Non-operators include: towercos, neutral host wireless infrastructure owners, fibre network owners that do not operate that infrastructure, telecoms facilities owners, content and applications providers (CAPs) for telecoms networks only.

FIG 2.8 : Connect Europe member capex in Europe only (excluding spectrum costs), total operator capex, and total capex in Europe, 2017–2024 [Source: Analysys Mason, 2025]

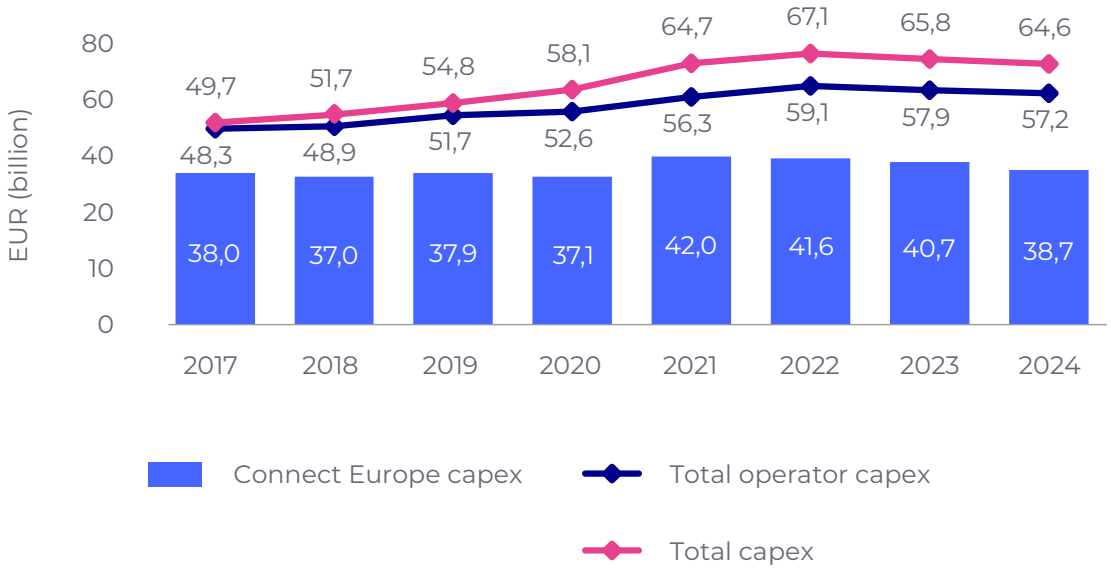


FIG 2.9 shows the split of European capex by operators (excluding investments by non-operators) between Connect Europe members and other operators. On the basis of telecoms operator capex alone, Connect Europe represents 67.7% of capex. The decline in share since last year's figure of 69.5% is inorganic (MasOrange and Sunrise are excluded). On a like-for-like basis, the share is broadly flat.

FIG 2.9 : Split of operator capex between Connect Europe members and other operators, Europe, 2024 [Source: Analysys Mason, 2025]

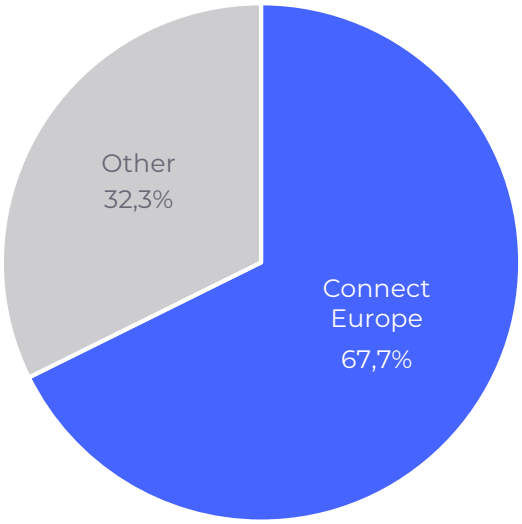
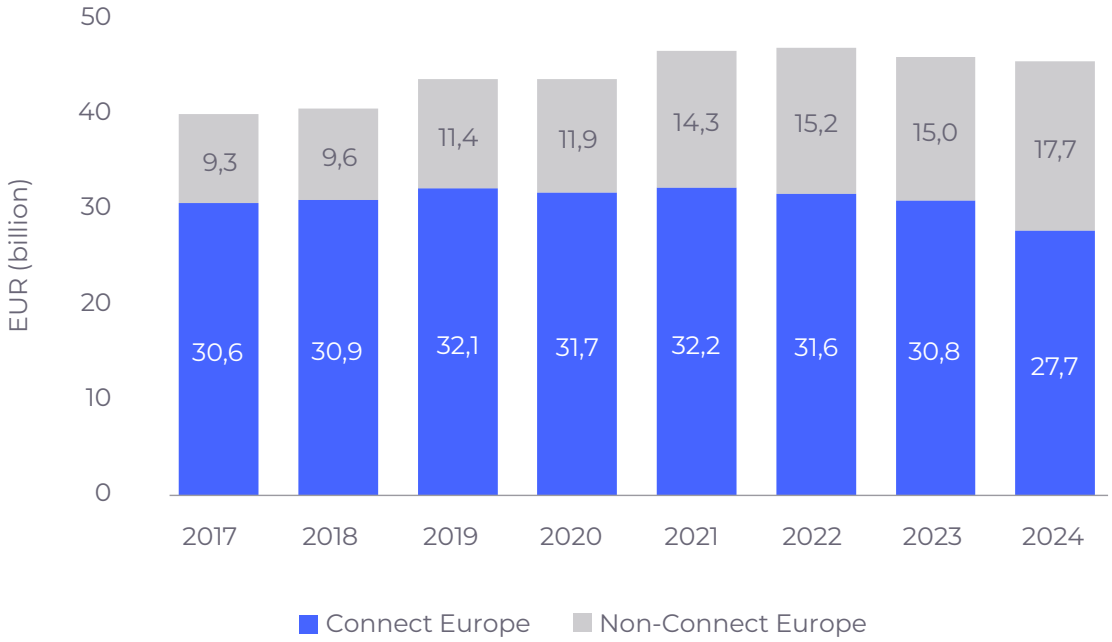


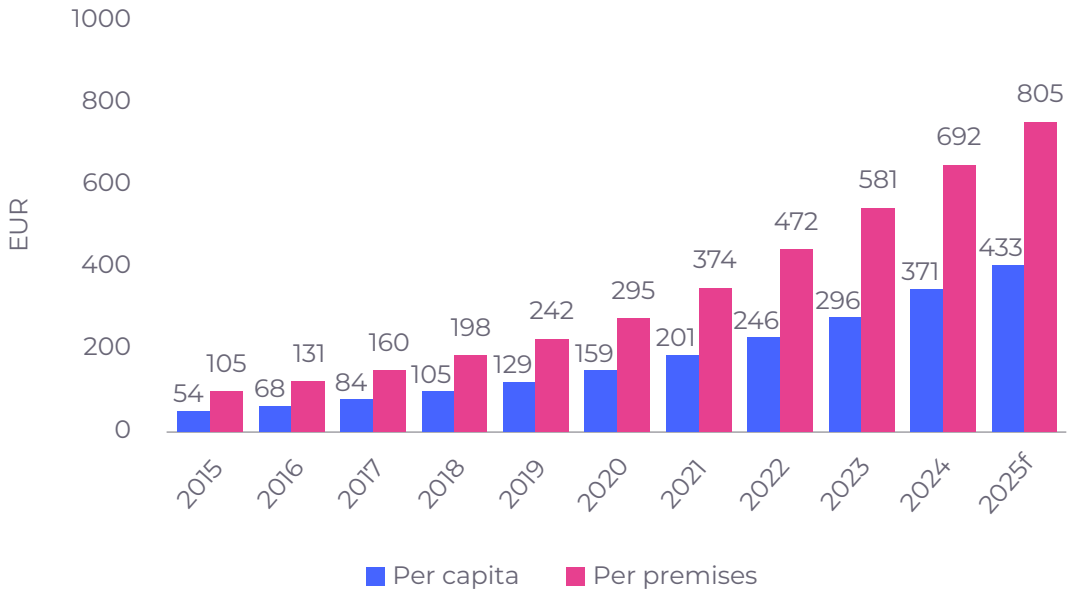
FIG 2.10 : Total operator capex, EU27, Connect Europe and non-Connect Europe, 2017-2024 [Source: Analysys Mason, 2025]



Connect Europe share of FTTH investment stood at 54% in 2024

FTTH has been by far the largest single component of European operator capex for the past five years. By the end of 2024 cumulative capital investment in FTTH in Europe stood at EUR371 per capita, or EUR692 per premises (including those not yet covered by any FTTH). These high figures speak of the elevated level of FTTH infrastructure overbuild in Europe. In 2024 the ratio between aggregate premises passed of all infrastructure-based FTTH plays and the number of unique premises passed stood at 1.46 to 1.

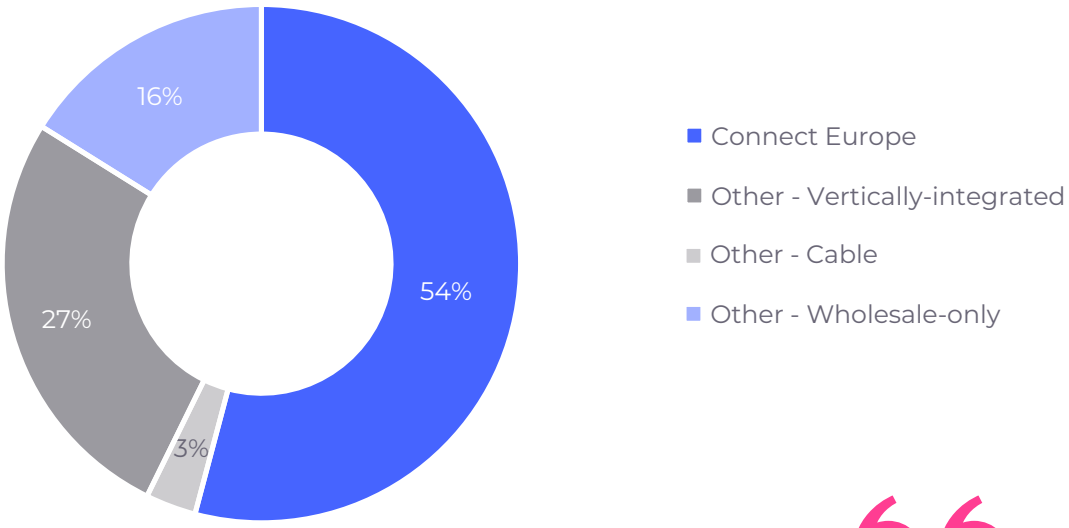
FIG 2.11 : Cumulative FTTH capex per capita and per premises, Connect Europe and others, 2015–2025f [Source: Analysys Mason, 2025]



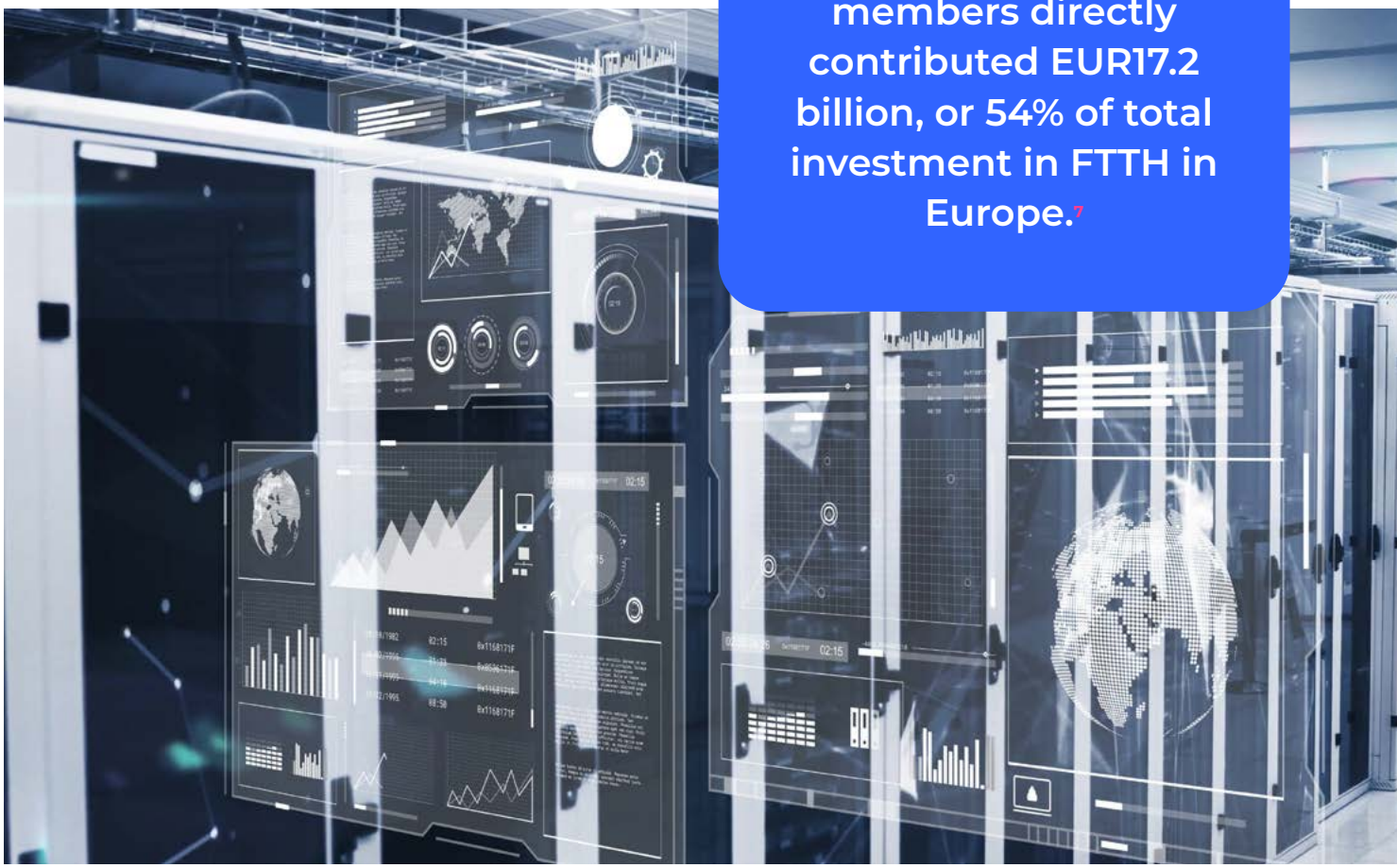
Fixed access capex is distributed among a greater number of players than mobile capex. High hundreds of new regional and local FTTH players compete with the established telecoms operators. These can be split into two groups: wholesale-only infrastructure businesses, which are fewer and generally larger, and vertically-integrated operators that participate in the retail market. Many of the wholesale-only entities are joint ventures between existing operators and institutional investors.

Cable operators' investments in fixed broadband can be divided into two camps: those that are self-overbuilding their legacy hybrid fibre coax (HFC) plant with FTTH, and those that are upgrading their HFC-based technologies (DOCSIS3.1 and DOCSIS4.0). Self-overbuilding is more capex-intensive than the latter, although cable operators will be looking to FTTH to deliver not only improved network performance but also substantially lower ongoing opex. Nevertheless, some cable operators will switch to using a third-party for FTTH, and some may acquire existing FTTH infrastructure. **FIG 2.12** below shows approximate share of FTTH capex, and therefore does not include upgrades to DOCSIS.

FIG 2.12 : Split of FTTH capex between Connect Europe members and other operator types, Europe, 2024 [Source: Analysys Mason, 2025]



Connect Europe members directly contributed EUR17.2 billion, or 54% of total investment in FTTH in Europe.[7]

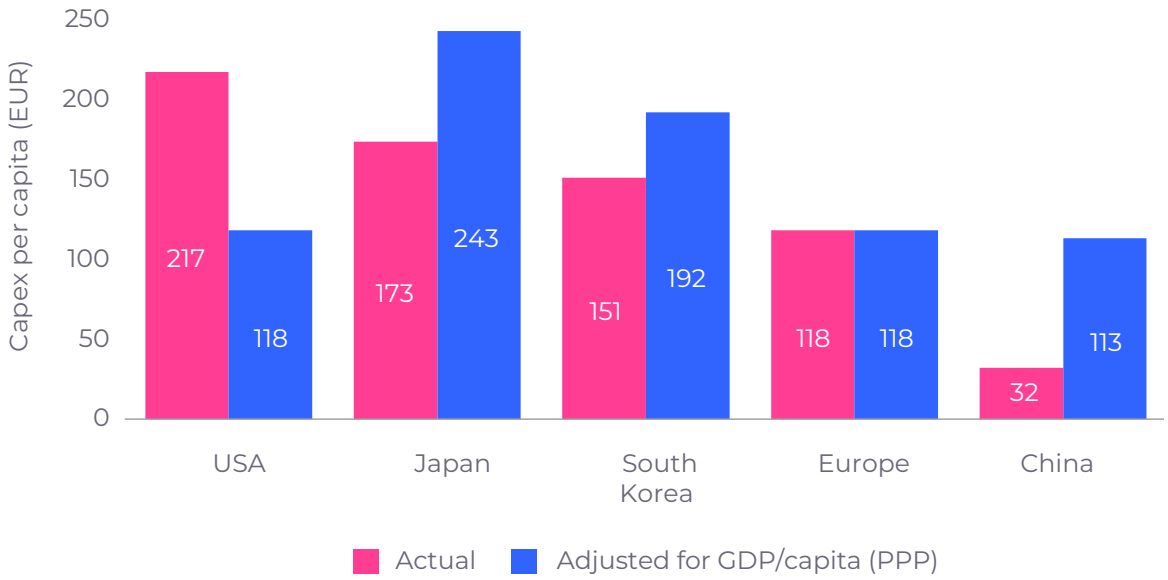


[7] Shares are not directly comparable with last year's shares. Connect Europe membership at the end of 2024 included a cable operator, Liberty Global, plus two wholesale-only operators, Fibercop (whose membership became effective in 2025) and TDC NET. These are excluded from the wholesale-only and cableco shares so as not to double count.

COMPARED WITH SIMILAR MARKETS, CAPEX PER CAPITA IS LOW, BUT CAPEX INTENSITY IS HIGH

FIG 2.13 shows total capex per capita in Europe compared with advanced economies: China, Japan, South Korea and USA.

FIG 2.13 : Capex per capita, nominal and adjusted for GDP/capita, China, Europe, Japan, South Korea and the USA, 2024 [Source: Analysys Mason, 2025]

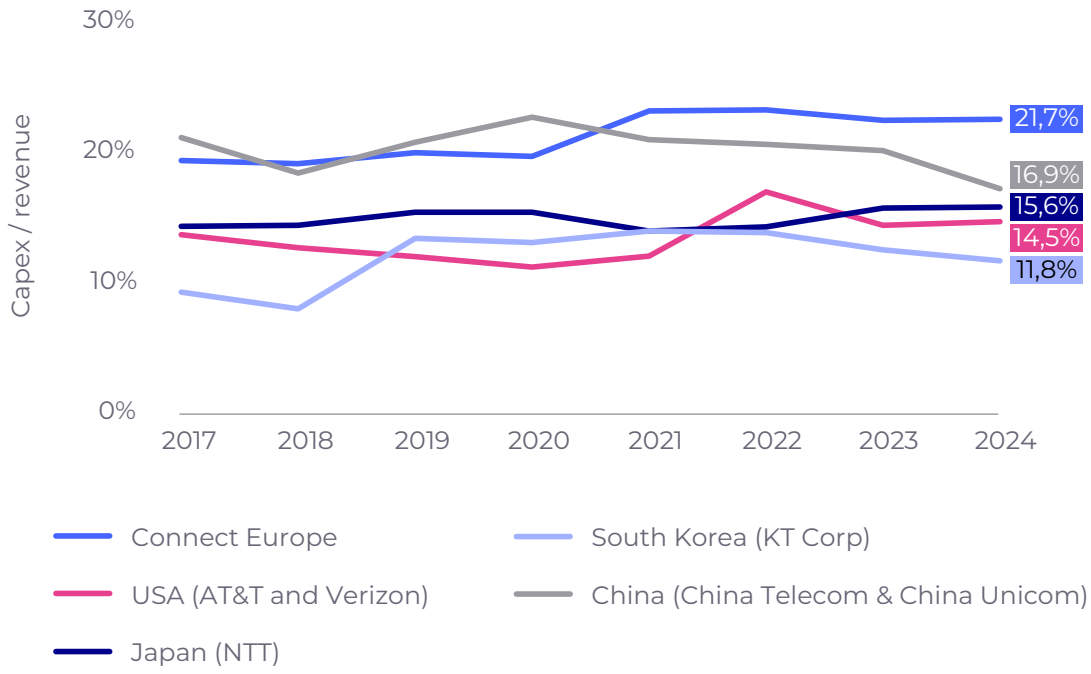


When adjusted for GDP per capita, the differences with USA and China are less marked, but European capex per capita remains substantially lower than in Japan and South Korea. Nevertheless the actual investment per capita is still substantially lower than that in the USA. Operators in all three Asian markets have a more broadly-based and diverse set of investments across the digital economy than those in Europe, and their investments in telecoms networks (in particular fibre and 5G) are smaller as a proportion of total investments.

The difference between GDP per capita in the USA and that of Europe has kept widening, and hence the difference between the nominal and adjusted figure for the USA is greater than in last year's report. The fact that the ratio between the two has grown is of course what the Draghi report on European competitiveness sought to address.

In their home markets (that is, where Connect Europe members are not challenger operators), Connect Europe member capital intensity is high, and substantially higher than comparable operators in China, Japan, South Korea and USA. Continued heavy investment in FTTH contributes to this, but there is an underlying structural aspect that has affected the European sector for over a decade and impacted its commercial sustainability. Low ARPU means low revenue, making capex intensity high even if capex per capita is not.

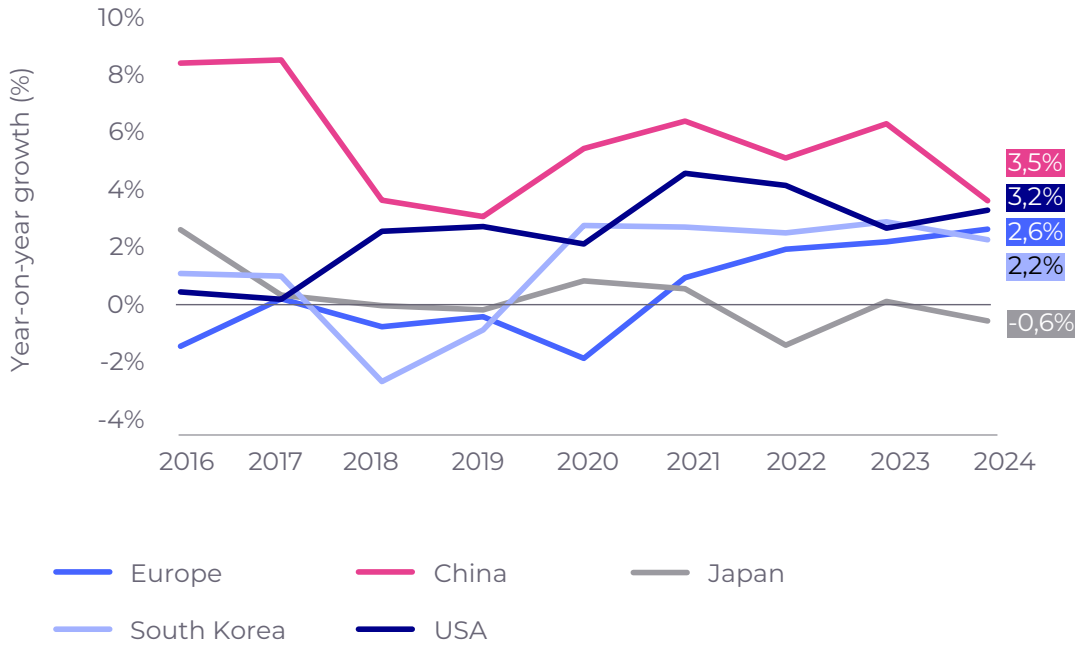
FIG 2.14 : Capital intensity in home markets, Connect Europe members and comparable leading operators in China, Japan, South Korea and the USA, 2017–2024 [Source: Analysys Mason, 2025]



EUROPEANS ENJOY LOW PRICES BY GLOBAL STANDARDS, BUT THIS HAMPERS OPERATORS' ABILITY TO INVEST AND GROW

Retail revenue growth of basic fixed and mobile services[8] in the European telecoms sector stood at 2.6% in 2024, up from 2.1% in 2023. Growth was broadly in line with that in China, South Korea and USA, but higher than in Japan. Growth in revenue is measured in local currencies, and in EUR for all of Europe, including for non-Eurozone countries.

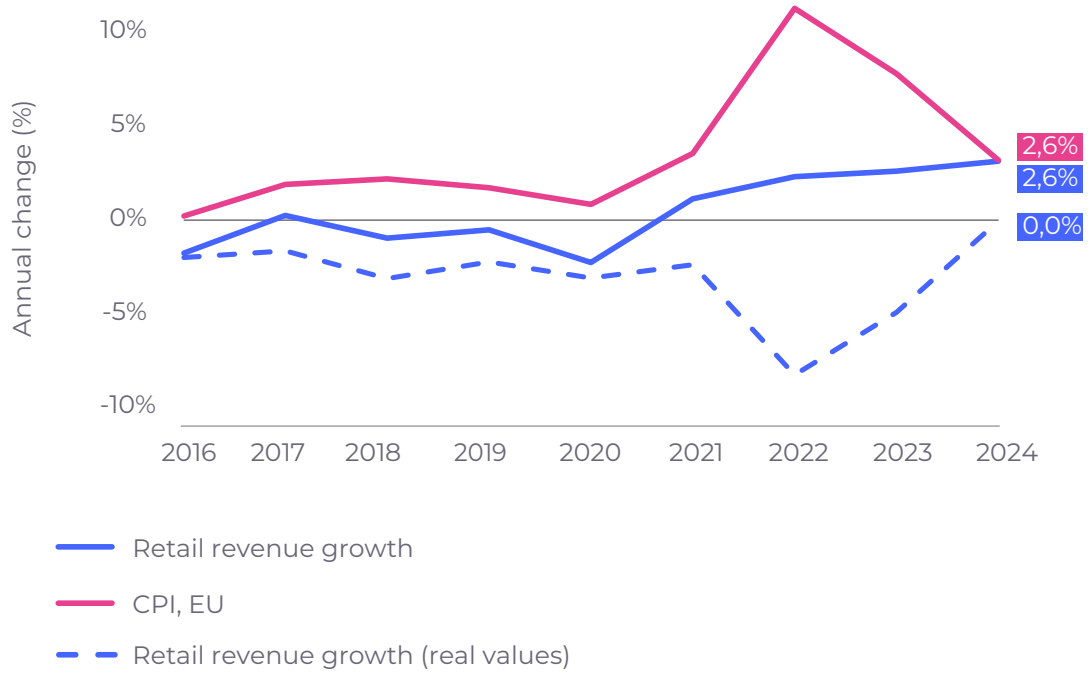
FIG 2.15 : Revenue growth for mainstream services, China, Europe, Japan, South Korea and USA, 2016-2024 [Source: Analysys Mason, 2025]



[8] Retail revenue for mobile services, fixed broadband and fixed voice.

This modest growth is actually the best performance in this measure for nearly two decades. CPI in the EU27 rose 2.6% in 2024, so in real terms this is standing still, but a substantial improvement on 2023, when in real terms it fell 4.0%. Mobile retail revenue, just over half of revenue, and fixed retail revenue grew at approximately the same rate.[9]

FIG 2.16 : Revenue growth for mainstream telecoms services compared to inflation, EU, 2017-2024 [Source: Analysys Mason, 2025]

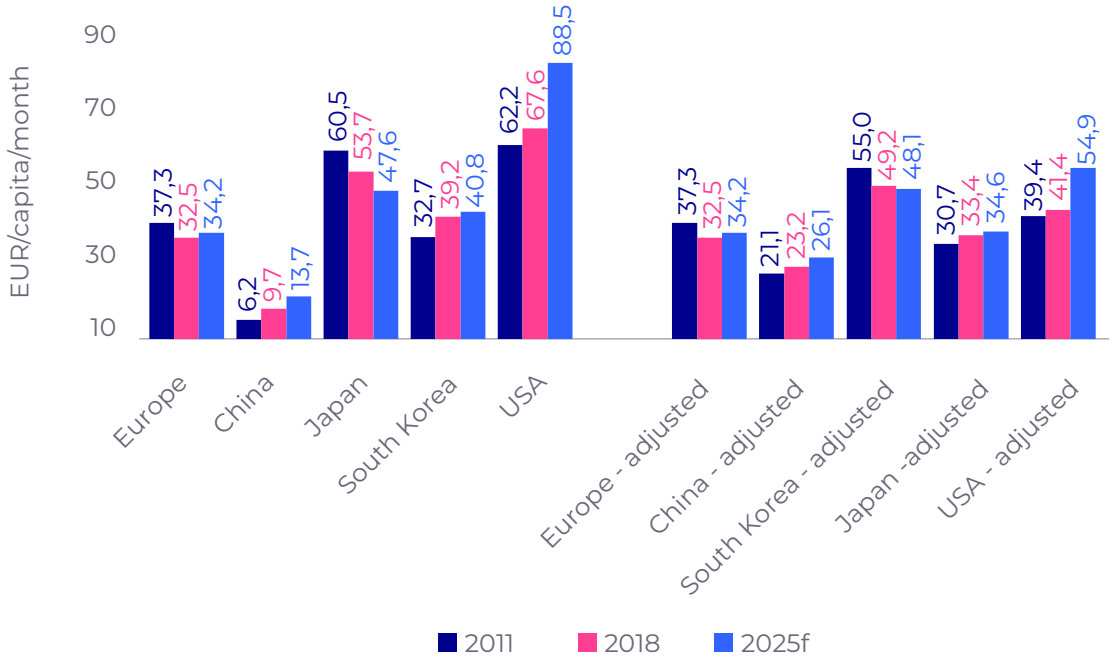


Since 2018, average spend per capita on telecoms services in the comparator countries has been heading in different directions. European spend per capita appears to have reached a trough, and has picked up again slightly in the past two years. Spend per capita has increased in the world's two largest economies, and plateaued in South Korea. The figures for Japan reflect the falling value of the yen in relation to the euro; in yen the average spend per capita has been broadly flat for the past seven years.

Demographic factors will affect future operator fortunes in many developed economies because of declining populations. Japan's population has been in steady decline since 2007, and the populations of China and South Korea have started to shrink. US population continues to grow. UN data and projections indicate that Europe's population has peaked and will start to decline. Whether the atomisation of household size offsets these changes will be an increasingly important issue for operators' businesses.

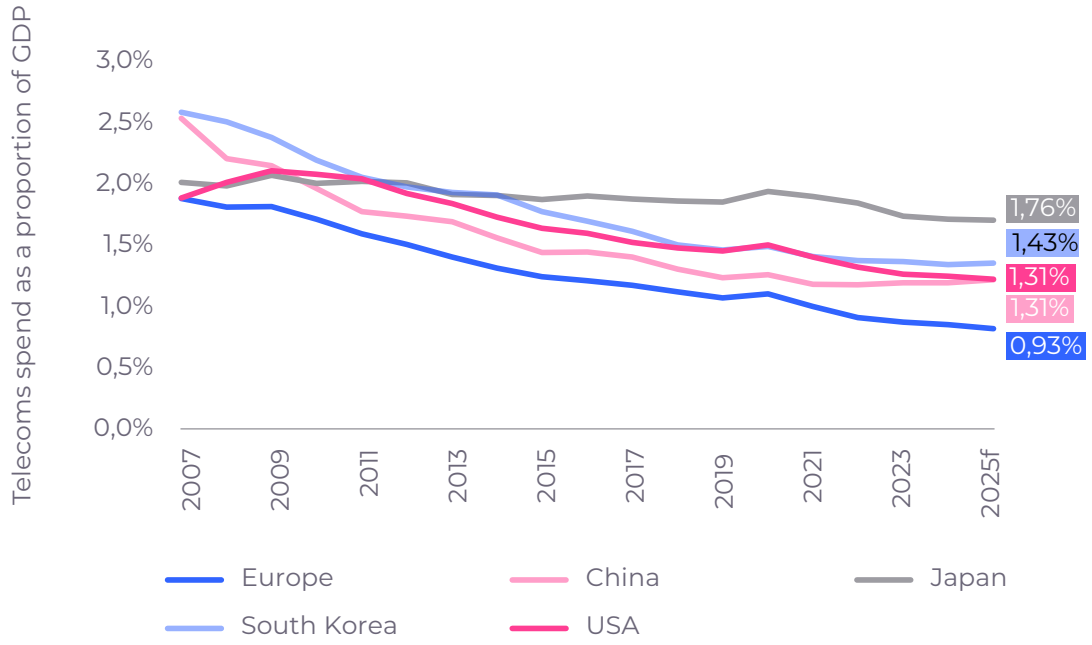
[9] Given the high level of bundling of fixed and mobile, especially in the consumer segment, accurately assessing the mobile/fixed split of revenue is increasingly difficult.

FIG 2.17 : Average spend per capita on mainstream telecoms, nominal and adjusted for GDP/capita (PPP), China, Europe, Japan, South Korea and the USA, 2011, 2018 and 2025f [Source: Analysys Mason, 2025]



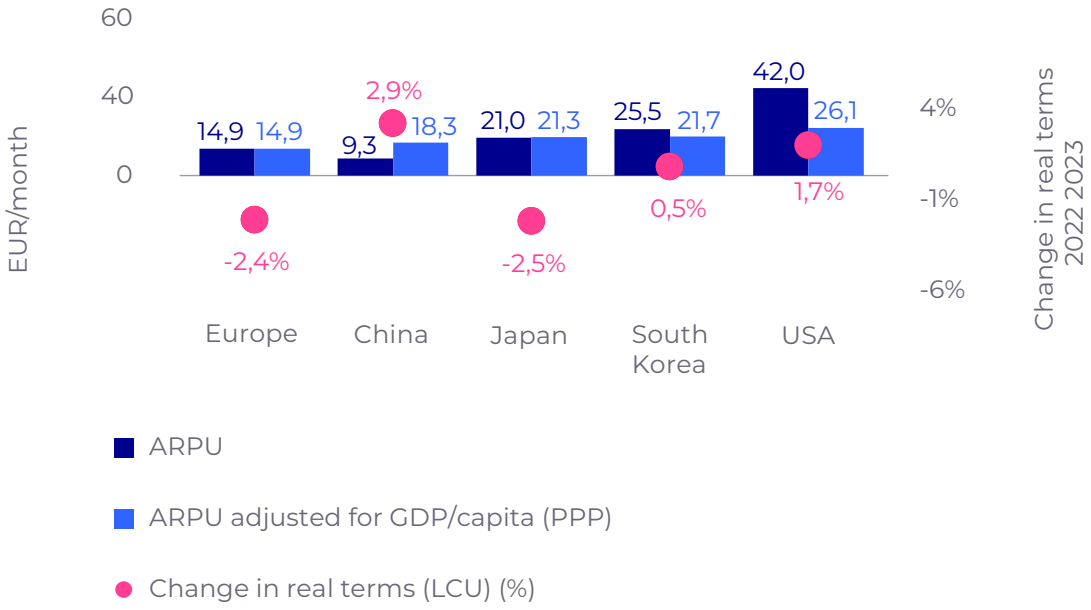
Mainstream telecoms revenue is a declining proportion of GDP. The rate of decline in Europe is similar to other developed markets, but the proportion of GDP is lower. Despite a modest uptick in revenue in 2024, Europe still spends less in proportion to GDP than comparator countries. Regulatory initiatives have likely resulted in artificially low prices, jeopardising the economic feasibility of operators' long-term investment plans.

FIG 2.18 : Telecoms spend as a proportion of GDP, China, Europe, Japan, South Korea and the USA, 2008–2025f [Source: Analysys Mason, 2025]



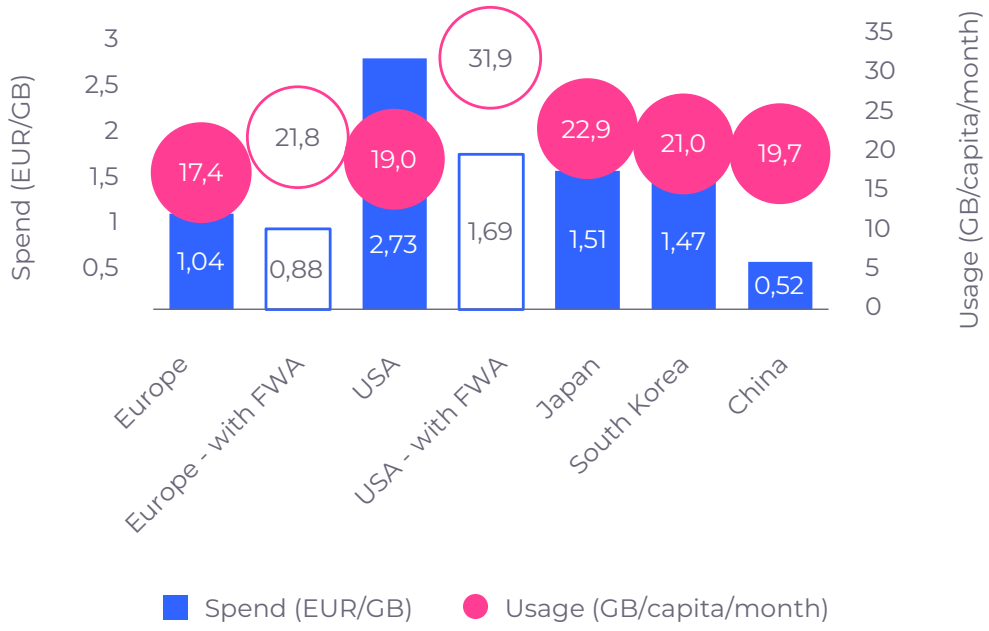
Average revenue per user (ARPU) in mobile remains low in Europe (**FIG 2.19**), and in real terms it is lower than all of the comparator countries. This is not because consumption is low: the differences between Europe and other similar countries are small. It is because competition, maintained at a high level by public policy, has driven down prices. Low prices may be perceived as good for consumers and businesses in the short term, but they are not fit for encouraging long-term investment in new, innovative services, network evolutions, or for investing in network coverage where the commercial case is marginal: indeed they often make the commercial case for network expansion non-existent.

FIG 2.19 : Mobile ARPU (excluding IoT SIMs), nominal and adjusted for GDP/capita (PPP), and change in real terms (LCU), Europe, USA, Japan, South Korea and China, 2024
[Source: Analysys Mason, 2025]



The differences between average European and comparator country usage of mobile networks in terms of gigabytes per month are narrowing, but the European average usage disguises huge differences between European countries in average usage. These differences can to a large extent be explained by the varying levels of fixed broadband penetration; in those countries where a larger proportion of people has no home Wi-Fi, mobile data usage tends naturally to be much higher. Major differences between Europe and comparator markets persist in revenue per gigabyte consumed. Revenue per used gigabyte of mobile data in the USA is almost double that in Europe.

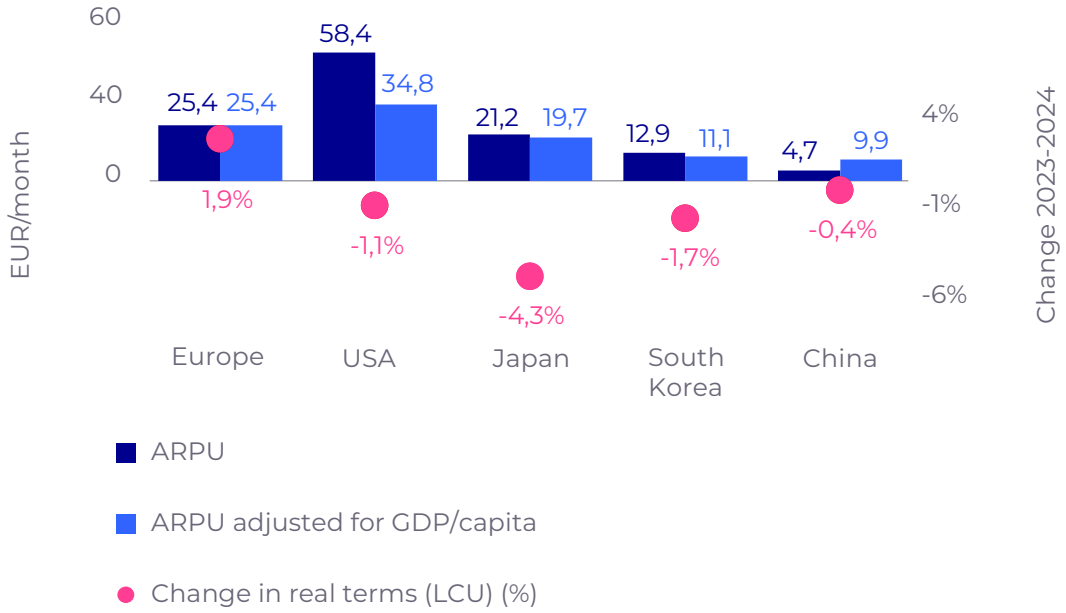
FIG 2.20 : Average spend per gigabyte of mobile data used and average mobile data usage per capita, China, Europe, Japan, South Korea and the USA, 2024 [Source: Analysys Mason, 2025]



Fixed wireless access (FWA) is an important component of traffic on mobile networks in the USA (34% of total traffic in 2024), and to a lesser extent in Europe (18% of total traffic in 2024), but has much weaker impact in Japan, South Korea and China. FWA connections have an average traffic level that comes close to other fixed broadband connections, which is typically 20 to 30 times higher than mobile handset connections. The revenue per gigabyte of a FWA connection is therefore a tiny fraction of the revenue per gigabyte of a smartphone. Yet even when FWA traffic and revenue is taken into account, revenue per gigabyte of data in the USA is more than double that in Europe.

Fixed broadband ARPU in Europe is higher than in comparator Asian markets, but much lower than in the USA. It rose 4.6% in 2024, which is equivalent to 1.9% in real terms.

FIG 2.21 : Fixed broadband ARPU, nominal and adjusted for GDP/capita (PPP), and change in real terms (LCU), Europe, USA, Japan, South Korea and China, 2024 [Source: Analysys Mason, 2025]



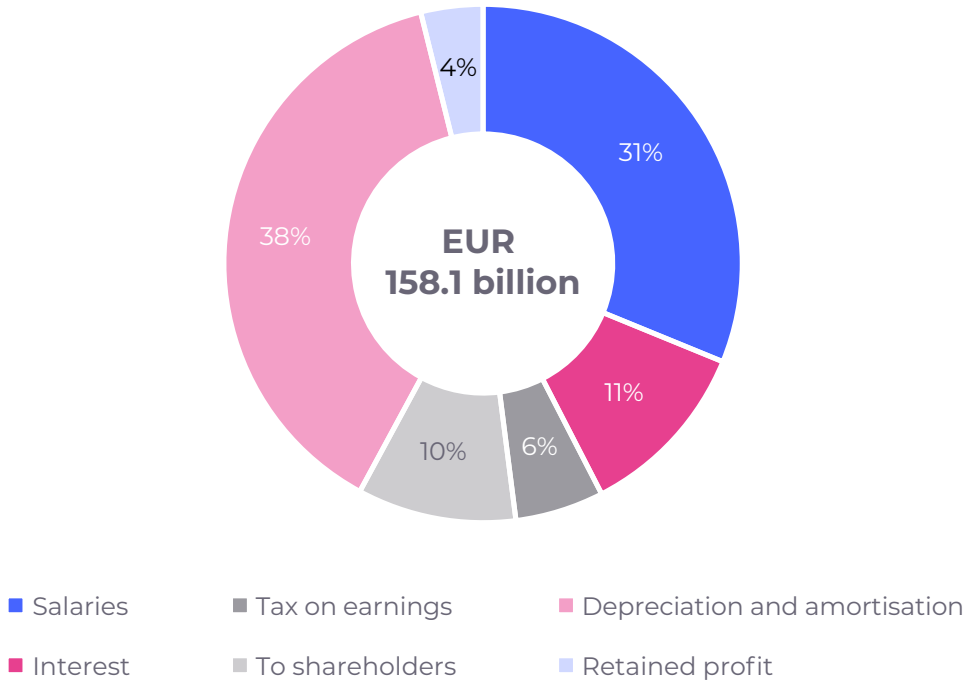
The USA has easily the highest monthly fixed broadband ARPU at EUR58.4. The USA has historically had lower levels of infrastructure competition in fixed broadband than Europe, although recent investment in FTTH coverage, plus the launch of competitive FWA services, have increased competition for the cable players, which remain the largest players in the market. It also, critically, imposes no ex ante SMP regulation in broadband access, which results in a more benign financial environment for operators.

Unlike in Europe, where the reverse is generally true, fixed-mobile convergence packages in Asia tend to treat fixed broadband as a bolt-on to mobile subscriptions. This tends to depress recorded ARPU value for fixed broadband, and may actually, as in China, create multiple (and often inactive) fixed broadband subscriptions per household.

CONNECT EUROPE MEMBERS' BROADER SPENDING DELIVERS FURTHER INDIRECT BENEFITS FOR EUROPEANS

Value-added, essentially revenue minus the non-personnel cost to provide service, stood at EUR158.1 billion in 2024. The distribution of this value has substantial indirect benefits for the broader European economy.

FIG 2.22 : Distribution of value-added, Connect Europe members at the group level, 2024 [Source: Analysys Mason, 2025]



Connect Europe members' personnel costs in Europe alone amounted to EUR30.9 billion in 2024, down 6.9% from EUR33.2 billion in 2023, and total directly employed staff fell 4.1%. This is partly a consequence of excessive competition, which drives down prices and leads to a pursuit of efficiency to support investment. Revenue per directly employed staff rose 2.8% in 2024 over 2023.

Connect Europe members paid around EUR38.5 billion in direct taxes (tax on earnings and other direct taxes) and indirect taxes (VAT and salary deductions) for their European operations in 2024; this is equivalent to about 21% of their revenue base. Around 15% of this tax base is made up of property taxes and telecoms-specific charges such as recurring spectrum licence fees (but not the prices paid at auction), fees for using numbering resources, specific taxes on telecoms assets (such as pylons and copper), universal service costs, the cost of financing national regulatory authorities and obligations to finance other sectors (such as public national-language TV).

Most Connect Europe members have distributed ownership, but a high proportion of shareholders are institutional investors such as pension funds. Hence the sustained net profitability of the industry has a direct impact on Europeans' well-being. Aggregate net profit for Connect Europe members, at a group level, stood at EUR23.4 billion in 2024, up 47% from 2023. In 2024, Connect Europe members distributed EUR15.8 billion in dividend payments related to 2023 income, up 11% over the previous year.

03

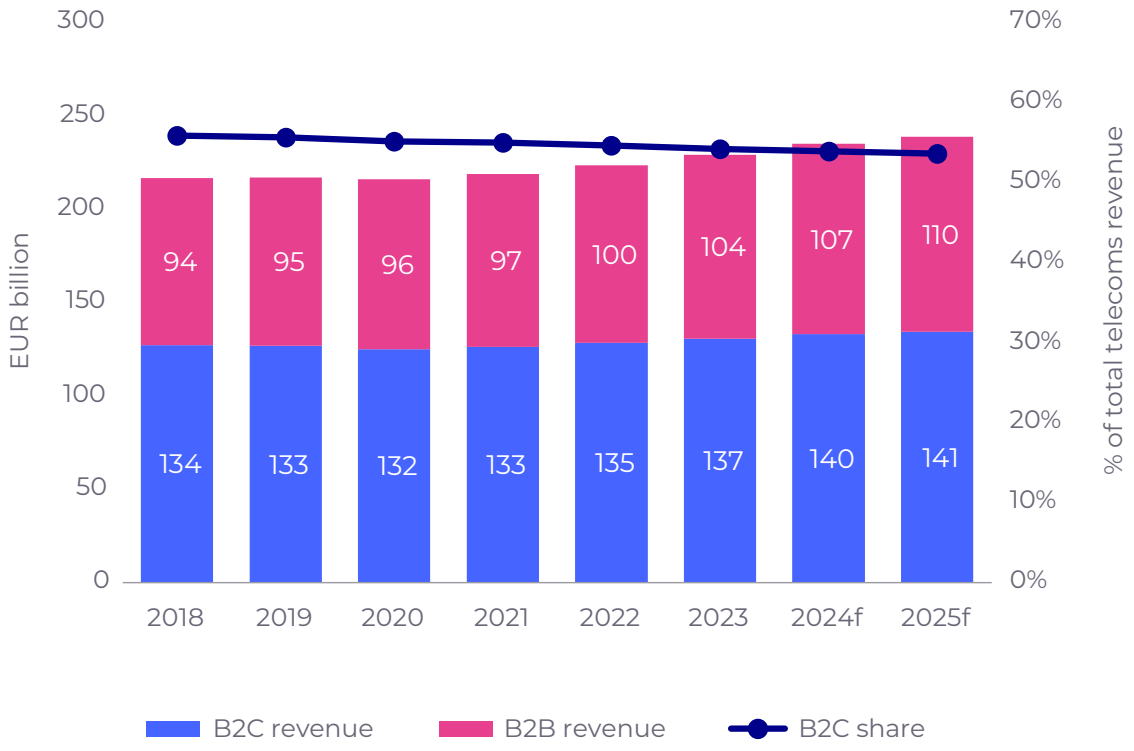
Evolving demand for connectivity and digital services

European telecoms operators are projected to generate EUR251 billion in retail revenues in 2025, up 1.6% from EUR247 billion in 2024 (FIG 3.1). The business-to-consumer (B2C) market is the largest, accounting for slightly more than half of all retail revenue.

The share of the retail telecoms market accounted for by the consumer and business segments is evolving slowly over time. The business-to-business (B2B) market is growing marginally faster. Operators face stiff competition in both markets, but the B2B market has presented more opportunity to innovate in recent years, which has enabled operators to sustain slightly stronger revenue growth. B2B revenue growth of 2.8% is forecast for 2025.

Consumer revenue is expected to account for approximately 56.3% of all retail revenue by the end of 2025 (**FIG 3.1**), down from 57.9% in 2020.

FIG 3.1 : Operators' B2B and B2C retail revenue and the B2C share of the total telecoms retail revenue, Europe, 2018–2025f [Source: Analysys Mason, 2025]



The following sections examine the dynamics of the consumer and business telecom markets, as well as their evolution.

CONSUMER CONNECTIVITY AND DIGITAL SERVICES

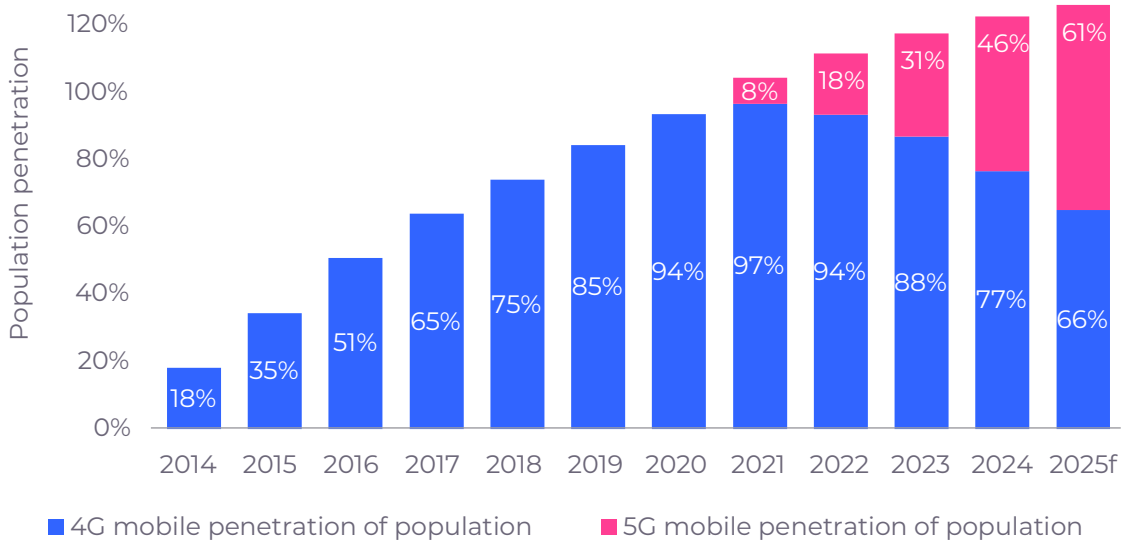
Mobile connections

5G services are now widely accessible across most European countries and 5G adoption is rising as a consequence. 5G population penetration in Europe rose from 30.9% in 2023 to 46.2% in 2024, and is projected to reach 61.4% in 2025 (**FIG 3.2**).

The growth is being enabled by increasing 5G coverage, improved affordability of 5G-capable devices, and increased inclusion of 5G connectivity within service plans as standard.

Mobile population penetration as a whole exceeds 100%, as there are more connected mobile devices than people in Europe.

FIG 3.2 : Population penetration of 4G and 5G, Europe, 2014–2025f [Source: Analysys Mason, 2025]

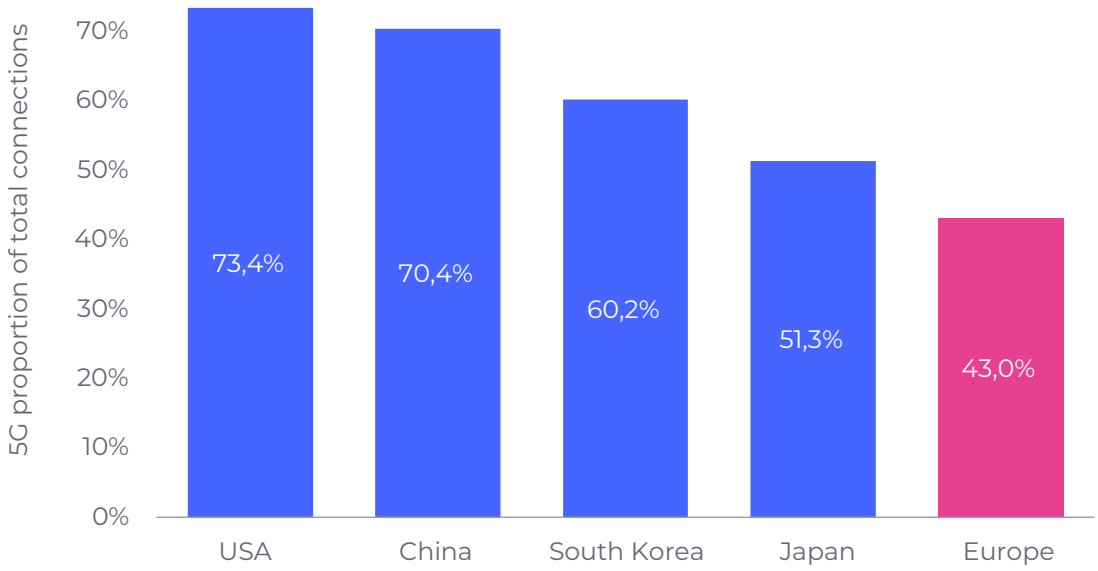


As of the end of June 2025, 5G accounted for 43% of all mobile connections in Europe[10]. The 5G share of connections varies significantly among countries in the region, with some, such as Denmark, Germany, and Austria, having around a 60% 5G share of connections. At the same time, some countries, such as Lithuania and Romania, are still below the 20% threshold.

[10] This figure is lower than 5G penetration because overall mobile penetration (connections per 100 people) exceeds 100%.

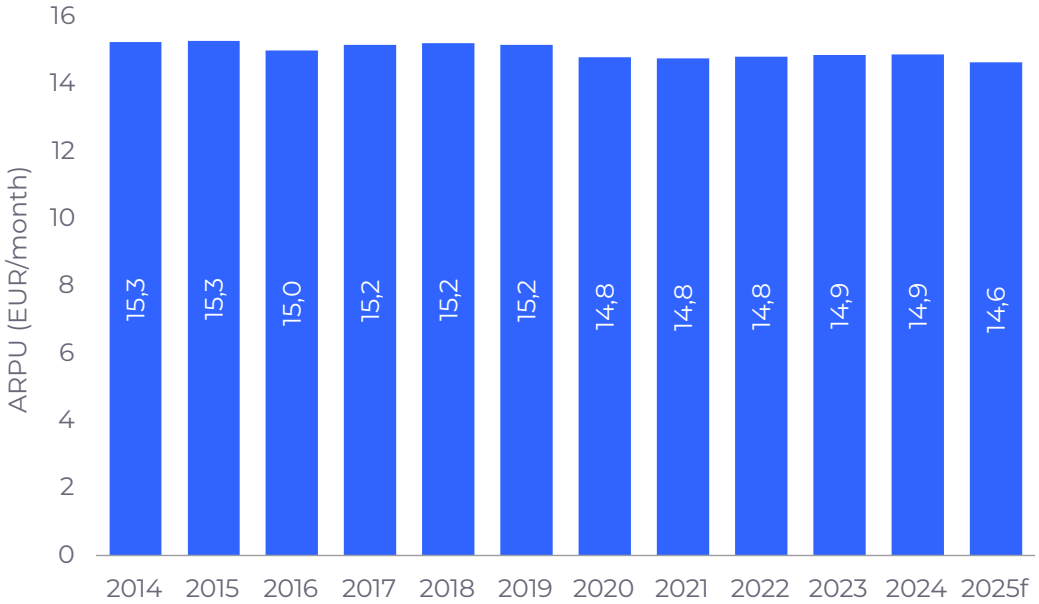
Europe still lags behind countries such as the USA, China, South Korea and Japan in terms of 5G adoption (**FIG 3.3**). Nonetheless, Europe is catching up. 5G share of connections increased by 14 percentage points (pp) in Europe in 2Q 2025 year-on-year, while it increased by only 7 pp in the USA, 10pp in China, 5pp in South Korea and 7pp in Japan.

FIG 3.3 : 5G share of all mobile connections, China, Europe, Japan, South Korea and the USA, 2Q 2025 [Source: Analysys Mason, 2025]



Despite increasing adoption, 5G has so far not resulted in significant revenue growth for operators. Mobile ARPU was flat in 2024 (**FIG 3.4**), and is expected to fall back slightly in 2025. Taking into account inflation ARPU would have decreased in 2024. Operators find it difficult to charge a premium for 5G services, making it challenging to monetise their investments in the new network.

FIG 3.4 : ARPU for mobile services, current values, Europe, 2014-2025f [Source: Analysys Mason, 2025]



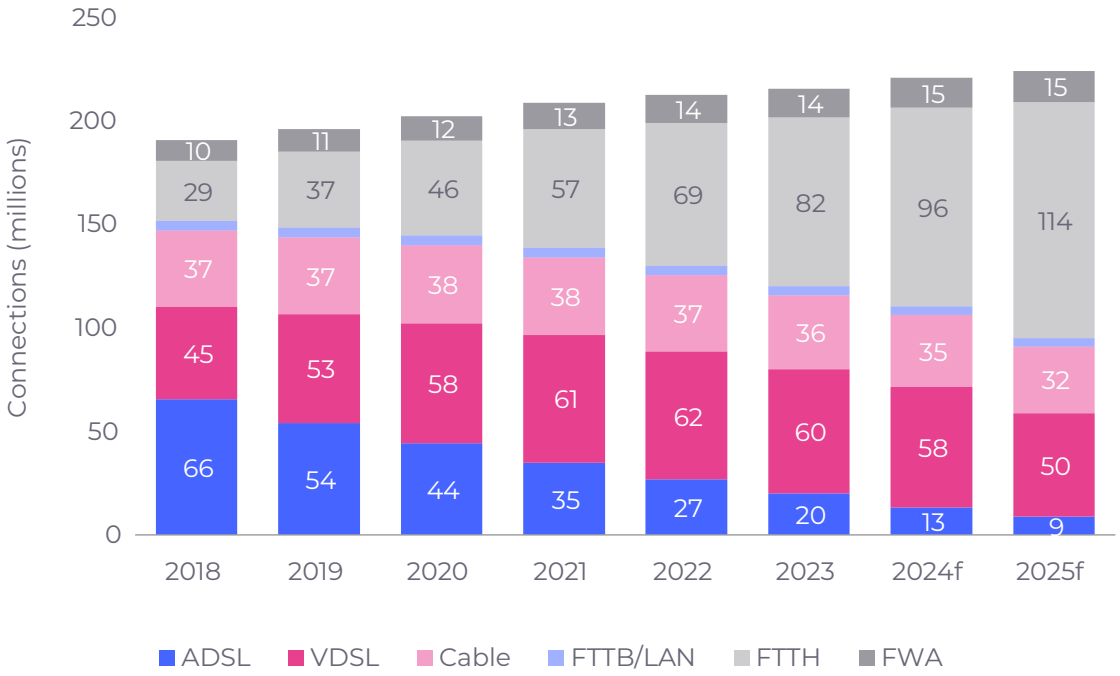
Fixed broadband connections

Since 2018, the fixed broadband market has experienced notable change. The increased emphasis on FTTH has led to a sharp decline in xDSL-based services. ADSL connections fell from 66 million in 2018 to only 13 million in 2024 (**FIG 3.5**). Additionally, the number of VDSL connections began to decline in 2023.

Cable broadband has historically been a common technology choice for the delivery of broadband access services; however, with the rapid expansion of fibre, cable's role has started to decline. While cable broadband technology continues to deliver gigabit-capable internet, a significant number of cable operators have made the decision to shift their investment towards FTTH networks due to the superior reliability of FTTH technology, the larger ecosystem of vendors, and its capacity to meet future demands. Importantly, FTTH networks also promise lower opex than cable networks (through reduced maintenance and energy costs), and a lower ongoing environmental impact.

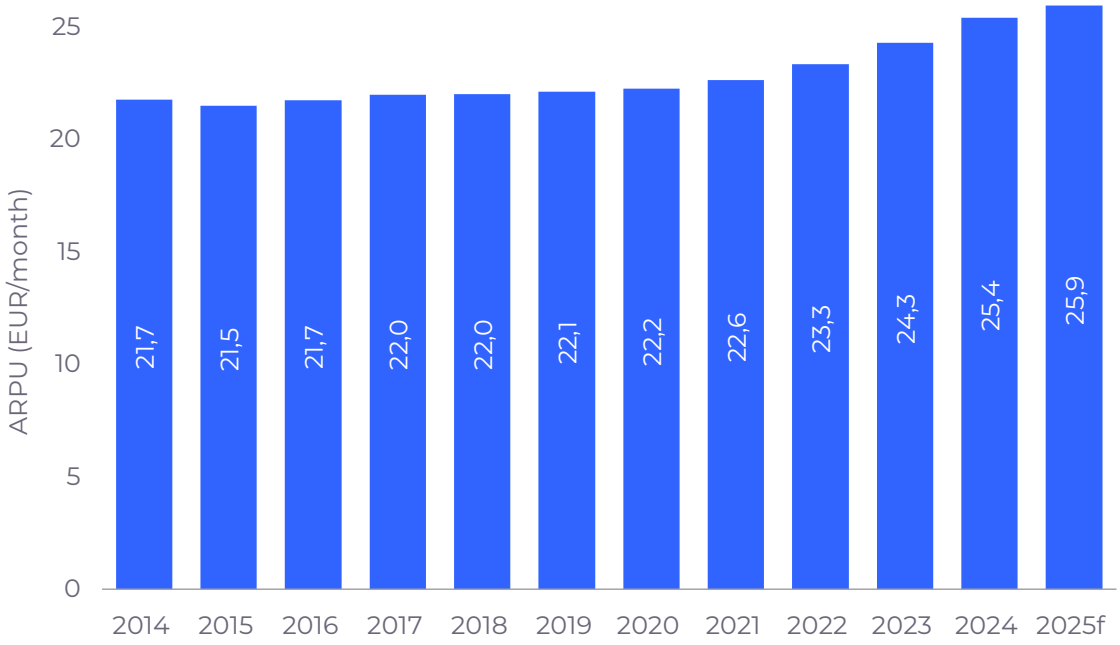
The FWA market is expected to grow, but the extent of expansion will differ significantly between countries. FWA accounts for only a small share of total connections. It is offered in areas where deploying fibre has been difficult or too costly, or in some cases by challenger operators without their own fixed networks in a region. Countries like Austria and the Czech Republic, traditionally mobile-focused markets, will continue to have a higher share of FWA compared with other European nations.

FIG 3.5 : Fixed broadband connections by technology, Europe, 2018–2025f
[Source: Analysys Mason, 2025]



Fixed broadband ARPU increased by 4.6% year-on-year in 2024 (**FIG 3.6**) as a result of both inflation-related price increases and increasing migration of consumers to FTTH-based services. The rise is expected to continue in 2025, albeit more slowly than in 2024, as inflation has eased across Europe as a whole.

FIG 3.6 : ARPU for fixed broadband services, Europe, 2014–2025f [Source: Analysys Mason, 2025]

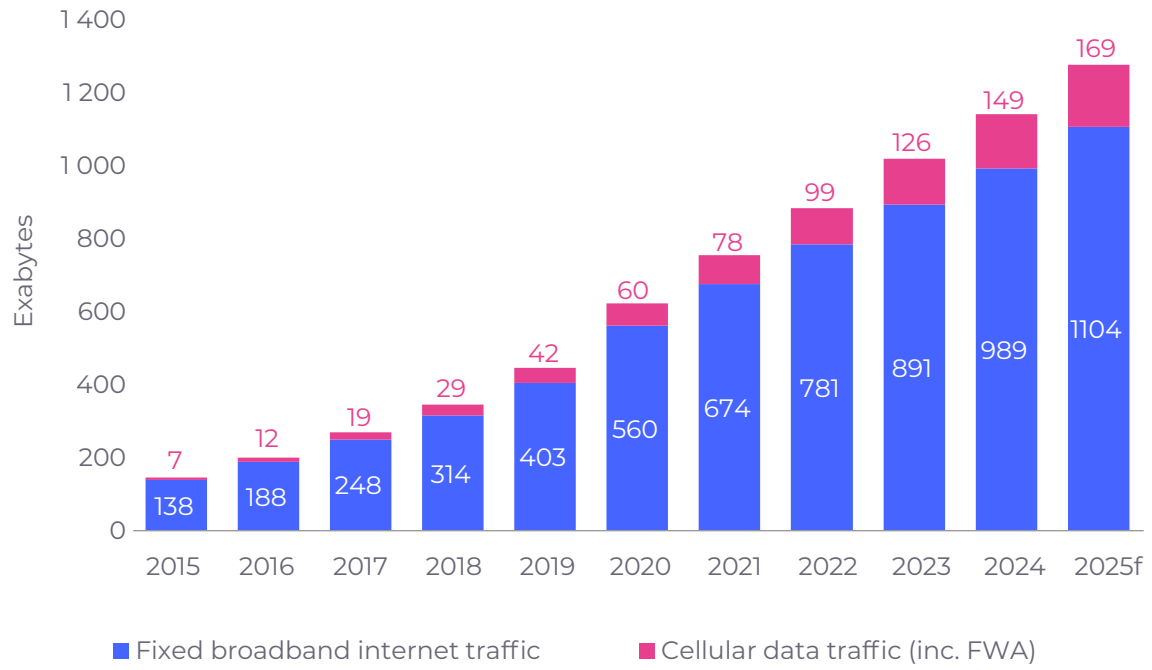


Fixed and mobile data usage trends

The consumption of mobile and fixed data continues to grow in Europe. Fixed internet traffic increased by 98.5 exabytes (11% year-on-year) in 2024 and is expected to rise by around 115 exabytes (11.6%) in 2025. Mobile data usage in Europe grew at a faster rate than fixed data usage in 2024 in percentage terms, although fixed data traffic still accounts for a much larger overall share. Mobile data traffic growth increased by 23 exabytes (18.3% year-on-year) in 2024 (down from 26.8 exabytes and 27% year-on-year in 2023). Mobile data traffic is expected to rise a further 19.7 exabytes (13.2% year-on-year) in 2025.

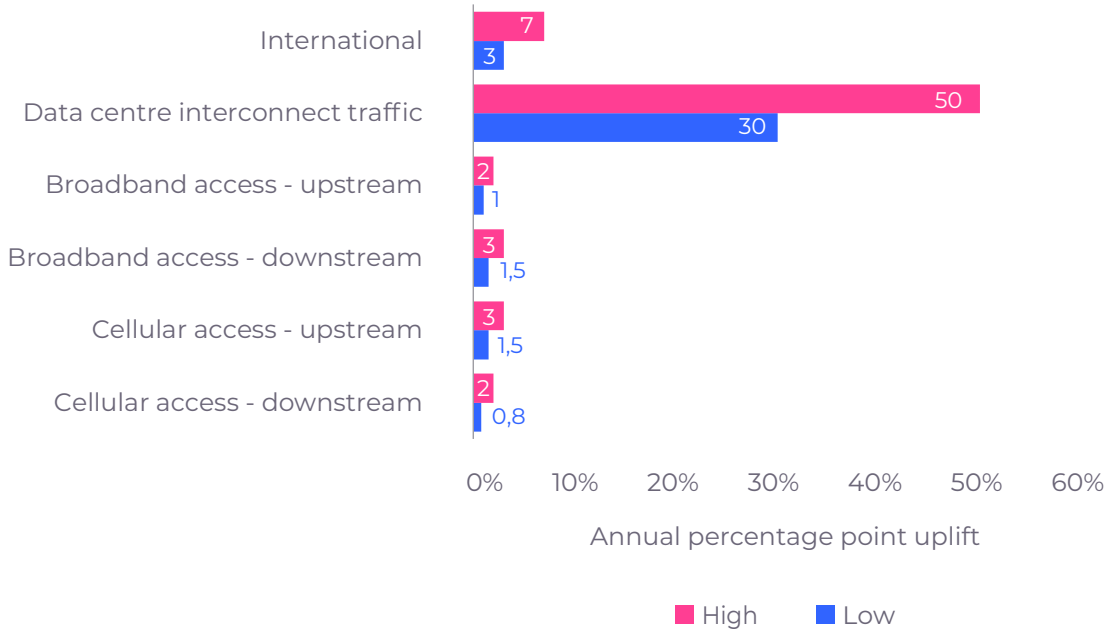
Fixed wireless access (FWA) is a significant driver of cellular data consumption, because unless users are substantially constrained by data-caps, households with FWA use their broadband connections in the same way that they would use a wired broadband connection. FWA broadband data traffic is dominated by streamed TV and video. FWA is not as widely adopted in Europe as it is in the USA, where FWA users have caused a tremendous surge in cellular network data usage, so the impact of FWA is more moderate in Europe.

FIG 3.7 : Fixed and mobile data usage, Europe, 2015–2025f [Source: Analysys Mason, 2025]



The impact of AI on traffic will be felt most in transport networks, where AI will continue to drive a tremendous uptick in traffic related to data-centre interconnect. Foundation models are often run across multiple campuses and metros in order to pool large numbers of processors. Much of this traffic will follow terrestrial routes, but increased flows between data centres (and particularly between hyperscale locations) will also lead to an uplift in international data traffic.

FIG 3.8 : Impact of AI on data traffic, AI share, high / low scenarios for traffic uplift attributable to AI, 2025 to 2030 [Source: Analysys Mason, 2025]



In access networks, the jury is out on exactly which user applications will drive most growth and how much growth will happen although it is commonly supposed that there will be a more discernible impact on upstream traffic (and the infrastructure needed to support that growth). In fixed and mobile access networks, the AI use-cases that look likely to have an impact include increased upload of consumer created content, increased usage of cloud gaming and virtual worlds (although some of this will substitute for TV/video consumption), and perhaps marginally increased consumption of TV and video content (although AI will most commonly lead to the replacement of one piece of TV content by another). AI use in the enterprise will lead to an uplift in telemetry and data sharing to feed AI models and rising use of inference services, and field staff will make more use of AR solutions.

Fixed–mobile convergence

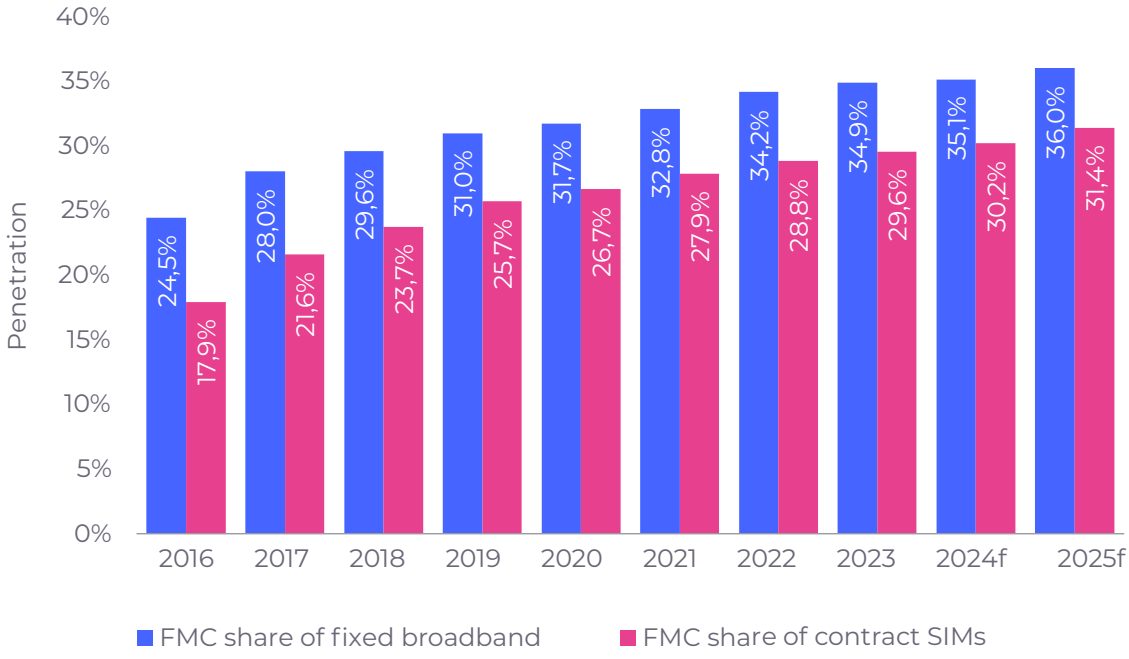
Operators utilise premium fixed-mobile convergence (FMC) bundles to boost the average spend per user (ASPU) within the higher-spending customer segment. Customers who purchase both fixed and mobile services from the same operator tend to spend more than those who buy these services from different providers. This enables operators to create and upsell premium bundles, thereby raising the ASPU.

FMC bundling has increased significantly in Europe over the past decade and is projected to continue growing in 2025. FMC's share of fixed broadband subscriptions and contract SIMs in Europe is expected to reach 36% and 31%, respectively, in 2025 (**FIG 3.9**).

The markets continue to shift towards convergence, albeit at different speeds, depending on the maturity of the FMC segment. FMC bundles are most common in Spain, France, Belgium, Portugal, and the Netherlands. However, Germany and Italy are expected to experience the fastest growth in FMC accounts, as they are relatively new FMC markets where FMC services only began gaining traction around 2020.

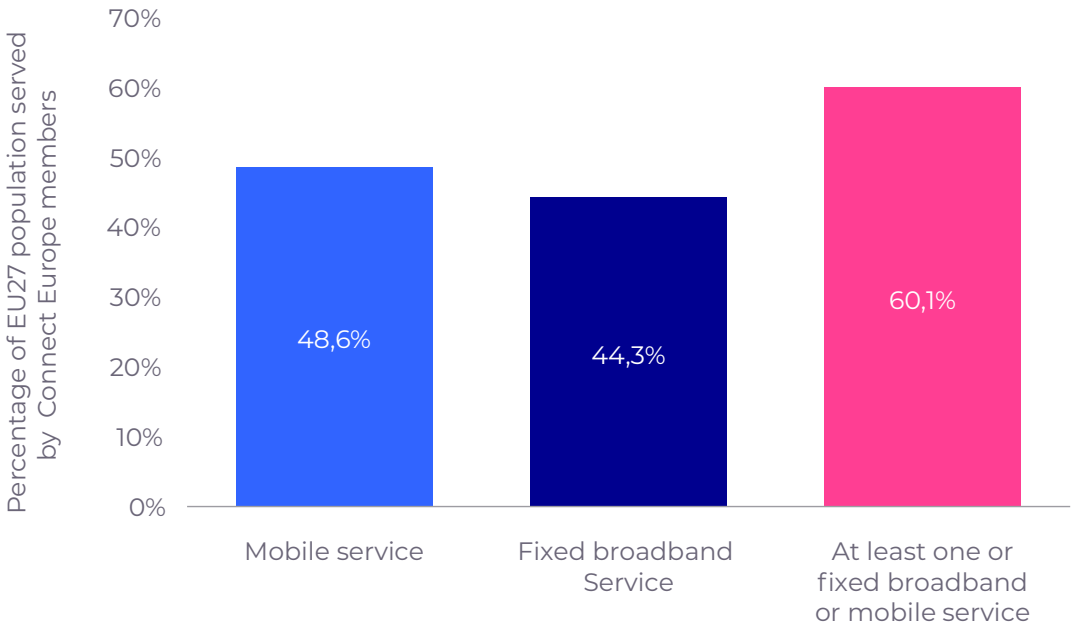
The adoption of FMC bundles is engendered by various factors, such as mergers between MNOs and ISPs, efforts by established providers to reduce customer churn or attract users from competitors, and wholesale business models that allow operators to enter the market without needing to own both fixed and mobile networks.

FIG 3.9 : FMC share of fixed broadband subscriptions and contract mobile SIMs, Europe, 2016–2025f [Source: Analysys Mason, 2025]



Connect Europe members' services are provided to 60.1% of Europeans (nearly 329 million people)

FIG 3.10 : Percentage of EU population supplied by Connect Europe members for mobile, fixed broadband and either mobile or fixed broadband, December 2024 [Source: Analysys Mason, 2025]

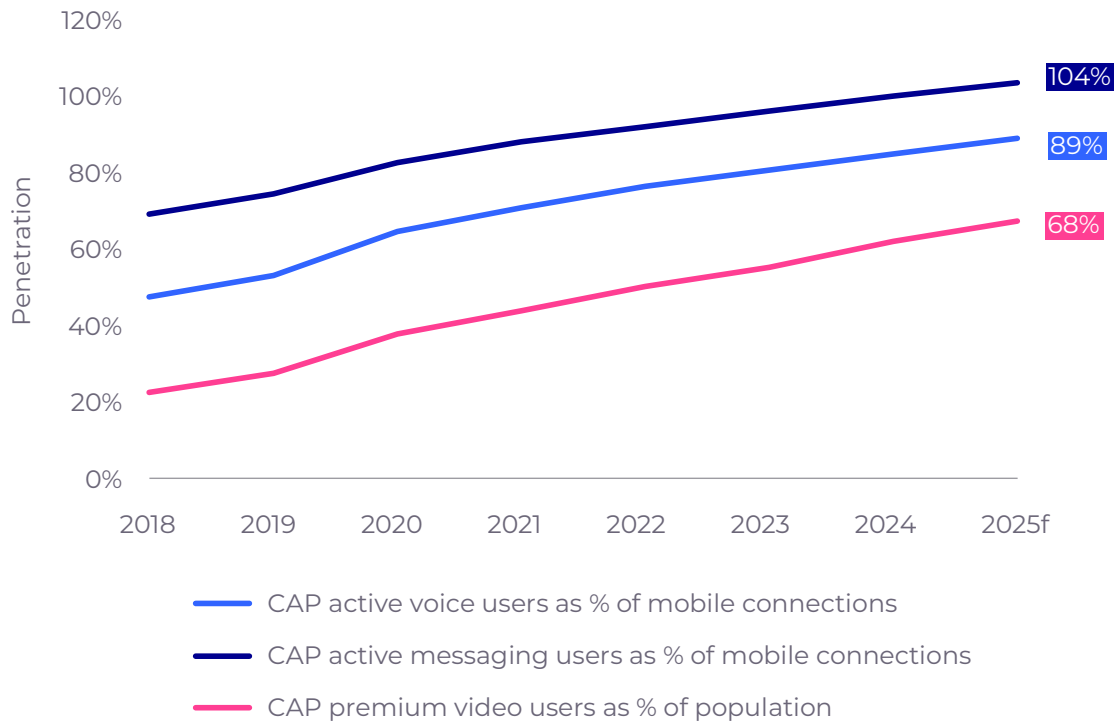


The members of Connect Europe provide their customers with a combination of fixed and mobile services, and between them they serve a substantial proportion of Europe's population. The Connect Europe members are estimated to serve 48.6% of the region's population with retail mobile services; and 44.3% of them with retail fixed broadband services. Some of those customers are supplied with both fixed and mobile services by the same operator, with the result that retail services provided by Connect Europe members are estimated to reach more than 60.1% of all Europeans[11].

B2C digital services: operators and content and application providers (CAPs)

CAPs achieved notable success by targeting segments within the communications industry through the deployment of web-based applications for telephony and messaging. Platforms such as Microsoft Teams and Zoom became popular for business use, while apps like WhatsApp, Facebook Messenger, and Snapchat, which are often integrated into social media, catered to consumer market needs. There are also other applications popular in specific regions, such as WeChat in China.

FIG 3.11 : Penetration of CAPs' services, active users, Europe, 2018–2025f
[Source: Analysys Mason, 2025]



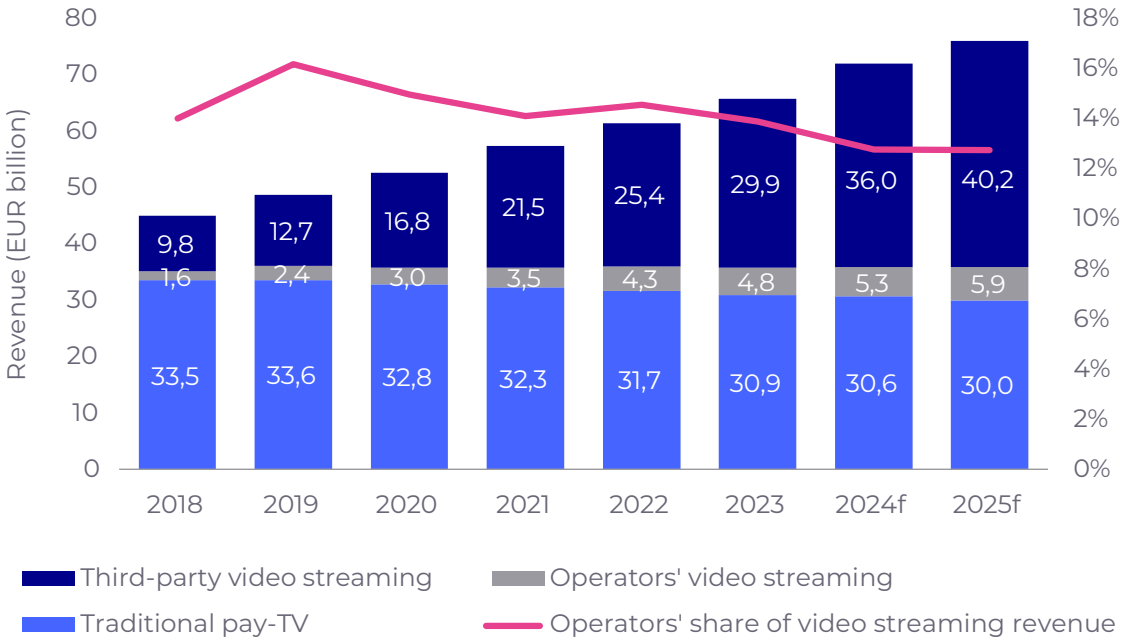
Messaging applications remain the most popular, with active user penetration exceeding 100% in 2024 (**FIG 3.11**). As many users maintain multiple accounts across various platforms, active user penetration is expected to rise further to 104% in 2025. The widespread adoption of messaging apps has led to a significant 40% decline in the number of SMS messages sent over mobile networks between 2018 and 2024, with a further decrease of 1.5% forecasted for 2025.

[11] Note that the numbers are not directly comparable to last year's report as they reflect changes in Connect Europe membership, and some significant divestitures by Connect Europe members.

CAP voice penetration is slightly lower than that of CAP messaging. It is expected to reach 89% in 2025. The CAP voice apps gained popularity due to their business use cases, the availability of video calls, lower international call costs, and the absence of roaming fees. The growing use of CAP voice has imposed more pressure on mobile voice traffic, which declined for the first time in 2022 and is expected to decrease by a further 3% in 2025.

The percentage of users of premium (paid-for) video applications is also increasing rapidly. With the continued success of services from companies such as Apple TV, Amazon, Disney+ and Netflix, premium video user population penetration is expected to reach 68% in Europe by the end of 2025. Most of these companies have also launched advertising-tier packages (offering discounted prices for packages with ads), which are becoming increasingly popular, with nearly 26% of all CAP premium video users expected to be in this segment by the end of 2025.

FIG 3.12 : Revenue from traditional pay TV services (all providers), network operator video streaming and third-party video streaming services, Europe, 2018–2025f, plus operators' video streaming market share (as %) [Source: Analysys Mason, 2025]



The revenue from pay-TV services continues to grow; with market expansion being driven by streaming services rather than traditional pay-TV services (that latter including cable TV, satellite TV, pay-DTT and operators' IP TV services). However, most of the growth in streaming services is being captured by third-parties rather than network operators (**FIG 3.12**). Network operator pay-TV revenue from IP-TV and streaming services is expected to increase by 0.5% in 2025. This is set against a fall in total revenues for pay-TV services delivered via satellite, cable and DTT TV, and an 11.5% growth in third-party streaming revenue.

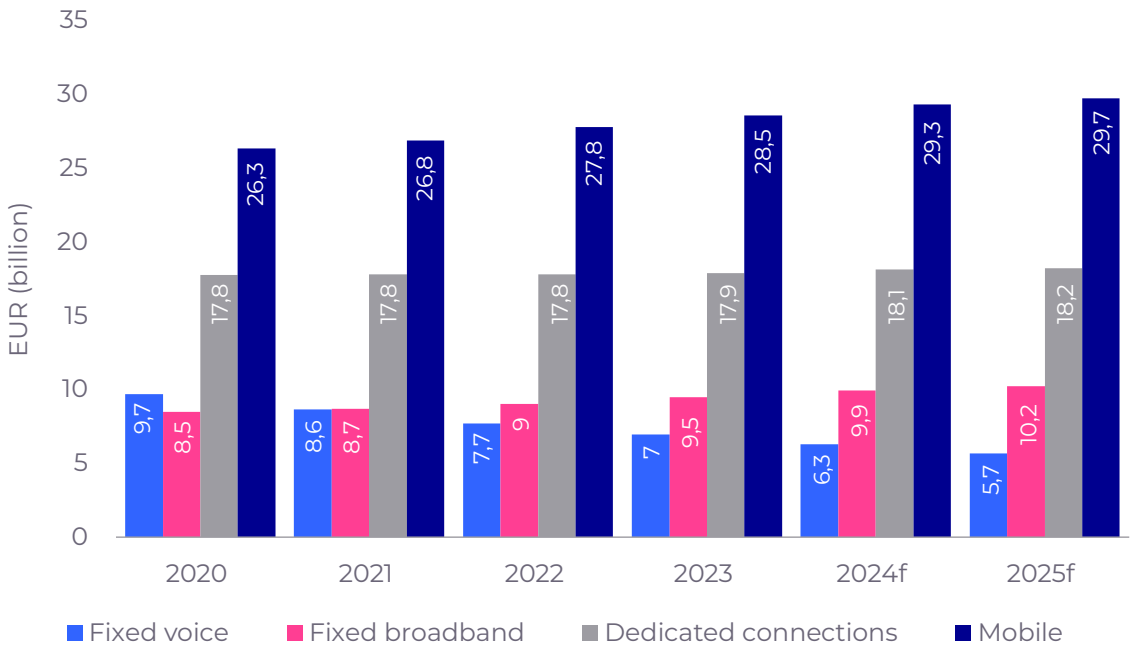
BUSINESS CONNECTIVITY AND DIGITAL SERVICES

Business connectivity

Retail revenue from B2B connectivity originates from four primary sources: fixed voice, fixed broadband, dedicated connections, and mobile connectivity services. Mobile connectivity services remained the largest segment, representing approximately 46% of all B2B retail revenue in 2024 (**FIG 3.13**).

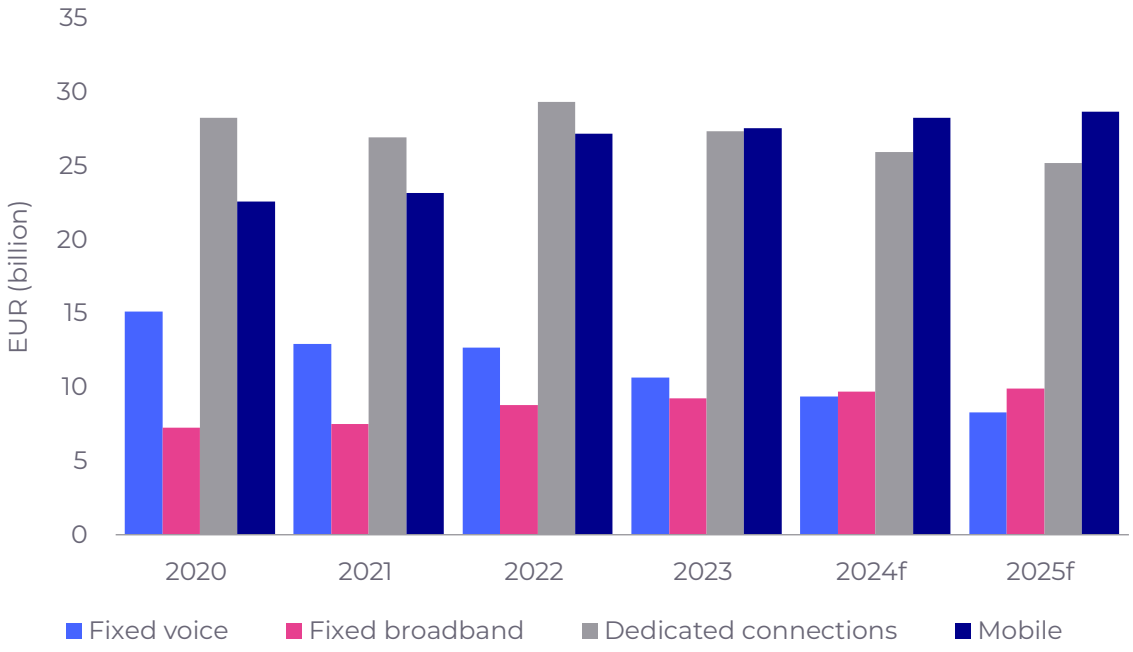
B2B retail revenue from fixed voice services continues to decline due to increased use of voice services supplied by content and application providers (CAPs) and the increased bundling of voice within contracts. The market for dedicated connections remained largely flat between 2020 and 2025, growing at a CAGR of 0.5%. Steady growth was achieved in the B2B mobile and B2B broadband segments with CAGRs of 2.4% and 3.8% respectively.

FIG 3.13 : Operators' B2B retail services revenue, Europe, 2020–2025f
[Source: Analysys Mason, 2025]



The US B2B retail market is around 12.5% larger than the European equivalent, and there are significant differences in fixed telecoms revenue mix (**FIG 3.13**). Dedicated connections represent a significantly larger portion of the market (35% compared to 29% in Europe); although revenue from these services has declined in 2023 and 2024 and is projected to continue decreasing in 2025. Fixed voice also contributes a greater share of revenue (11% versus 9%), and remained bigger than the fixed broadband services market until 2024, when US fixed broadband finally overtook the US fixed voice market. The fixed broadband and mobile markets account for smaller shares of the US market (14% and 40%) than they do the European one (16% and 47%).

FIG 3.14 : Operators' B2B retail services revenue, USA, 2020–2025f
[Source: Analysys Mason, 2025]



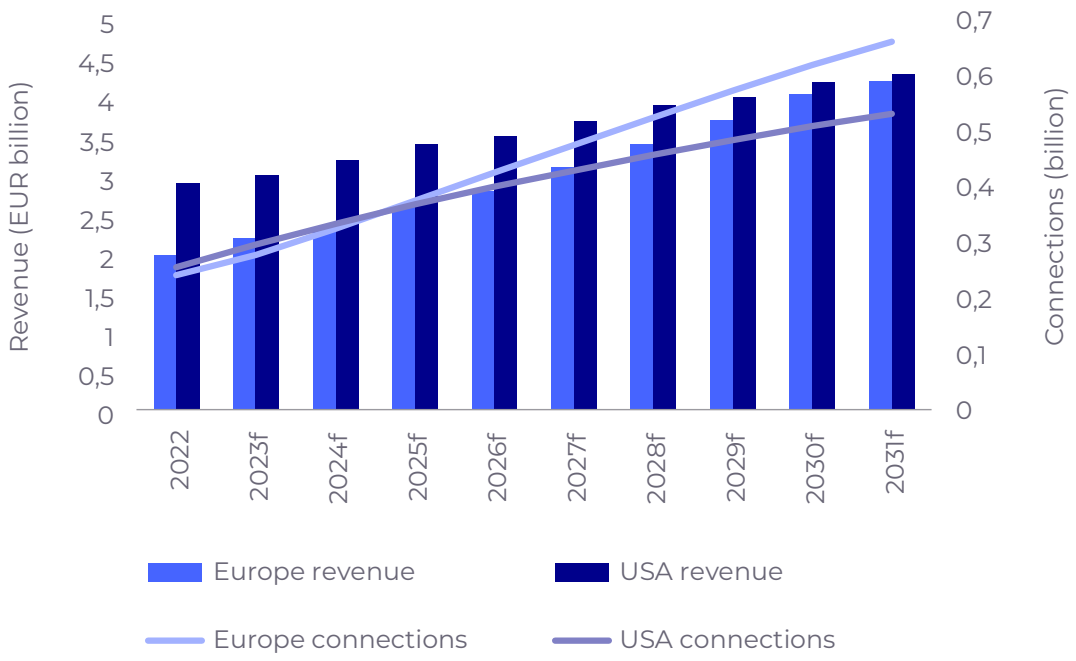
The Internet of Things

Growth in the Internet of Things (IoT) connectivity market has been slowed by strong connectivity pricing pressure, but the overall market will continue to expand between 2024 and 2031.

Strong competition will mean continued downward pressure on connectivity prices for operators (measured in terms of EUR per megabyte), but increased adoption of high bandwidth IoT applications will mean overall growth in revenues.

European operators' collective wireless IoT connectivity revenue (EUR2.3 billion) was around 28% lower than US operators' collective revenue (EUR3.2 billion) in 2024; but European operators are expected to catch up between 2025 and 2031. Operator revenues are projected to reach around EUR4.2 billion in Europe by 2031 (up 82% over the period) and EUR4.3 billion in the USA by 2031 (up 34%).

FIG 3.15 : Number of active wireless IoT connections and wireless IoT connectivity revenue, Europe, USA, 2022–2031f [Source: Analysys Mason, 2025]

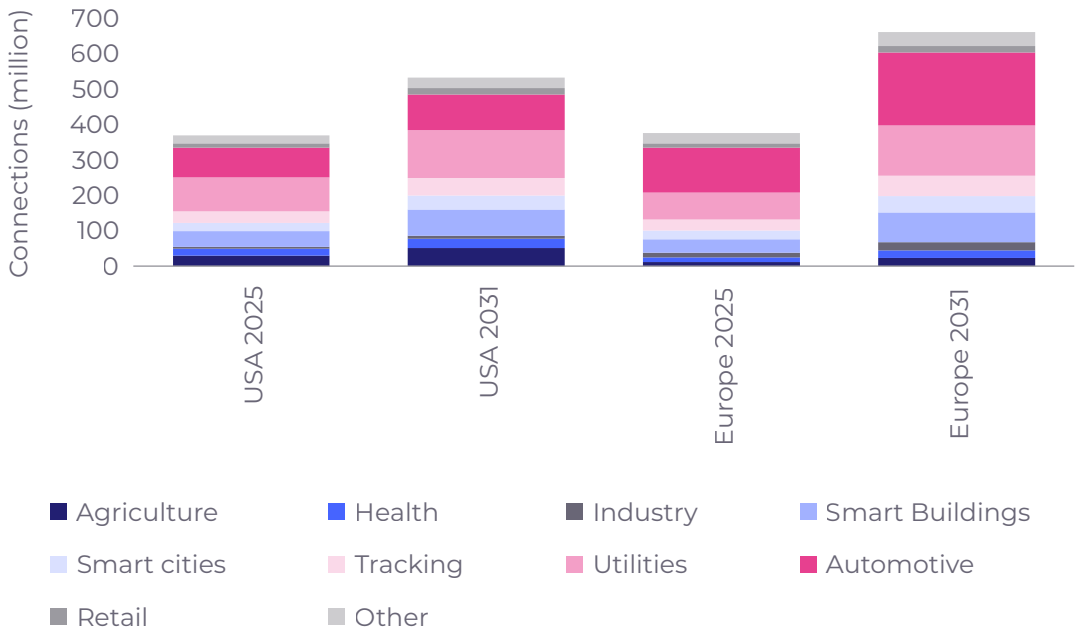


The number of wireless IoT connections managed by operators will rise much more quickly in Europe than in the USA. The number of wireless IoT connections in Europe will be around 660 million by 2031, an increase of 76% from the end of 2025. In comparison connection numbers will reach 530 million in the USA, up by 44% over the same period.

4G was the dominant technology choice for IoT in 2024, and it will retain the largest share through to 2031, although its importance will begin to reduce as the number of NB-IoT, LTE-M and, in particular, 5G connections rises.

Average connectivity revenue per IoT connection is expected to fall in both regions between 2024 and 2031 as a result of stronger growth in low-bandwidth (lower revenue) applications. Average revenue per connection will remain higher in the USA than Europe throughout the forecast period, but the gap will close, as a greater number of high-bandwidth (and higher value) connections will are adopted in Europe.

FIG 3.16 : Number of active wireless IoT connections by vertical industry, Europe, USA 2025–2030f [Source: Analysys Mason, 2025][12]



There are many similarities and a few significant differences between the forecast mix of operators' wireless IoT connections in Europe and the USA. Automotive IoT connections (a high bandwidth and higher revenue IoT application) will account for the largest share by 2031 at 306 million, but the numbers will be much higher in Europe than the USA by 2031 (205 million compared to 101 million). Utility connections (low bandwidth and low revenue) will be substantial in both regions and will account for the largest share in the USA at 134 million and the second largest share in Europe at 142 million. The second, third and fourth categories in both regions will be smart buildings, smart tracking and smart cities respectively. The USA will have substantially more agricultural wireless IoT connections than Europe; Europe will have more industrial wireless IoT connections.

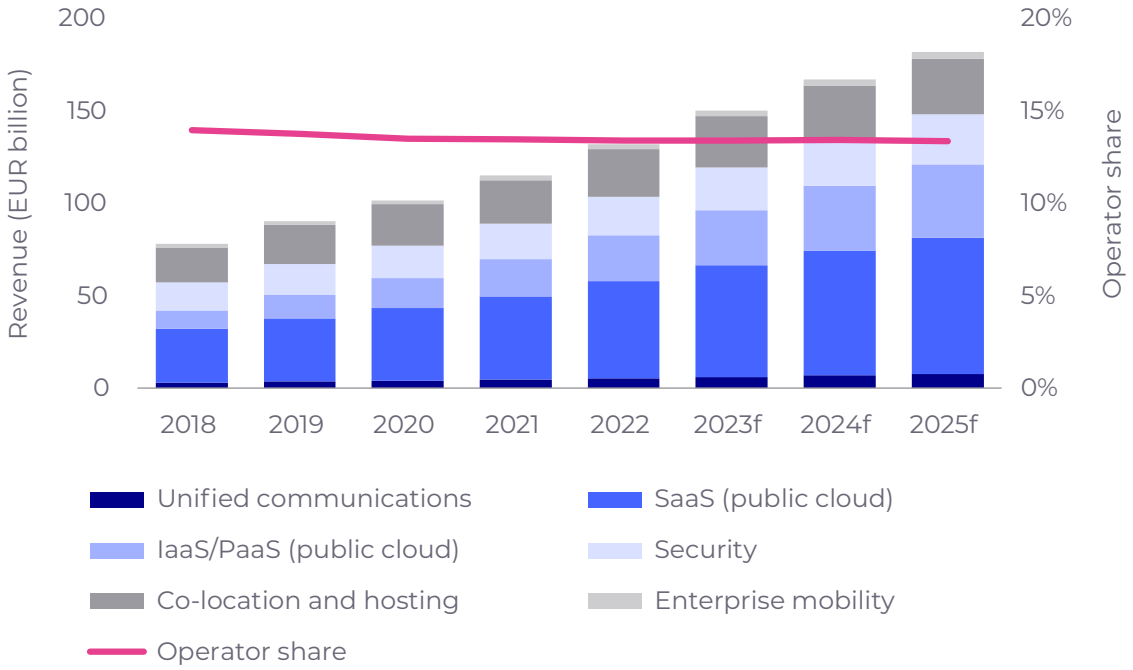
B2B digital services

The revenue from non-connectivity-related B2B services continues to grow. It increased at a CAGR of 13.6% between 2018 and 2024, with a further rise of 8.9% expected in 2025 (**FIG 3.17**). Historically, European operators' share of this revenue has been declining due to fierce competition from US cloud providers. It fell from 15% in 2018 to 13.4% in 2022. However, the decline has slowed recently, and operators' share is projected to stay nearly flat in 2025. Operators are increasingly bundling core connectivity services with non-connectivity and ICT solutions to enhance the value they offer to, and the revenue they generate from, enterprise customers; and also to make core services stickier (i.e. to make it less attractive for their customers to switch suppliers).

[12] See Annex for data table.

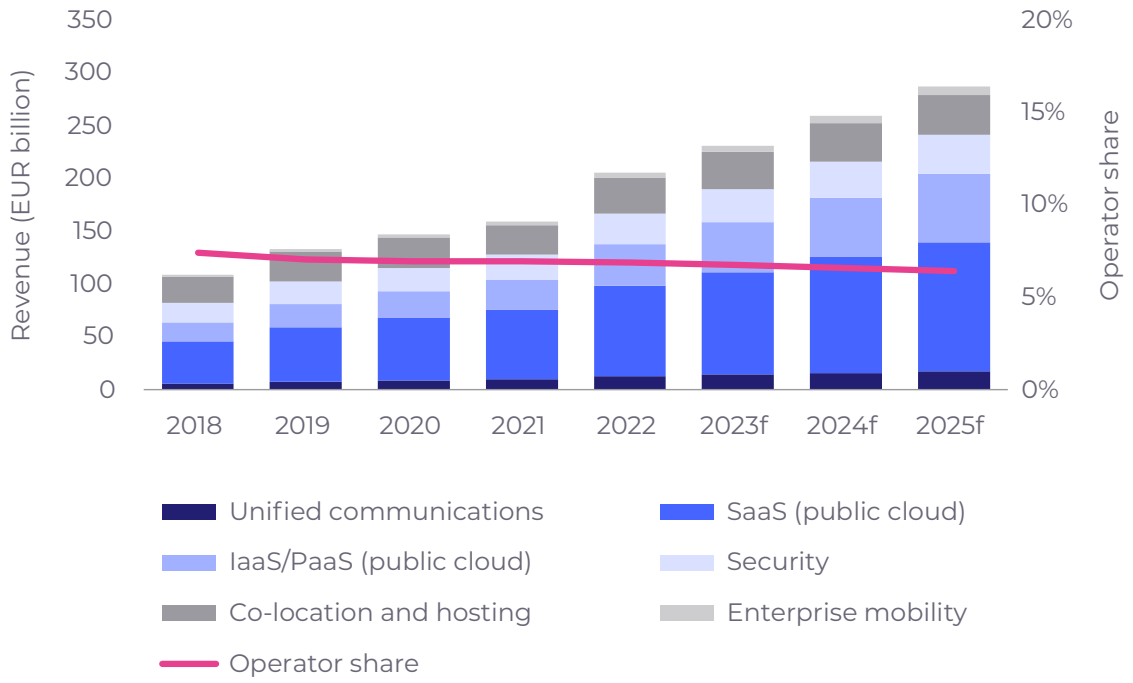
Software-as-a-service (SaaS) will continue to be the most significant component, making up over 40% of all B2B digital revenue. This marks nearly a 3 percentage point rise since 2018. The next largest segment, infrastructure-as-a-service (IaaS), is forecasted to account for 21.8% in 2025, up from 12.6% in 2018. It is also the fastest-growing service among non-connectivity-related B2B services. Security, and co-location and hosting also make up a substantial share of revenue; however, they are growing more slowly than other services, leading to a declining proportion of revenue. Unified communications and enterprise mobility remain the smallest components, with the latter showing very limited growth compared to the rest of the market.

FIG 3.17 : Non-connectivity-related B2B services revenue and operators' market share, Europe, 2018–2025f [Source: Analysys Mason, 2025]



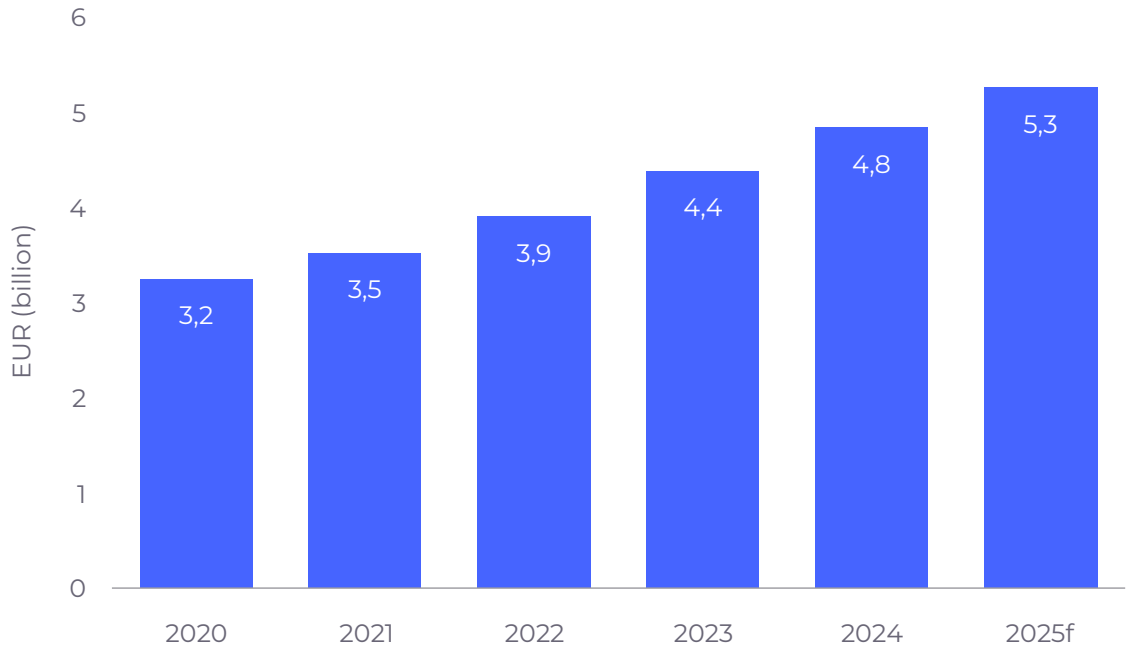
Revenue from non-connectivity-related B2B services is growing more rapidly in the USA. It increased at a CAGR of 15.5% from 2018 to 2024 and is expected to rise by another 10.8% in 2025. Notably, operators' share of revenue is considerably lower in the USA compared to Europe. It will be just 6.4% in 2025, down from 7.4% in 2018. SaaS and IaaS are the leading services in terms of revenue, similar to Europe.

FIG 3.18 : Non-connectivity-related B2B services revenue and operators' market share, USA, 2018–2025f [Source: Analysys Mason, 2025]



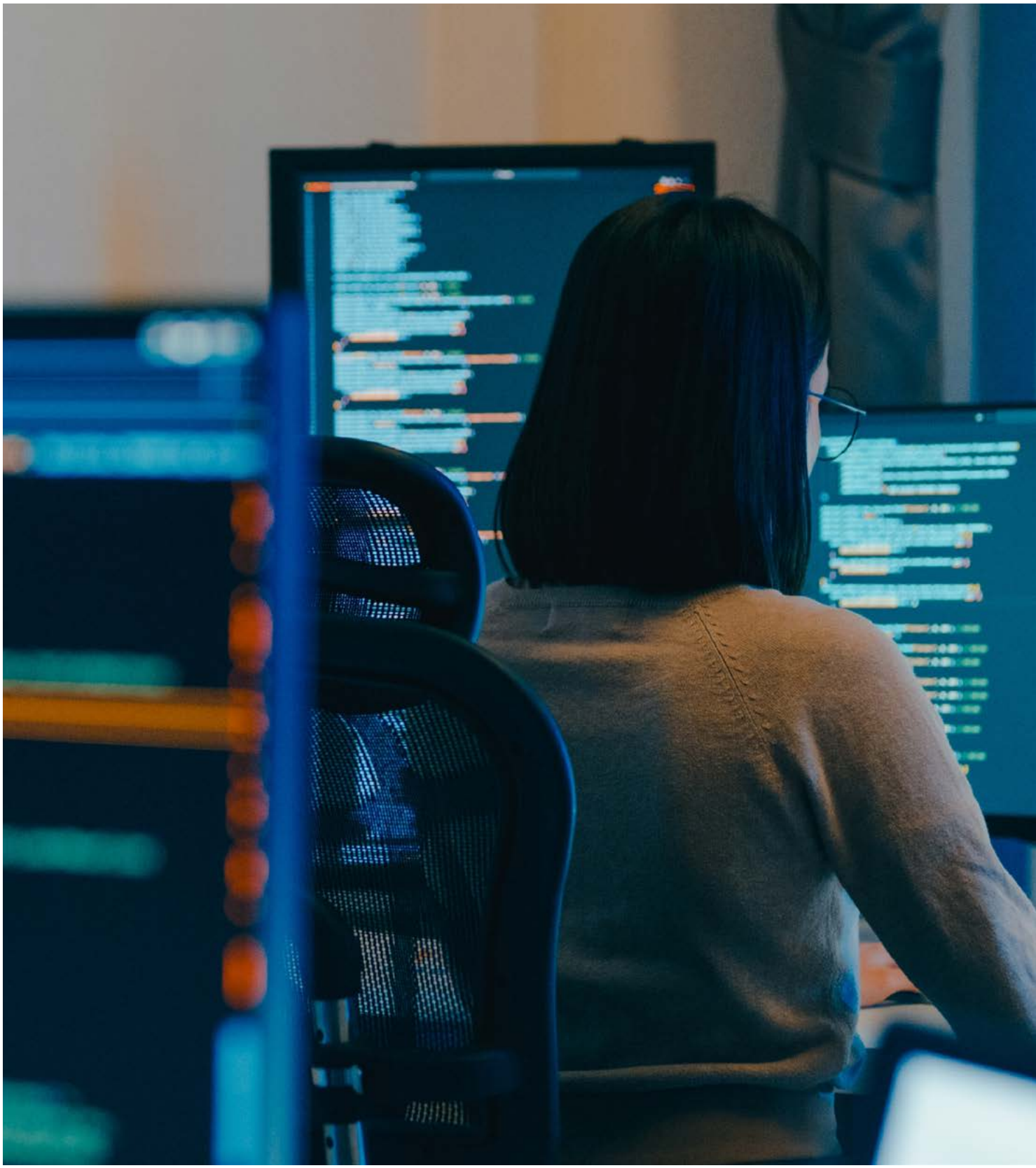
Operators provide a wide range of cybersecurity services including endpoint security, web and email security, network security, data security solutions, mobile security and managed security services. They are comparatively small players in the cybersecurity market compared with software companies, systems integrators, channel resellers and security solutions specialists, but their revenues are rising.

FIG 3.19 : Operators' cybersecurity retail revenue, Europe, 2020–2025f [Source: Analysys Mason, 2025]



European operators' retail revenue from cybersecurity services is estimated to have grown by 10.4% in 2024, and is forecast to rise by nearly 9% to EUR5.3 billion in 2025.

Operator revenue from cybersecurity services is primarily captured from large enterprise customers (those with more than 250 employees). These companies account for more than half of all operator sales in this market.



04

Levelling up networks for the benefit of all Europeans

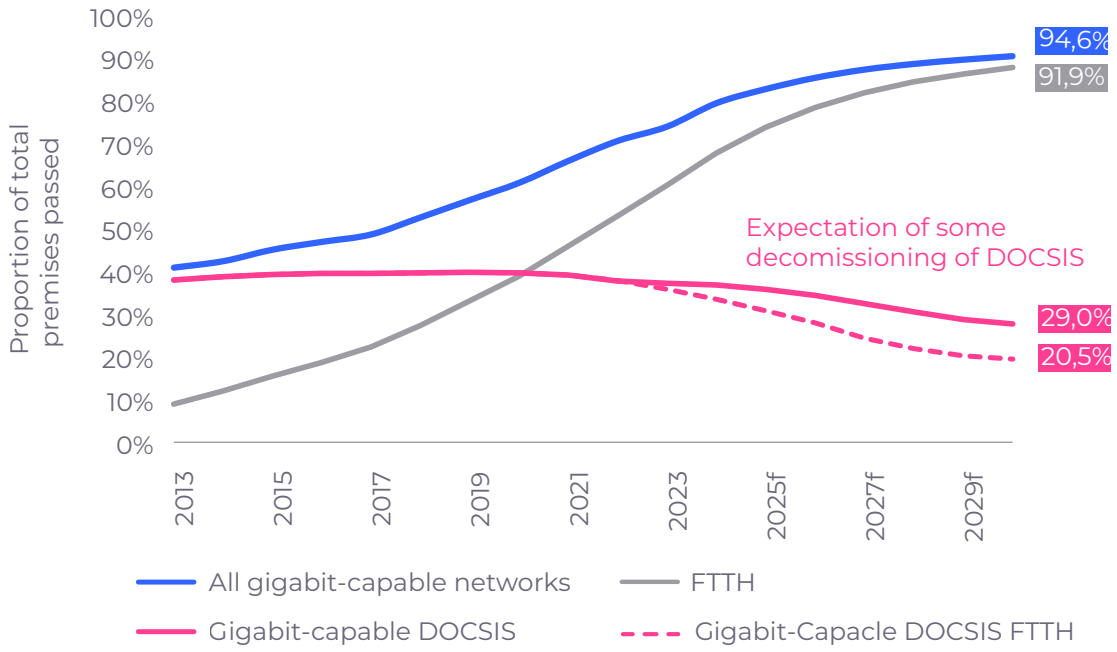
Future networks will have to meet certain connectivity targets, but they will also have to be lean and green, and they will have to be resilient in the face of increasing threats.

GB

AROUND AT LEAST EUR88 BILLION ADDITIONAL INVESTMENT IS REQUIRED TO REACH THE FIXED GIGABIT TARGET

The EU Digital Decade infrastructure targets – full population gigabit and 5G coverage – are ambitious and exceed the ambitions of most other liberal economies. These ambitions are costly. As things stand, the EU will not meet its "gigabit for everyone by 2030" objective.

FIG4.1 : Premises passed by gigabit-capable technologies, Europe, 2014–2030f
[Source: Analysys Mason, 2025]



Based on a combination of factors, including operators' plans, we now project that FTTH coverage, in terms of unique premises passed, will reach 91.9% of premises in Europe by the end of 2030. At the same time 94.6% of premises will be served by at least one gigabit-capable network (FTTH, cable DOCSIS or FTTB/LAN). This means that 15.3 million addresses or 29.6 million people in Europe will be unserved by gigabit-capable networks, and 23.1 million addresses or 44.8 million people will be unserved by FTTH. For the EU alone, 14.3 million addresses or 27.7 million people in Europe will be unserved by gigabit capable networks, and 21.6 million addresses or 41.8 million people will be unserved by FTTH.

A substantial proportion of cable DOCSIS network footprints will have undergone some level of self-overbuilding with FTTH by 2030. The decline in overall coverage of gigabit-capable cable between the early 2020s and 2030 reflects a projection that some cable networks will have been entirely decommissioned by then. This process has already started at a small scale, and for those that have self-overbuilt it makes sense to migrate customers as swiftly as possible and to decommission the legacy infrastructure. Whether cable operators do choose to self-overbuild with FTTH, or switch to buying wholesale FTTH, depends to a large extent on the intensity of FTTH infrastructure competition in the market. If they are faced with strong FTTH competition, continuing to operate complex and costly cable DOCSIS networks may become commercially unsustainable, and they will self-overbuild not because in capex terms it is cheaper (generally it is not), but because of long-term opex savings that will keep them competitive. Some cable operators will in the shorter term prioritise footprint expansion (which will invariably mean FTTH) over FTTH upgrades to their existing footprint.

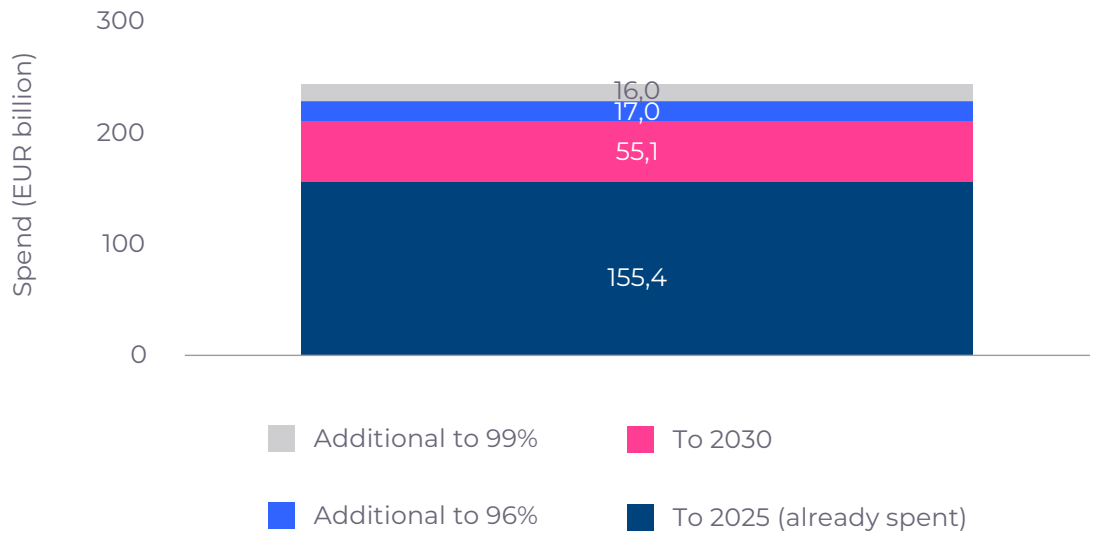
The 262 million premises passed by FTTH in Europe will be covered by an average of about 1.52 FTTH physical networks per premises by 2030. These projections of FTTH deployment are based on a several overlapping factors: operator plans, unit capex trends, competition levels and expected take-up levels. A substantial degree of consolidation, where buy replaces build, is also to be expected in order to avoid overbuild.

FIG4.2 shows total spend in Europe to the end of 2024, the costs out to the 91.9% projection, and a projection of the costs of coverage required to cover out to 96% and further out to 99% of premises with FTTH[13]. The total capex excludes any overbuild so far and any projected overbuild: in other words, it is the minimum required to reach a particular level of coverage.

In the EU, 21.6 million addresses - representing 41.8 million people - will remain unserved by FTTH by 2030.

[13] We have set the target at 99% rather than 100%. The last 1% will have extremely high and variable costs, and there will always be a discontinuity between built premises and coverage.

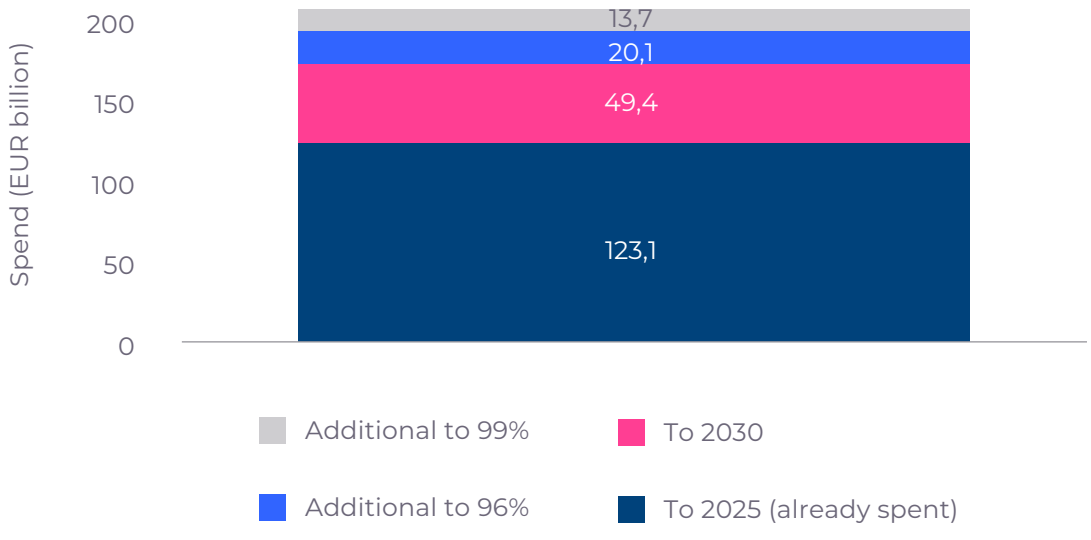
FIG4.2 : Cost of deploying future single network FTTH to forecast 2030 coverage, and additionally to 96% and 99% coverage, Europe [Source: Analysys Mason, 2025]



For Europe as a whole, we project that a further EUR55.1 billion will be spent between the end of 2025 and the 91.9% FTTH coverage projection for 2030. The additional cost from that level of coverage out to 99% will amount a further EUR34.0billion.

For the EU27 alone, the additional cost to the slightly lower coverage projection (91.1%) by 2030 amounts to EUR49.4 billion and the additional cost to reach 99% is EUR33.8 billion.

FIG4.3 : Cost of deploying future single network FTTH to forecast 2030 coverage, and additionally to 96% and 99% coverage, EU27 [Source: Analysys Mason, 2025]



SPECTRUM ASSIGNMENT IS UNEVEN AND ANNUALISED LICENCE COSTS ARE HIGH

The European Commission's Digital Decade strategy set a target of 5G coverage of all populated areas by 2030. This target does not specify the type of 5G networks deployed. The State of the Digital Decade 2025 report (June 2025), reported that around 94% of the EU's population was covered by 5G of some kind at the end of 2024[14]. (These updates also report 3.4 GHz-3.8 GHz population coverage although this was not a Digital Decade target: the achieved coverage for the same period was 67.7%.)

The amount of spectrum assigned varies considerably between countries in Europe, but at November 2025 there were only a handful of small countries that had not yet assigned spectrum in any of the 5G bands. The Draghi report highlighted the inconsistencies of spectrum assignment in the EU. It recommended increasing EU-level control of spectrum harmonisation and spectrum auctions, and recommended longer duration of licences plus fewer restrictions to encourage growth and cross-border investment opportunities across EU member states.[15]

FIG4.4 : Assignment of spectrum in the main 5G bands for nationwide public mobile service, Europe, November 2025 [Source: Analysys Mason, 2025]

Country	Spectrum assigned in the 700 MHz band (MHz)	Spectrum assigned in the 3.4 GHz–3.8 GHz band (MHz)	Spectrum assigned in the mmWave band (MHz)
Albania	0	280	0
Austria	60	300	1400
Belgium	60	410	0
Bosnia	0	0	0
Bulgaria	0	300	1600
Croatia	60	320	1000
Cyprus	60	400	0
Czech Republic	60	400	0
Denmark	80	390	2850

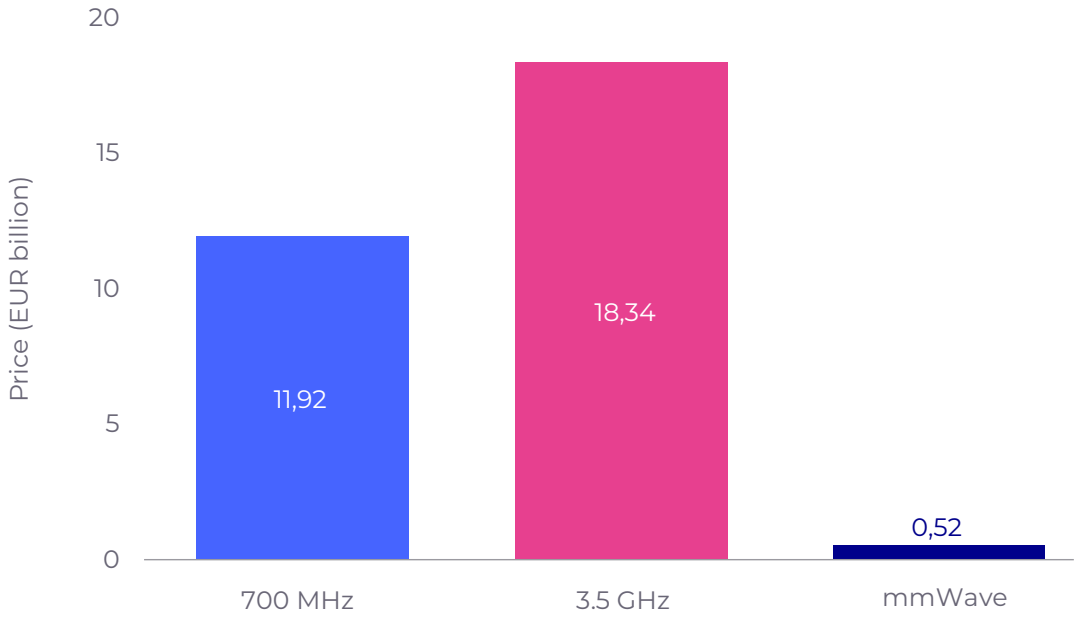
[14] See State of the Digital Decade 2025, page 5.
[15] See The Future of European competitiveness, page 35.

Country	Spectrum assigned in the 700 MHz band (MHz)	Spectrum assigned in the 3.4 GHz–3.8 GHz band (MHz)	Spectrum assigned in the mmWave band (MHz)
Estonia	60	390	2400
Finland	60	390	2400
France	60	310	0
Albania	0	280	0
Austria	60	300	1400
Belgium	60	410	0
Germany	60	300	0
Greece	60	390	1000
Hungary	50	390	0
Iceland	40	300	0
Ireland	60	340	0
Italy	75	363	1000
Latvia	80	400	0
Lithuania	40	300	0
Luxembourg	60	330	0
Malta	0	300	0
Montenegro	60	380	0
Netherlands	60	300	0
Norway	60	400	0
Poland	60	400	0
Portugal	60	400	0
Romania	30	655	0
Serbia	0	0	0
Slovakia	60	390	0
Slovenia	75	380	1000
Spain	60	380	2000
Sweden	40	320	0
Switzerland	70	300	0
UK	80	400	5400 (high-density regions only)

The European Commission's Digital Decade strategy set a target of 5G coverage of all populated areas by 2030.

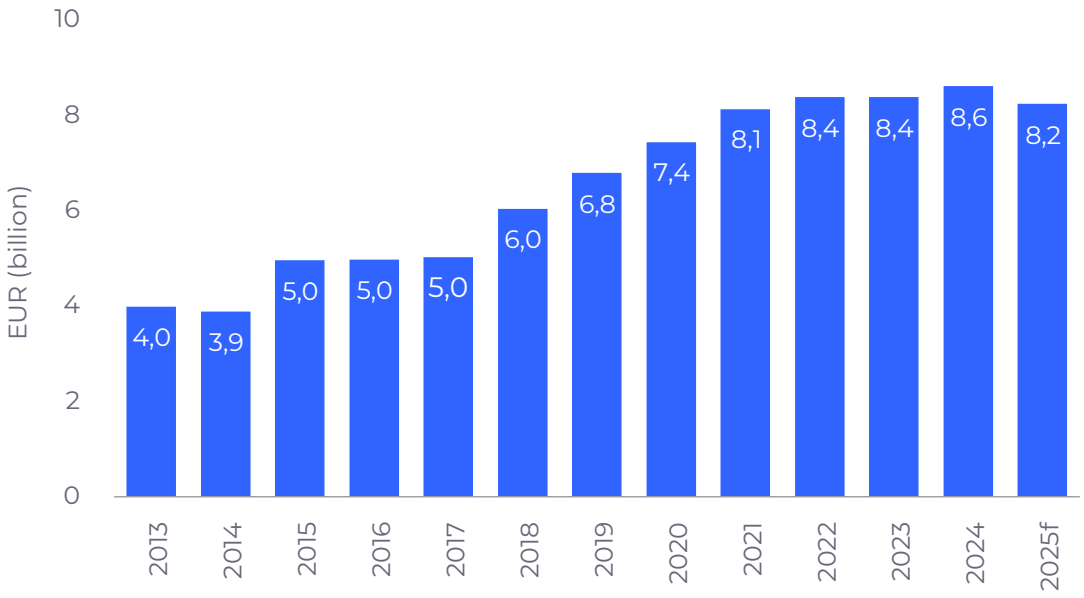
FIG4.5 below shows the total prices paid for the main 5G bands (700 MHz, 3.5 GHz and mmWave). Other than for the small countries that have not assigned spectrum yet, and for mmWave, which has much lower value than the other two bands, the total figure, currently at EUR30.8 billion, is unlikely to change much.

FIG4.5 : Total prices paid for the main 5G band licences, Europe, 2015–October 2025[16] [Source: Analysys Mason, 2025]



On an annualised basis, and including discount rates across the periods of the licences comma European MNOs are paying over EUR 8 billion per year for licences, about 7.8% of mobile revenue.

FIG4.6 : Annualised spectrum costs, excluding 3G licences, European mobile operators, 2013-2025f [Source: Analysys Mason, 2025]



[16] Includes EUR1.4 billion paid for non-auctioned licences.

The slight decrease in 2025 can be attributed to the lower annual cost of annual licence fees that apply when licences have expired than the amortised cost of the original licences. Spectrum pricing reforms offer a potential path to unlocking investment for 2030 targets. According to the GSMA, administrative renewals at no cost for over 500 licences expiring by 2035 could save the industry up to EUR30 billion in the 2025–2030 period, which could be used to reinvest in 5G SA and capacity. These savings, according to the GSMA, could boost network speeds by up to 23%, supporting Digital Decade goals.[17]

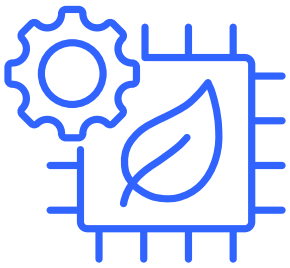
Future spectrum needs

Many industry stakeholders argue that more mid-band spectrum will be required for mobile, although estimates rest on projections of traffic, which vary considerably and which are inherently uncertain. A group of CEOs of leading European mobile operators, including many Connect Europe members, asked, in a joint open letter in October 2024, for the European Commission to allocate the upper 6 GHz band (6425 MHz – 7125 MHz) exclusively for mobile networks. European telecom operators provide both mobile and fixed services, including Wi-Fi at homes, companies and public places. They stated that the lower 6 GHz band (5925 MHz – 6425 MHz), which is licence-exempt and used for the latest generations of Wi-Fi, is in fact only lightly used and is sufficient to satisfy current and future Wi-Fi needs of European citizens and enterprises. They argue therefore that there was no evidence of demand that should lead to the upper 6 GHz band also being designated licence-exempt.[18] There is, outwith the USA, a growing global consensus growing that the upper 6 GHz band should be licensed to MNOs: Brazil has shifted to this position, and China, which originally intended to assign both the lower and upper 6 GHz bands to MNOs, appears to be shifting towards licence-exempt for the lower band and mobile for the upper band. The UK has proposed splitting the upper band into licence-exempt and licensed for MNOs.

GSMA analysis indicates that mobile operators require at least 2 GHz of mid-band spectrum by 2030 to prevent capacity constraints in dense urban areas, building on current assignments of around 1 GHz. This, GSMA argues, necessitates prioritising the upper 6 GHz band for licensed mobile use, alongside high-power access to the 3.8-4.2 GHz range. Without this, according to the GSMA, over 50% of dense urban populations risk congestion by 2030, undermining quality of service.

Europe's Radio Spectrum Policy Group (RSPG), the body set up to assist and advise the European Commission on radio spectrum policy issues, published an Opinion in November 2025 which states that either 665 or 700 MHz of spectrum within the upper 6 GHz band should be designated for mobile use.[19]

[17] Spectrum Pricing and Renewals in Europe, GSMA, December 2025, page 7.
[18] See https://www.telefonica.com/en/communication-room/blog/european-telecoms-ceos-call-6-ghz-band-allocation-mobile-networks/
[19] Long-term vision for the upper 6 GHz band, RSPG, November 2025.



NETWORKS ARE BECOMING LEANER AND GREENER

Regulatory, social, employee, customer and investor pressures are all combining to encourage operators to reduce the environmental impacts of their activities. In many cases improved environmental sustainability (and particularly the efficient use of resources including minimal consumption of materials and energy, and maximum recycling and reuse) also has a cost benefit. Europe's operators have been proactive in terms of tackling their environmental impact, and in communicating their plans.

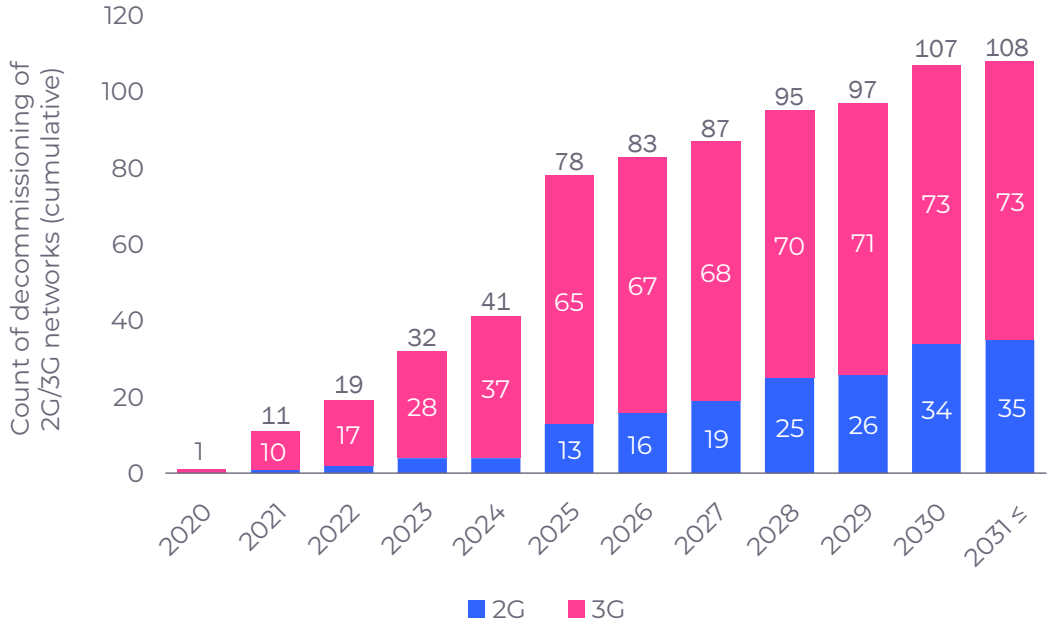
Decommissioning inefficient legacy networks

Many operators are seeking to reduce their operating costs, and at the same time are reducing their ongoing energy consumption (and associated carbon emissions), by decommissioning legacy networks and technologies including PSTN copper, local exchanges, xDSL broadband and HFC and legacy mobile (2G and 3G) networks.

In the context of legacy mobile networks operators can not only avoid the high energy costs, but they can also reduce operating costs by avoiding running multiple networks concurrently, and they can re-use spectrum more efficiently for their 4G/5G networks.

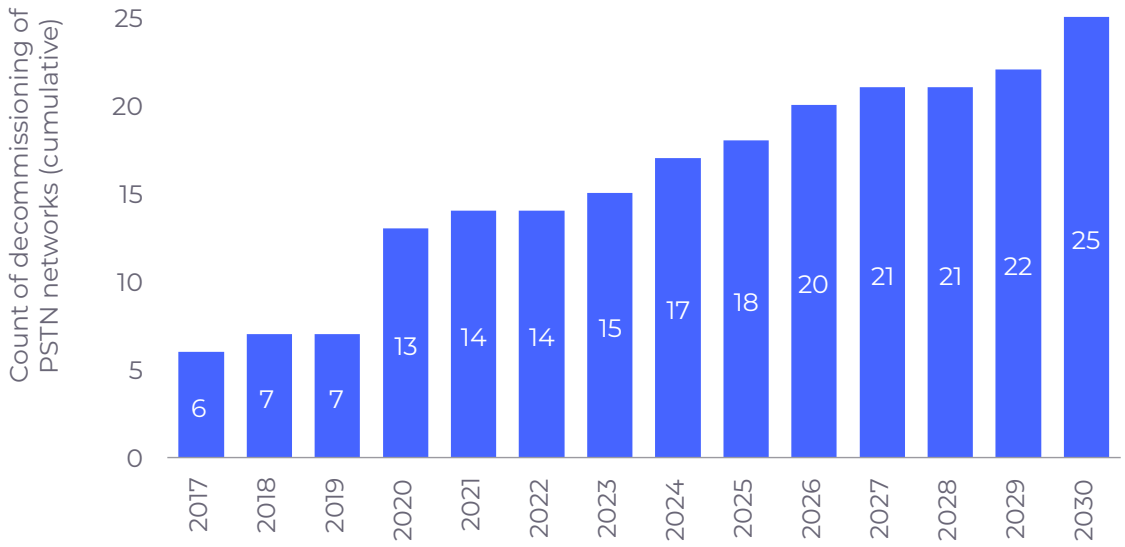
Most European operators plan to decommission their 3G networks before their 2G networks. It is expected that most 3G networks will be decommissioned in Europe by 2030.

FIG4.7 : Cumulative number of decommissioned 2G and 3G networks, Europe, 2020–2030 and later [Source: Analysys Mason, 2025]



73 operators have announced plans to decommission their 3G networks by the end of 2030, and 35 of them plan to shut off their 2G networks by that date.

FIG4.8 : Cumulative number of decommissioned PSTNs, Europe, 2017–2030 [Source: Analysys Mason, 2025]



By the end of 2024 17 European countries had phased out PSTN switches and moved to IP-based services in the backbone (many still offer some legacy analogue telephony or PSTN emulation services, although these too are being steadily phased out). This number is expected to rise to at least 25 by 2030.

European operators are targeting full copper decommissioning within the upcoming years, according to each market reality. While some have already done so, and some others will do so this decade, setting an EU-wide copper switch-off date as early as 2030, a possible part of the Digital Networks Act, will be all-but-impossible to implement, and it would constitute an unjustified regulatory intervention running contrary to actual market developments, infrastructure-based competition and consumer choice.

Decoupling energy consumption from greenhouse gas emissions

Telecoms operators in Europe are making strong progress in terms of reducing their energy consumption and decoupling energy consumption from carbon emissions by moving to the use of renewable energy sources. Many Connect Europe members have now set externally validated net-zero targets for both their direct (Scope 1 and 2) and indirect (Scope 3) carbon emissions.[20] The Science Based Targets Initiative is an independent organisation established to validate companies' carbon reduction targets against scientific principles. The table below shows members of Connect Europe that have validated short-term targets (designed to meet requirements to limit global warming to a specific temperature increase - in the case of all these companies, 1.5C) and longer-term targets to achieve net zero across the value chain (encompassing scopes 1, 2 and 3). Some European operators have announced net zero targets but are not working within the SBTi initiative.

FIG4.9 : SBTi-based emission reduction targets, Connect Europe members at the group level [Source: Science Based Targets Initiative[21], 2025]

Operator	Near-term science-based target date (scope 1 and 2)	Target date for net-zero emissions (value chain)
A1	2030	2040
BT	2031	2041
Deutsche Telekom	2030	2040
Elisa	2030	2040
Fibercop	2030	2050
GO	2030	2050
KPN	2030	2040
Liberty Global	2030	
Magyar Telecom	2030	
Melita	2030	
MEO	2030	

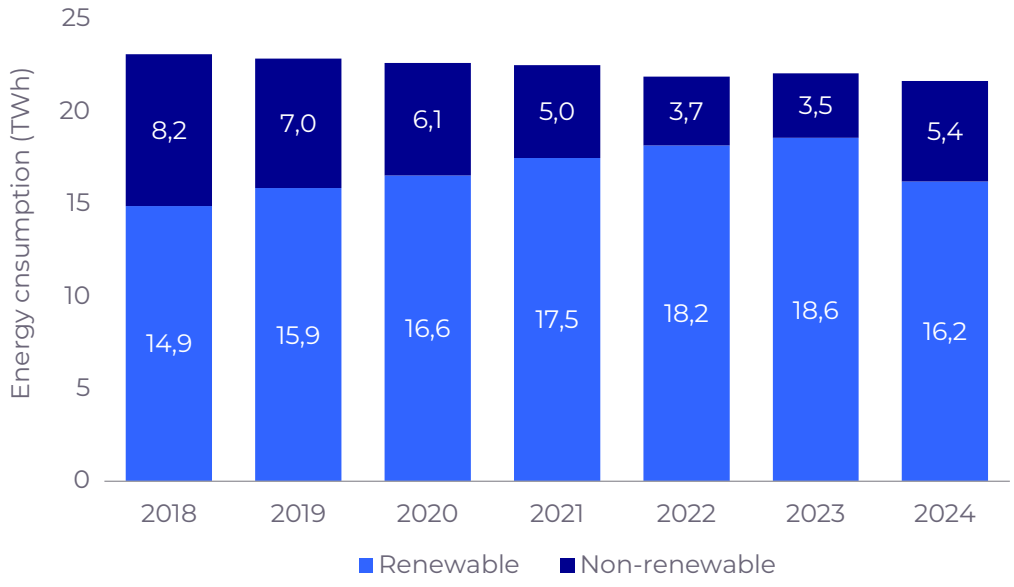
[20] Scope 1: direct emissions from an operator's own activities as a result of the combustion of fuels on site; Scope 2: indirect emissions from the purchase of energy including electricity); Scope 3: all other indirect emissions from an operator's upstream and downstream activities.
[21] https://sciencebasedtargets.org/target-dashboard

Operator	Near-term science-based target date (scope 1 and 2)	Target date for net-zero emissions (value chain)
Orange	2030	2040
Proximus	2030	2040
TDC	2028	2030
Telefónica	2030	2040
Telenor	2030	2045[22]
Telia Company	2030	2040
TIM Group	2030	
Swisscom	2030	2035
United Group	2030	2040
Virgin Media O2	2030	2040

This table only shows targets that have been validated against the Science Based Targets initiative (SBTi) Net-Zero Standard. To check progress in SBTi, click here https://sciencebasedtargets.org/companies-taking-action

The energy usage of the Connect Europe members' European operations steadily fell between 2020 and 2022, and although they have grown a little in 2023 and 2024 as operators have invested in 5G infrastructure and data centre/cloud/ AI technologies, they are widely looking at methods to keep energy consumption low (such as changing the technology mix in the RAN, or steadily upgrading fixed network equipment to be more energy efficient or (as discussed above) switching off legacy infrastructure. [23]

FIG4.10 : Energy consumption from renewable and non-renewable sources, Connect Europe members, Europe only, 2018–2024 [Source: Analysys Mason, 2025]

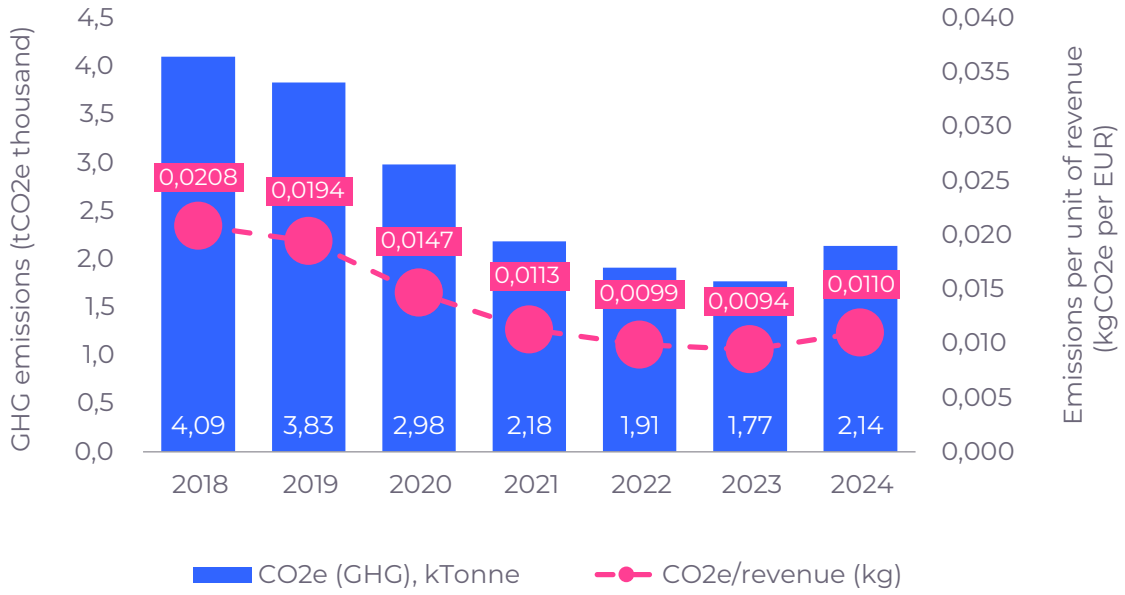


[22] 2040 target for Nordic operations; 2045 target for Asian operations.
[23] Note the energy consumption numbers have been restated from previous years to reflect changing Connect Europe membership.

The Connect Europe members have also been seeking to reduce the environmental impact of their energy consumption by using more renewable energy.

European operators' use of renewable energy grew steadily over the six years to the end of 2023. The renewable share of energy consumption fell in 2024 to 75%. The drop from 2023 was largely the result of a change of renewable energy certificate purchasing and accounting strategy at a single large operator, rather than any change in operator ambition to reduce environmental impact.

FIG4.11 : Scope 1 and 2 GHG emissions and emissions per unit of revenue generated, Connect Europe members, Europe only, 2018–2024 [Source: Analysys Mason, 2025]



Use of renewable energy is one of the primary means of reducing carbon emissions related to energy consumption, and for this reason the reduced share of renewable energy in 2024 led to a rise in carbon emissions of the Connect Europe members in 2024 after rapid reductions between 2018 and 2023.

Connect Europe members' Scope 1 and 2 emissions within Europe decreased 57% between 2018 and 2023 (calculated using the market-based method), and then rose 21% in 2024. Consequently, the carbon intensity of revenue generated by their businesses has followed a similar pattern; emissions per unit of revenue fell by around 55% between 2018 and 2023, and then climbed by 16% in 2024 (**FIG4.13**).

Scope 3 emissions produced across the entire value chain are the most difficult and complex to assess. Scope 3 emissions represent around 80% of a telecoms operator's total carbon emissions, and 80-90% of a typical operator's Scope 3 emissions come from upstream activities in their supply chain – mainly from the purchase of their goods and services (category 1) and capital goods (category 2).[24]

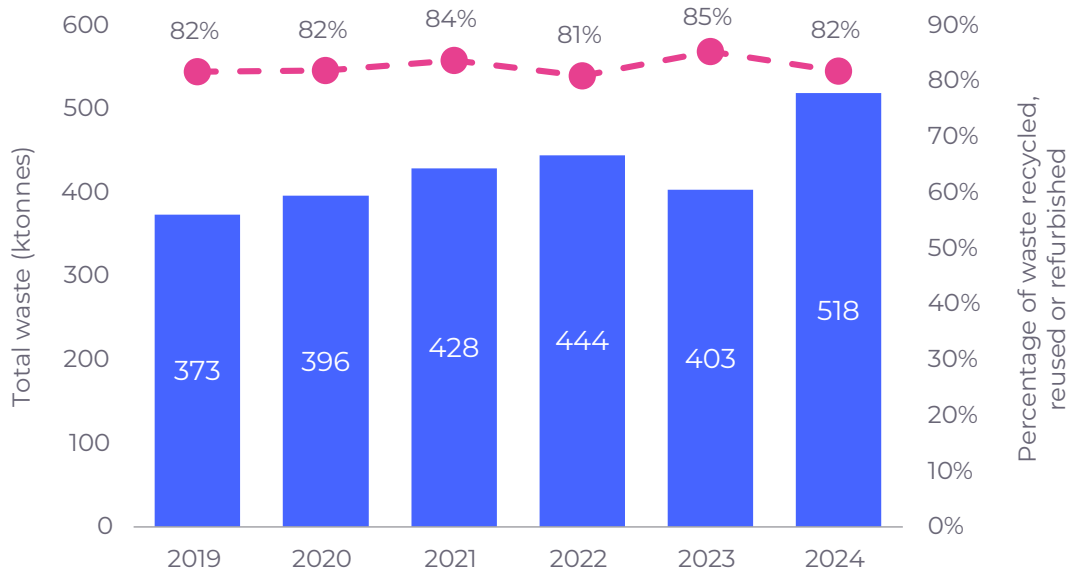
[24] ARCEP, https://www.arcep.fr/nos-sujets/numerique-et-environnement.html

Due to the complexity of telecoms supply chains operators have typically set net zero target dates (encompassing scopes 1,2 and 3) from 2040 and onwards. In the meantime they are engaging with the suppliers to ensure they have carbon reduction roadmaps, that suppliers' roadmaps align with what operators need to achieve, are setting procurement strategies that encourage improved sustainability, and longer-term many plan to set specific targets for suppliers.

Reducing and managing waste, and reducing resource usage

In addition to reducing carbon emissions and energy consumption operators are also reorganising their operations to reduce waste and increase reusing or recycling. This includes reducing waste from ongoing operations (such as office waste), but also the waste generated when old equipment is decommissioned, and the waste generated when CPE is replaced or upgraded.

FIG4.12 : Total waste generated, and percentage of waste recycled, reused, or refurbished, Connect Europe members, group level, 2019–2024 [Source: Analysys Mason, 2025]



Figures for waste fluctuate substantially, and major network decommissioning projects can increase waste levels for individual operators, as well as recycling levels (especially if materials such as copper cables cannot be recovered). This had an impact on the Connect Europe waste and recycling numbers in 2024.

Because of the lack of harmonisation at the EU level, market player reporting generally is also inconsistent on waste. Levels of waste production and disposal are often unreported or disclosures are limited. Definitions of waste are often vague and varying methodologies are used to account for volumes of waste and to report on the extent of material recycling or reuse.

That said, the collective Connect Europe member recycling, reuse and refurbishment rates are ahead of the global average. The Connect Europe members place a strong emphasis

on circular economy initiatives, with their efforts to encourage reuse and recycling of smartphones and other network equipment playing a key role in reducing emissions and negative environmental impacts across the value chain.

THE SECTOR HAS TO DOUBLE DOWN ON SECURITY AND RESILIENCE IN THE FACE OF GROWING PHYSICAL AND CYBER THREATS

Telecom operators are integrating security into every aspect of their networks to ensure their services are secure in order to minimise any negative impact on end-users. They are also investing in the resilience of their networks – for instance by implementing back-up power solutions, ensuring redundancy in fixed, mobile network and data centre infrastructure, and undertaking strategic reviews to ensure their architectures and processes can survive multiple disruptive events.

Telecoms infrastructure is critically important for national economic growth and social health, serving as the backbone of modern society. Faced with increasing cybersecurity and physical threats from malicious actors or from accidental or environmental damage, operators, governments and the EU are scrutinising the security and resilience of their communications systems, including domestic infrastructure, submarine cables and international links. Operators are working hard to implement rules established by NIS2, DORA and other national security frameworks. The Network and Information Systems (NIS) 2 Directive creates a legal requirement to assure cybersecurity in 18 critical sectors; and places a requirement on medium and large companies in the communications and digital infrastructure market to take appropriate risk management measures (and to report breaches). The Digital Operational Resilience Act (DORA) is intended to help financial markets to control cyber-security risks. It also covers third-party service providers such as telecoms players, given their fundamental role in the financial industry's day-to-day operations. To ease implementation, the sector is calling for simplification and better harmonisation on the various timelines and reporting obligations enshrined in those various legislations.

New legislative proposals in the course of 2026 may cover cybersecurity matters, including for subsea cables to mitigate risks. Operators are already strongly committed on security with a range of recent initiatives that include:

Mobile network security - 6G networks will need to be able to deal with an ever expanding range of threat vectors

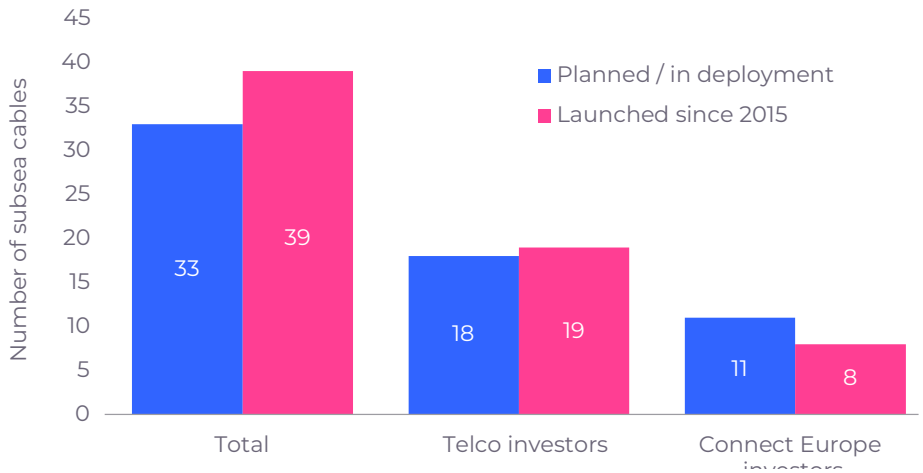
including the emergence of new threats such as quantum computing-enabled key decryption and AI-enabled attack mechanisms. European operators, vendors, and academic institutions are involved in a range of EU-funded projects to work on embedding security into 6G standards by design. Key consortium-led EU projects include: ROBUST-6G, SAFE-6G, ITRUST6G, RIGOROUS, CONFIDENTIAL6G; and (the more recent) MARE (Programmable, Modular and Disaggregated Security Plane for 6G Ecosystems), and X-TRUST 6G (Extended zero-trust and intelligent security for resilient and quantum-safe 6G networks and services) projects.

Quantum encryption – As quantum computers become more capable and sophisticated, concern has grown about the potential for the technology to be used to compromise security systems. In June 2025, the EU Member States and the EU Commission published a roadmap and timeline for the introduction of post-quantum cryptography. All States should begin transitioning to post-quantum from 2026, and the technology should be applied to critical infrastructures – including telecoms – by the end of 2030 at the latest. A number of operators, including Connect Europe members BT, Deutsche Telekom, Orange, Proximus, Telefónica and TIM have been involved in technology trials of quantum encryption and quantum communications over fibre networks.

AI security – The EU's horizontal regulation on Artificial Intelligence introduced in 2024 sets out a framework to govern use of AI, with higher safeguards required for higher-risk activities. The first obligations came into force in 2025 prohibiting use cases including emotion recognition at work, causing harm by using AI to manipulate people, and others. Rules covering general-purpose AI came into force, and EU-wide coordination initiatives were started. Notably, telecoms operators will have to ensure they comply with rules on high-risk AI. At the same time, Europe's operators are already investing in AI to improve the security and resilience of their systems.

Ensuring the resilience of submarine cables - Subsea cables have become a critical component of the global digital economy, enabling the flow of critical data around the world. By the end of 2024 there were nearly 200 operational subsea cables with a landing point somewhere within Europe. Telecoms operators have been, and continue to be, significant investors in those cables. 39 cables with landing point in the region were launched between 2015 and 2025, and nearly half of them had telecoms operators among their investors. A further 33 cables with European landing locations are planned, in development, or partially operational. 18 of those have telecoms operator investors. In this respect, the Connecting Europe Facility funding programme has been instrumental in supporting EU operators' investment. The European Competitiveness Fund could play a crucial role in supporting continued cable deployment.

FIG4.13 : Telecom operator ownership of subsea cables, Europe 2025
[Source: Analysys Mason, 2025][25]



It is estimated that telecom operator share of investment in the 33 planned/in-deployment subsea cables with European landing points will be nearly EUR3 billion.

In February 2025 the European Commission published an Action Plan on Cable Security encompassing both telecoms and electricity cables. This is designed to help prevent, detect, respond to, and deter damage to cables. The Action Plan built on already existing initiatives designed to build capacity (through Connecting Europe Facility CEF digital and energy funding), help anticipate risks (through the recommendation on Secure and Resilient Submarine Cable Infrastructures), adopt cybersecurity risk-management measures (through the directive on measures for high common level of cybersecurity -NIS2 Directive) and enhance the physical resilience of critical entities (through the critical Entities Resilience Directive). It also announced an increase in funding for submarine cables, which is considered positive by telecom operators.

Collaborating with other industries to protect customers

Operator activity extends beyond assuring their own infrastructure to helping organisations in other sectors to protect their customers. For example, operators and third parties are innovating in the area of authentication and fraud protection. This is an emerging use use for network APIs. Authentication and fraud prevention APIs have the potential to be used by entities such as payment service providers, fintech companies and organisations in other sectors to replace current two-factor authentication message mechanisms, and offer more secure and frictionless methods of user verification. Examples of such solutions include the SIM Swap, Number Verification and Know Your Customer (KYC) Match APIs. Connect Europe members are involved in multiple initiatives to bring these commercial APIs to market.

As a result of trials undertaken by operators in recent years, they have also been well-placed to respond to regulatory developments in a variety of European countries in 2025 that have increased rules around caller ID authentication requiring operators, for example, to verify roaming status or to block international calls with spoofed CLIs.

[25] Connect Europe subsea cable investment figures include investments by TI Sparkle. The Sparkle spin off deal was still being finalised at the time of writing.

05

Connect Europe members play a key role in European technology innovation

5G STANDALONE NETWORKS

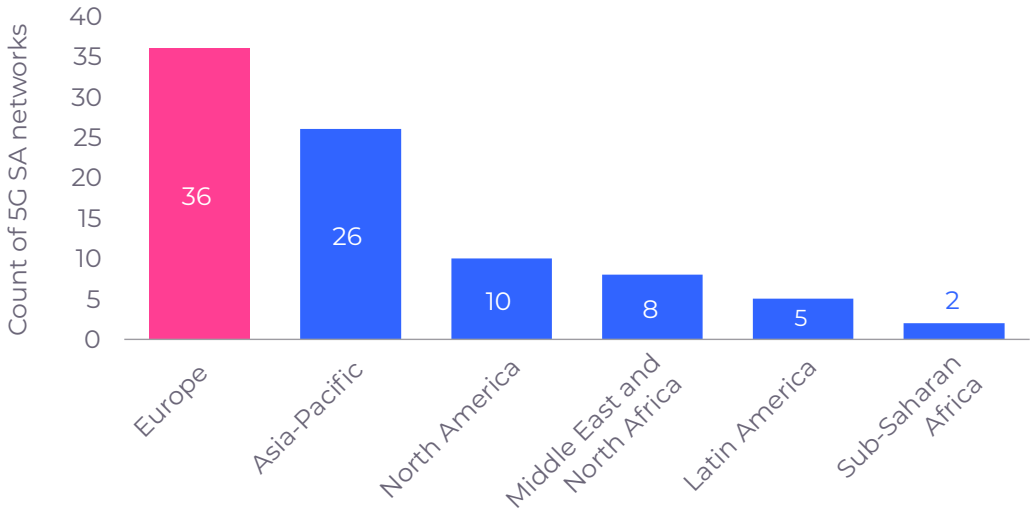
5G standalone (SA) is a full implementation of the 5G architecture, by contrast with 5G non-standalone, which still relies on the 4G packet core. 5G SA requires the deployment of a brand new, cloud-based core, which can support significant new capabilities that are impossible or limited with 5G NSA or 4G. These include dynamic network slicing, advanced traffic management, convergence with other access networks, and cloud-enabled services such as network-on-demand. 5G SA also improves RAN coverage and spectral efficiency, and enhances the ability to harness advanced 5G RAN capabilities such as support for massive numbers and density of devices and IoT sensors, or ultra-low latencies.

However, implementing the 5G core, and reconfiguring the RAN to be optimised for 5G SA, are significant tasks that many operators have been cautious about undertaking until the business case has been well-established. Many of 5G SA's capabilities, while technically impressive, are difficult to monetise at scale except in niche environments such as very advanced manufacturing plants, which are often supported by private cellular networks. However, 2025 has seen a marked acceleration of deployment of 5G SA in public networks, as operators have identified efficiency and user-experience benefits from 5G SA, that can improve KPIs such as cost efficiency, spectrum utilisation and churn reduction, and so reduce the need to monetise 5G SA in niche high-performance use cases.

To date, there are 87 operational 5G SA public networks worldwide (**FIG5.1**), including five that are for fixed wireless access use only. These are all in commercial use, or are supporting commercial trials with full launch scheduled by the first quarter of 2026. This number is a considerable increase on the year-ago total of 56 operational networks, and demonstrates the fastest growth in adoption so far, by some measure. In 2023 and 2024, there were 10 and 14 launches respectively, while in 2025 there have been 31 to date. There have additionally been launches of 5G private networks, by telcos or specialist operators.

In Europe, the number of 5G SA public networks has almost doubled from 19 a year ago to 36 today. Some notable launches in 2025 included new services from Orange in France and Romania, O2 in Czech Republic, Elisa in Estonia and Sunrise in Switzerland. Many operators expanded networks that had reached a few urban areas in 2024, to far broader availability, including EE UK, Vodafone in Germany and other territories, and Wind Tre in Italy. MasOrange launched Spain's first 5G-Advanced network in Seville while Vodafone and Austria's A1 agreed the first 5G SA roaming agreement in Europe. In 2025, MEO launched commercial offers based on 5G SA and introduced 5G Mobile Private Networks (MPN) tailored for enterprise environments requiring secure, high-performance connectivity, as well as 5G Mobile Virtual Private Networks (MVPN) solutions to ensure end-to-end security and flexibility for critical applications.

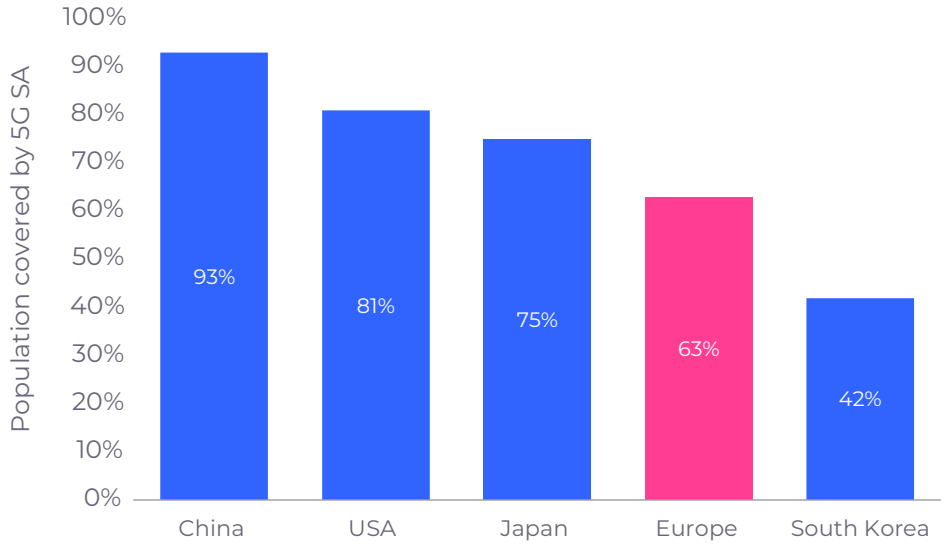
FIG5.1 : 5G SA commercial networks by geography, 3Q 2025
[Source: Analysys Mason, 2025]



The proliferation of SA services has been more marked in Europe than in the other major 5G regions, Asia-Pacific and North America. In APAC, the number has risen from 18 to 26, and in North America, from seven to 10.

Of course, there are fewer mobile operators in other regions than in Europe, several of the world's largest 5G SA networks are elsewhere, so highest network count does not equate to highest coverage. China has the highest overall 5G SA coverage level in the world (**FIG5.2**), with 92% of its population able to access 5G SA services from at least one operator. This is followed by the USA on 81%, where T-Mobile used the 600 MHz band to drive very wide 5G SA coverage. Europe has reached 63%, up sharply from an average of 40% last year, thanks to some major coverage expansion initiatives by operators such as Drei Austria (over 75% population covered), the three main German operators (over 90%), and Telefónica and MasOrange in Spain (over 90%). However, there are still many countries where there is very limited access to 5G SA.

FIG5.2 : 5G SA population coverage, by region, 3Q 2025 [Source: Analysys Mason, 2025]



Operators in all regions have been investigating which applications may best enhance the business case for deploying 5G SA at scale in public networks. Many of the leading innovations have been seen in China, where the three main mobile operators have deployed very advanced networks to support commercial use cases based on network slicing, extended reality (XR), AI analytics and other capabilities that are enabled or enhanced by 5G SA. **FIG5.3** provides a selection of commercially launched applications in Europe, and in the US and China.[26]

FIG5.3 : Selected commercially launched 5G SA applications in Europe, USA and China[27] [Source: Analysys Mason, 2025]

		Europe	USA	China
FWA	FWA QoS prioritisation	x	x	
	Network slicing -industrial	x	x	x
	Network slicing – gaming			x
	Quality on demand (QoD)		x	x
Industrial	Port automation	x		x
	Factory - quality inspection		x	x
	Factory - automation	x	x	x
	Commercial drones		x	x
	Smart grid monitoring	x	x	x
	Remote medical diagnostics	x	x	x
	Remote equipment predictive maintenance			x
	Smart agriculture	x	x	x
	Smart mines		x	x
Consumer	XR gaming		x	x
	XR events apps	x	x	x
	Enhanced voice and messaging			x
	VR healthcare consultation	x	x	x
	Gaming	x		
City and transport	Fleet management	x	x	x
	Surveillance cameras	x	x	x
	Automated trams/buses			x
	Emergency services coordination	x	x	x

[26] This is not an exhaustive list but it represents the services that, according to Analysys Mason's 5G operator survey and trackers, have been rolled out at national scale, and which the operators regard as being generative of new revenues. Some are expansions of services that were already offered in 5G NSA, such as FWA or 5G voice, while others are specifically enabled by 5G SA.
[27] 'X' indicates there is at least one identified commercial service in the region.

OPEN RAN

Open RAN, under the auspices of the O-RAN Alliance, establishes a set of common specifications for a virtualised or cloud-based RAN (vRAN), and standard interfaces between key RAN elements, notably basebands and radio units, where these are disaggregated. These specifications are designed to enable equipment and software from different vendors to be deployed in the same network in a standard way. The initiative has attracted significant interest and investment from operators around the world, which see it as a way to diversify their supply chains and make it easier to introduce new vendors and technologies to their RANs should their requirements change; as well as a blueprint to facilitate the challenging migration to vRAN.

Analysys Mason conducts an annual survey of operators, which asks about their deployment and investment intentions for their RAN, and this has included Open RAN intentions since 2019. The results show that, after some initial over-optimism, operators reset their expectations somewhat from 2022 as they recognised the significant challenges of deploying Open RAN, such as integration with existing networks. About two-thirds of European operators said that they planned to start implementing Open RAN during the life of their 5G networks, but the average planned start date for a European operator's Open RAN macro network deployment was pushed out from 2025, in the 2020 survey, to 2028 in the 2024 survey.

But in the 2025 survey, a new increase in confidence was seen. The average start date had not been pushed out further, remaining at 2028, and for the first time, the percentage of operators planning an Open RAN before 2030 had risen, from 64% to 69%.

European operators, even where they have increased their lead times to deploy commercial Open RAN, have remained in the forefront of trials and ecosystem development. Vodafone has been one of the leaders, and has commercial networks in operation in several markets, including the UK, as well as a significant innovation hub in Spain. The UK has the largest number of Open RAN trials and deployments of any country in the world, at 17, with BT, Virgin Media O2 and Vodafone Three all active. The UK has overtaken the total in the USA and Japan, which have 17 and 13 respectively (though some of these, such as NTT Docomo's Tokyo Open RAN, are on a larger scale than any networks in Europe). Deutsche Telekom, Orange, TIM

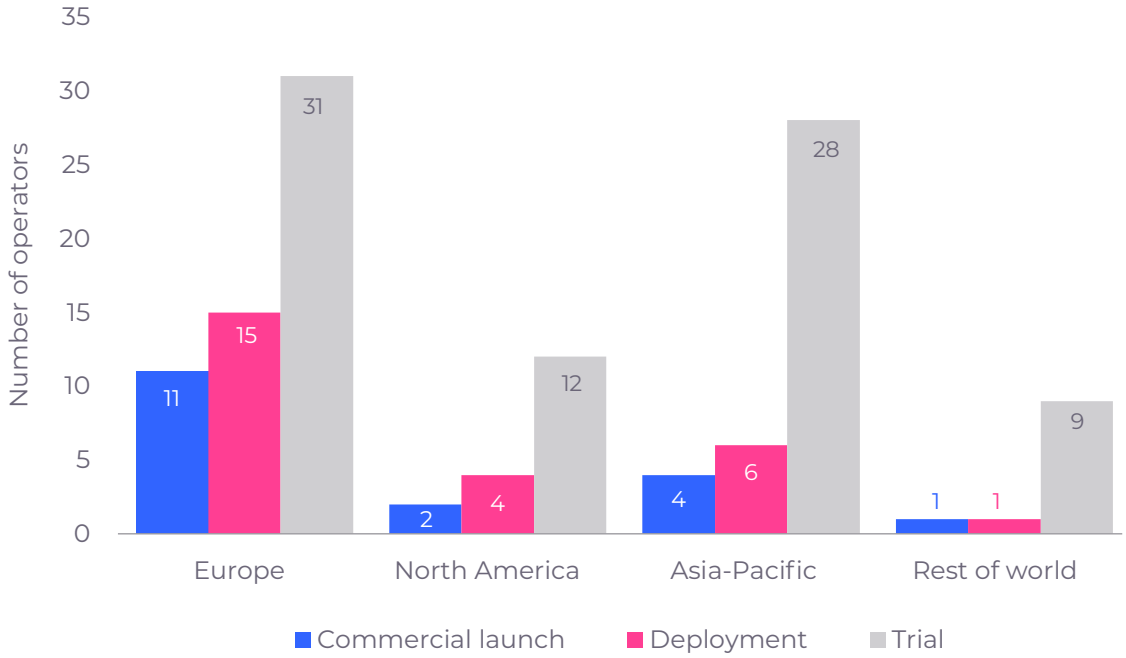
and Telefónica also continue to be active in trialling and deploying the technology while contributing to efforts to build a European ecosystem.

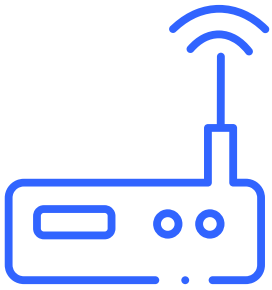
Operators are starting to set significant targets for open network deployment. For instance Deutsche Telekom plans to deploy 3000 Open RAN sites by the end of 2027 and in early 2026 it is expected to issue an RFQ for a network modernisation covering 30 000 sites, with Open RAN interface compliance as a component. Orange has pledged to mandate Open RAN compliance for any new procurements from 2025. The impact of these commitments will be seen as large operators introduce a second wave of 5G equipment, often to support improved coverage and capacity together with 5G Standalone or 5G Advanced. However, there have also been some setbacks for global Open RAN in 2025, notably in the USA, where some government funding for the technology was withdrawn, and Echostar decided to sell its mobile spectrum and largely wind down its Open RAN.

FIG5.4 shows the increasingly strong leadership position that European operators are collectively taking in Open RAN. The number of trials and deployments in Europe has leapt dramatically from 16 in 2024 to 57 in 2025, partly because operators have embarked on trialling the technology for the first time, for instance Three UK in Scotland; and partly because already-active operators have multiplied the number of trial or commercial networks. The number of Open RANs has risen less sharply in North America (up from 10 to 18 trials and deployments) and in Asia-Pacific (up from 24 to 38), but there is steady progress in all three regions, and we expect to see a leap in large-scale commercial roll-outs in the 2028-2030 timeframe. Europe leads the way in terms of both commercial launches and pre-commercial deployments.

The number of Open RAN trials and deployments in Europe has leapt dramatically from 16 in 2024 to 57 in 2025.

FIG5.4 : Open RAN trials and deployments in Europe, North America, Asia-Pacific and Rest of World, 2025 [Source: Analysys Mason, 2025]





OPEN GATEWAY AND NETWORK-AS-A-SERVICE

Network-as-a-service (NaaS) has the potential to support new business models for operators. Operators can provide connectivity and related services from a single platform to customers, particularly enterprises, but also to other service providers. The services can be provided and billed on a consumption basis, similar to cloud services, which provides improved flexibility compared to traditional enterprise or virtual network operator contracts. Operators seek to expand the value-added applications they can offer with NaaS, by exposing their network and platform capabilities to developers through open APIs.

There has been a steady increase in operator activity related to open APIs, based on industry initiatives such as MEF, CAMARA and GSMA's Open Gateway. These initiatives aim to make it easy for developers to incorporate network functionality into applications in a standard way, so that their apps can run on the network of any supporting operator.

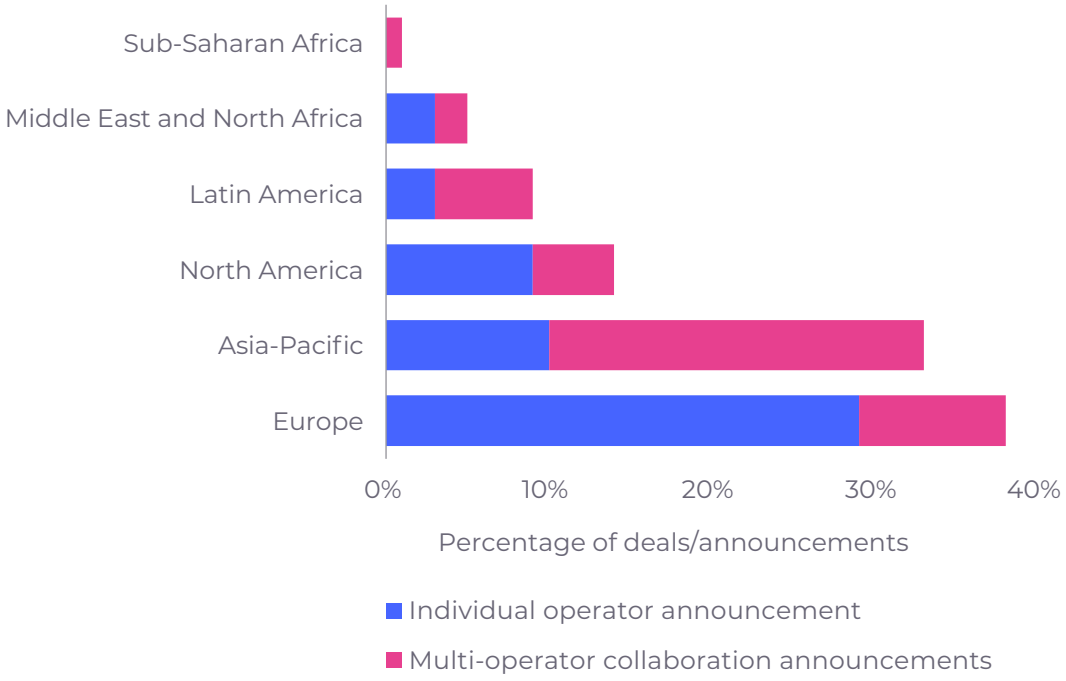
As **FIG5.5** shows, European operators have dominated the drive to develop network APIs and so increase the potential revenues

from enterprise applications and NaaS. As of June 2025, 38% of network API platform-related announcements had been made by European operators, the vast majority of them based on one of the open initiatives listed above. This was slightly down from over 40% in the previous year, as a result of increased activity in Asia-Pacific. But the number of publicly announced initiatives has almost doubled during that year, and now totals 85 separate activities in Europe.

Another change is the increased level of cooperation between operators. In 2024, 34% of network API initiatives were multi-operator collaborations, and in Europe the percentage was just 13%. A year later, 46% of initiatives globally involve multiple operators. This reflects the rising adoption of open standards, which facilitate multi-company partnerships, and the recognition among leading API and NaaS adopters, such as Telefónica and Orange, that cooperating around platforms will greatly increase the variety of applications available, and therefore the value to customers and developers.

There are still barriers to overcome to unlock the full potential of network APIs and NaaS. In particular, operators acknowledge that the majority of commercial APIs are still supporting simple functions such as SIM swap, whereas value for enterprises will be derived from more advanced APIs such as those related to network quality of service. These advanced APIs are more complex to implement than the simple ones, but they will enable high-value services and will be an important enabler of network slicing, in which enterprises can be assigned their own virtual slice of connectivity, automatically provisioned with the relevant QoS attributes for their requirements.

FIG5.5 : Network API platform-related announcements by region, and by individual or multi-operator announcement [Source: Analysys Mason, 2025]



INVESTMENT IN CLOUD, COMPUTE AND AI INFRASTRUCTURE

In recent years operators have been investing in the cloud, compute (data centre and edge) and AI capability needed to complement advanced telecoms networks. These investments are enabling innovation in the operation of telecoms networks themselves, but they are also a critical part of the infrastructure needed for wider enterprise and government innovation. Connect Europe members are among those telecoms operators that are positioning themselves as European suppliers of sovereign, trusted data and AI infrastructure and services. They have also been developing new services that leverage these infrastructure investments.

Investment in network cloud infrastructure

Operators' migration of their networks and network operations to the cloud has been slower than expected at the start of the 5G era. Reasons have included the relatively cautious adoption of 5G Standalone, which relies on a cloud-based mobile core, and the significant technical and organisational challenges of implementing vRAN. However, two interrelated trends are driving a revival in operator interest in cloudifying their networks, and an uptick in investment. These are the drive towards a significantly increased level of autonomy in network operations, and operator interest in AI. The latter includes using AI and machine learning to enhance autonomous networking systems, but also investing in AI-optimised cloud infrastructure that can be monetised with enterprises or other service providers, as well as support new consumer applications.

For example, MEO continues to invest in network automation and is paving the way toward fully Autonomous Networks. This journey focuses on leveraging AI-driven solutions, closed-loop automation, and intent-based operations to deliver greater efficiency, resilience, and agility across fixed and mobile infrastructures. This will minimise manual intervention, accelerate service delivery, and ensure superior customer experience, while preparing the network for future capabilities such as dynamic slicing and zero-touch operations.

> Analysys Mason forecasts that global operator spending on network cloud infrastructure will grow from EUR15 billion in 2024 to USD21.5 billion by 2030, at a CAGR of 6%.

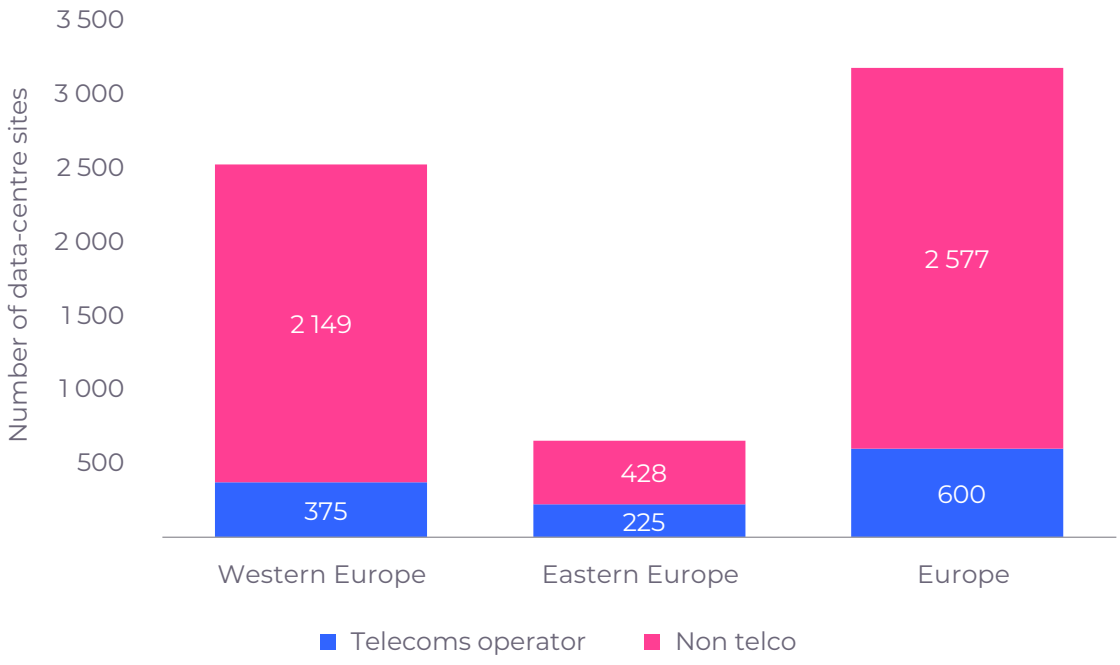
In Europe, operators such as Telefónica and Vodafone are gradually moving beyond small-scale, limited-scope deployments towards broader, more strategic roll-outs. This shift is being driven by the expansion of 5G SA core deployments and legacy core/IMS modernisations because operators are looking to take advantage of the advanced automation capabilities of cloud-native networks to reduce costs. Service innovation via network slicing and APIs is also becoming increasingly tangible.

In Europe, some initiatives may help to facilitate the migration to the cloud, particularly by helping to address concerns about data sovereignty, security and federation. For instance, the European Commission Important Project of Common European Interest (IPCEI) will apply to next generation cloud infrastructure and services (CIS), and will enable a federated and fully cloud-native network from end to end. A total of 19 companies from seven member states (France, Germany, Hungary, Italy, the Netherlands, Poland, and Spain) including 4iG, Deutsche Telekom, Orange, Telefónica and TIM are participating directly in the project. It has led to the launch of the open-source Sylva Project that is now operational.

Telecom operator investment in data centres

Data centres are the focus of significant investment around the world, as they are an essential component of the infrastructure needed for a successful digital economy. Telecoms operators are active investors in this market in Europe.

FIG5.6 : European operator ownership of data centres [Source: Analysys Mason, 2025]



Telecoms operators own around 19% of all the data centres in Europe, and are still investing in the region. At least 27 new European data centres with nearly 1300MW of additional capacity[28] are currently planned or under construction that are backed by telecoms operator investors.

[28] Capacity data is not available for all developments.

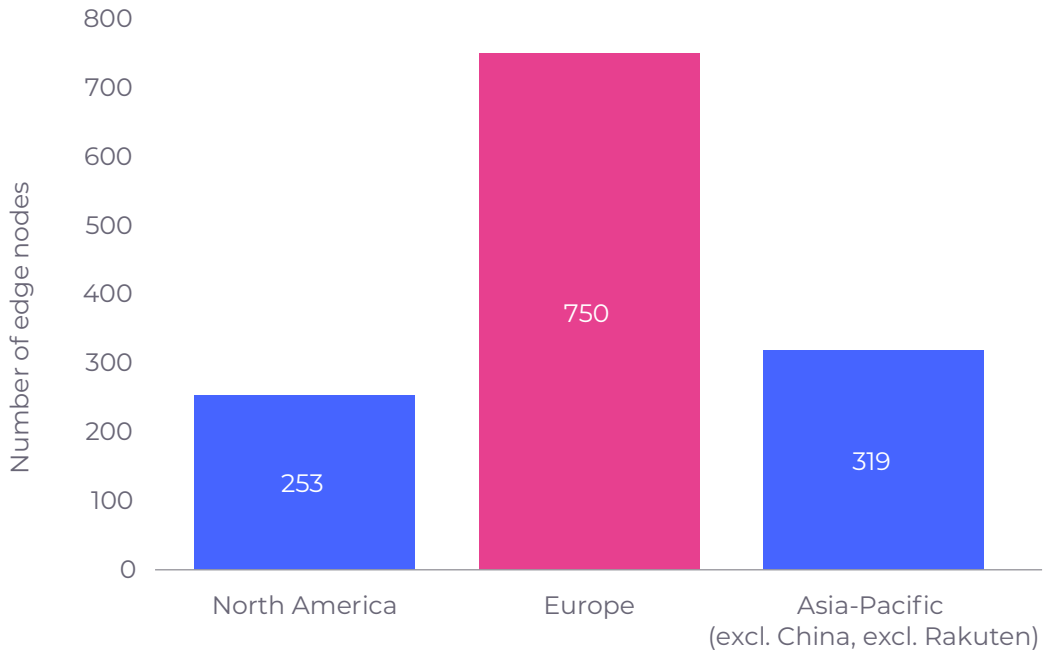
Investment in edge compute infrastructure

Edge compute infrastructure is expected to support the development of a range of innovative low-latency applications and services, including AI inference, connected car and IoT (especially industrial and manufacturing) applications. Edge infrastructure is also anticipated to improve local data control, and support enhanced security.

The European Commission's latest estimates suggest that the number of edge nodes deployed across Europe (EU27) more than doubled to over 2200 between 2023 and 2024[29]. This figure includes deployments by telecom operators, cloud providers, and enterprises themselves.

> Operators alone are estimated to have deployed around 430 edge nodes in 2024, up from around 320 in 2023, showing significant progress over a year.

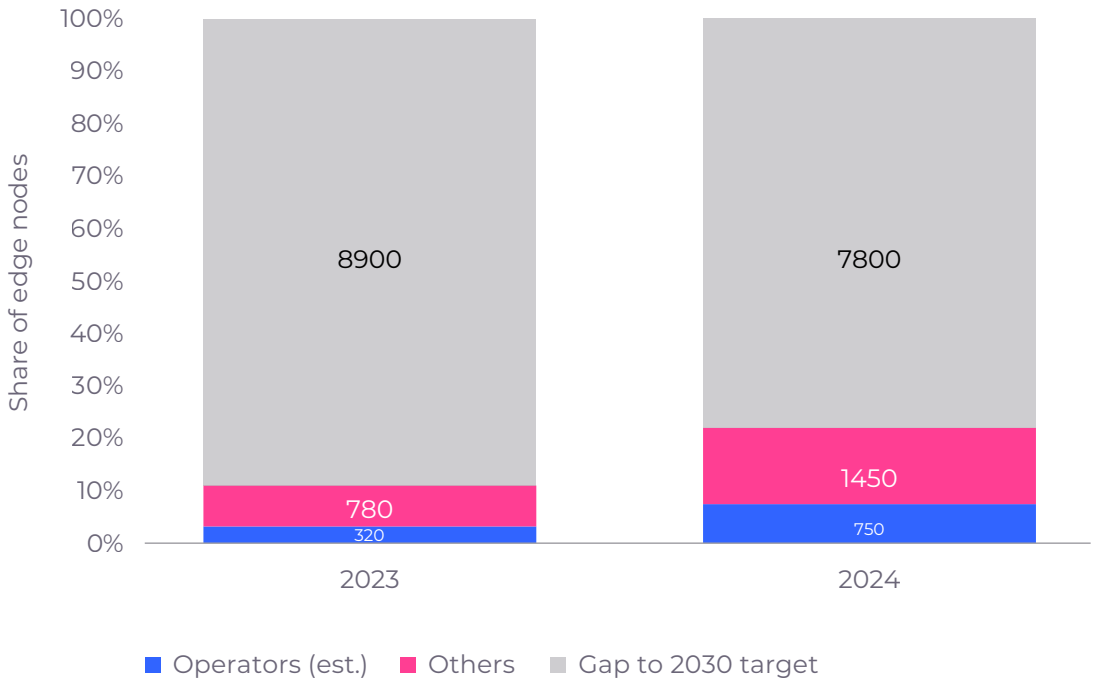
FIG5.7 : Live operator edge nodes by region, to date (publicly disclosed)
[Source: Analysys Mason, 2025]



This growth aligns with the EU's broader ambitions under the Digital Decade programme, which targets 10 000 climate-neutral, secure edge nodes by 2030.

[29] State of the Digital Decade report, European Commission, 2025.

FIG5.8 : Progress towards the EU's edge node target
[Source: European Commission and Analysys Mason estimates, 2025]



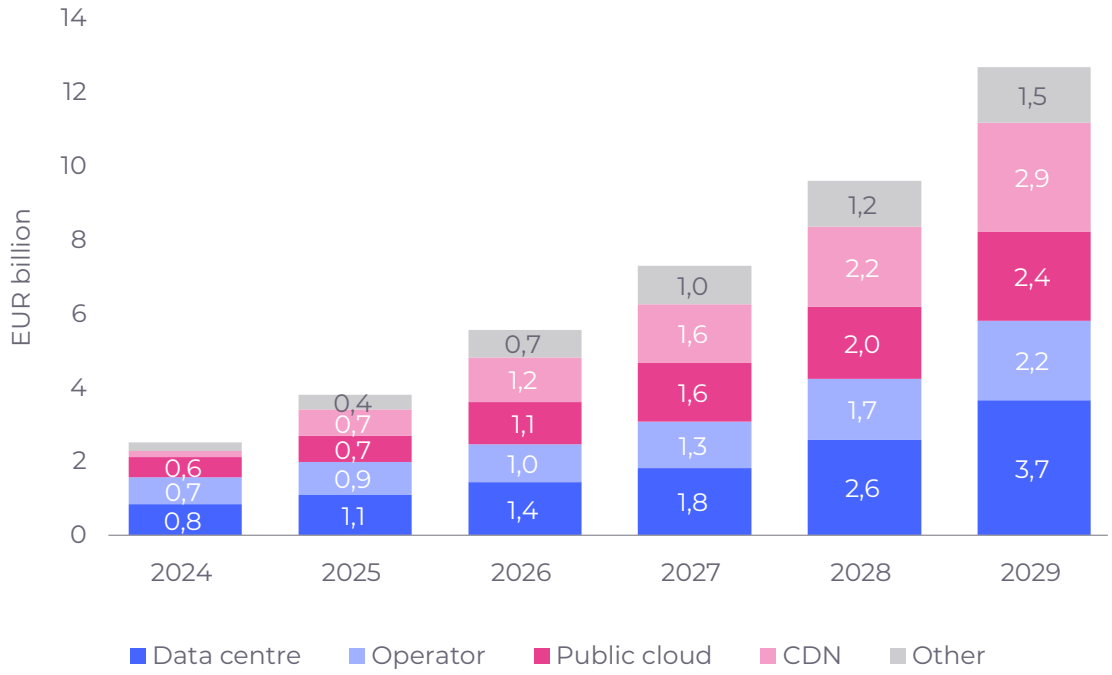
To maintain momentum, in 2024, several European telecom operators, including Deutsche Telekom, TIM and Telefónica have joined the 8ra – Cloud-Edge Continuum initiative[30]. Launched as a flagship project under the IPCEI on Next Generation CIS programme, 8ra brings together over 100 partners - including telecoms operators, infrastructure providers, and research institutions - from 12 EU member states. The initiative is focused on:

- Building a sovereign, federated cloud-edge ecosystem that ensures interoperability and reduces dependence on non-European hyperscalers.
- Developing a modular, open-source reference architecture for edge cloud services, covering infrastructure, orchestration, AI, and data layers.
- Piloting real-world edge applications to validate the architecture's scalability and practical impact.

The 8ra initiative is expected to play a pivotal role in helping the EU meet its 2030 edge node deployment targets.

[30] 8ra Cloud Edge Continuum

FIG5.9 : Spending on public edge node infrastructure, by company type, worldwide, 2024–2029 [Source: Analysys Mason, 2025]



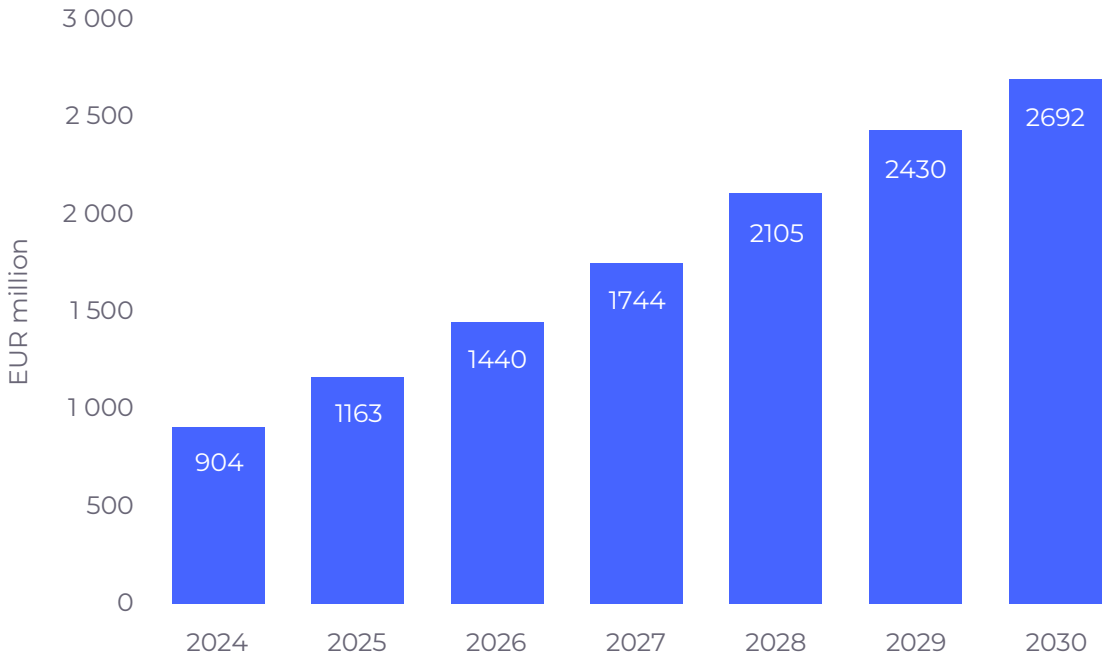
Spending on public edge infrastructure worldwide reached an estimated EUR2.5 billion in 2024, rising 33%. Expenditure is expected to accelerate in 2025, and the market as a whole is forecast to grow to EUR12.7 billion in 2029, fuelled by strong spending growth by all player types. The content delivery network (CDN) provider share will grow fastest. Operator investment in public edge node infrastructure is expected to reach nearly EUR2.2 billion in that time.

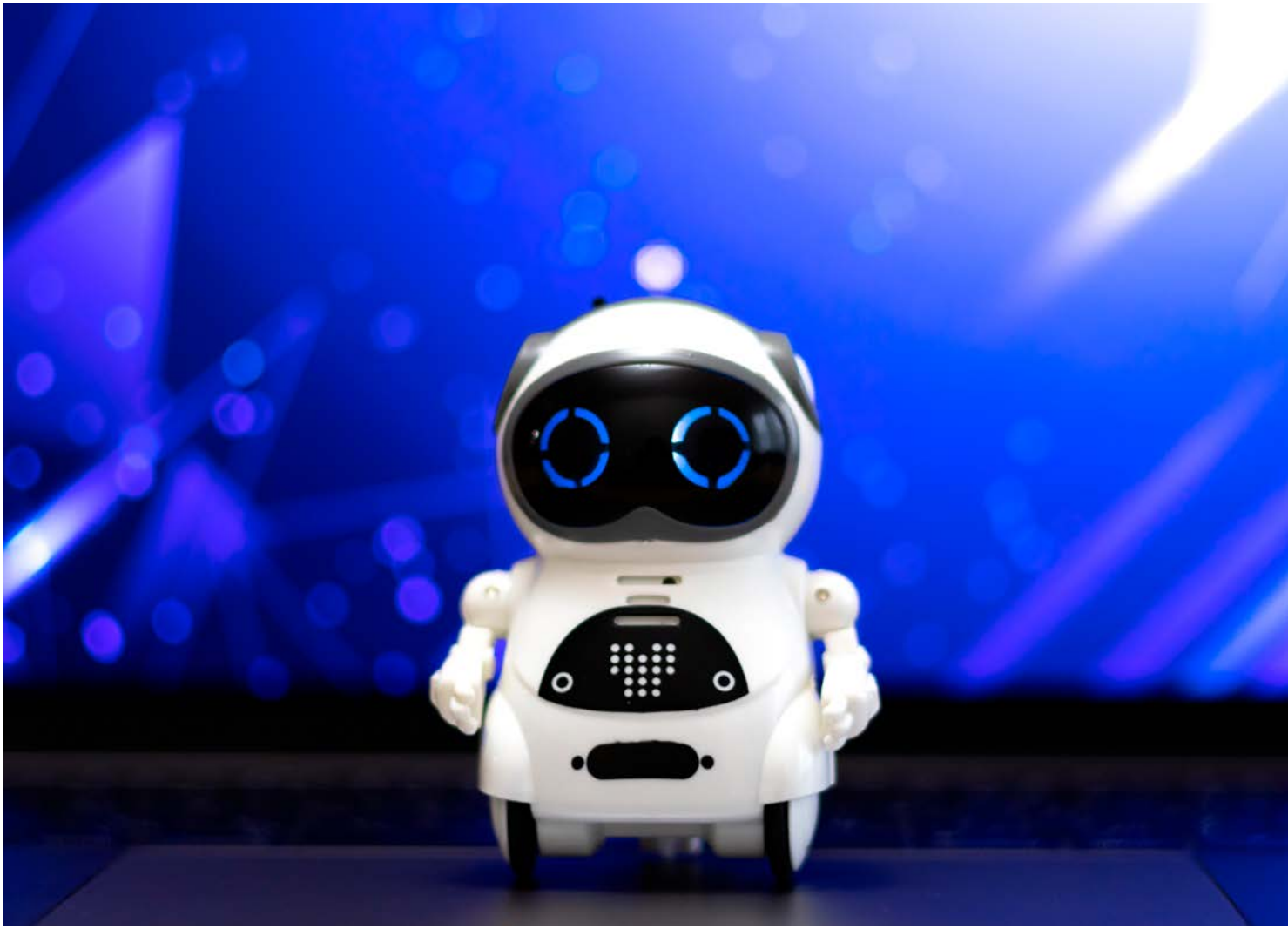
Investment in AI cloud infrastructure

Investment in AI is widely considered critical to remaining competitive, and is expected to enable improvements to customer service, modernisation and automation, and the creation of new business-models and services. Telecoms operators are investing in cloud AI infrastructure to support both internal AI use cases and AI-related services for enterprises and consumers, including investments in AIaaS, and GPUaaS.

Operators have been investing in AI for some time, but the emergence of GenAI, large language models, and new AI chipsets, has led to an acceleration of investment in AI applications, use-cases and the underpinning infrastructure. Annual investment in cloud AI infrastructure (including compute, storage, networking and cloud infrastructure) by European operators is expected to nearly triple between 2024 and 2030 rising to around EUR2.7 billion per year.

FIG5.10 : European operator investment in AI cloud infrastructure
[Source: Analysys Mason, 2025]



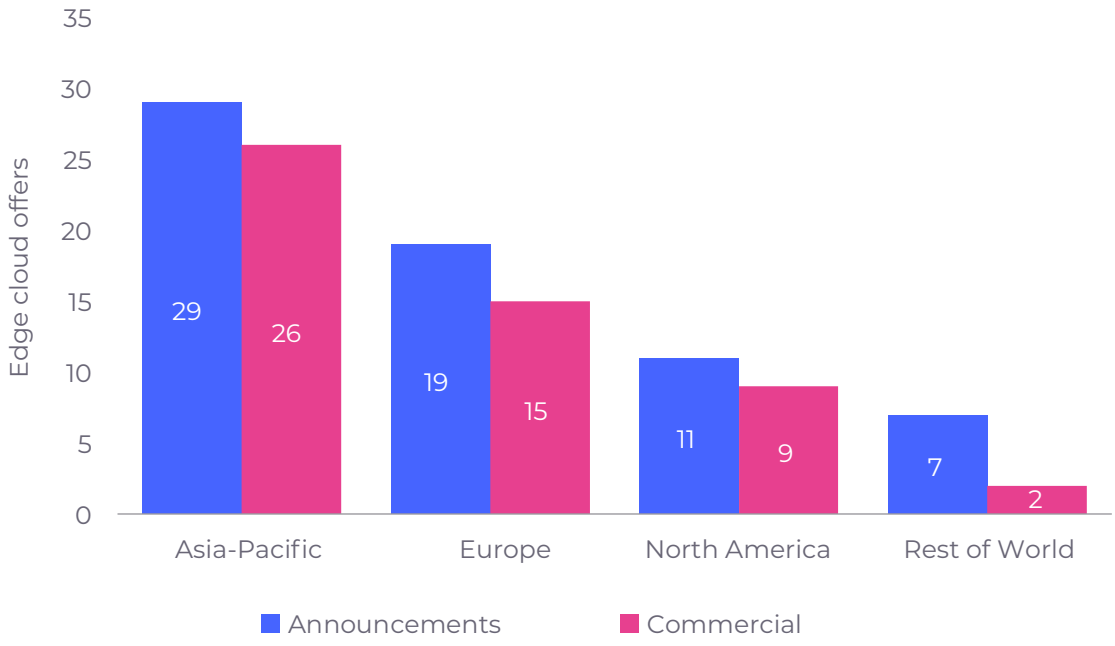


PROVISION OF CLOUD, COMPUTE AND AI SERVICES

Provision of edge cloud computing services

Edge cloud computing is enabling operators to deliver more responsive, secure, and scalable digital services. Telecom operators are partnering with other players in the edge ecosystem, including hyperscalers, technology vendors, data centre providers, and neutral hosts, to deliver new edge cloud offers and to overcome some of the challenges of deploying edge use cases including cost and time to market.

FIG5.11 : Operators that have announced projects or commercialised edge cloud offers, by global region, to 1H 2025 [Source: Analysys Mason, 2025]



An increasing number of operators are announcing edge cloud projects or launching commercial edge cloud services. By the end of October 2025, 52 operators had launched commercial services, with just over half of the commercial launches by operators in the Asia-Pacific region. The number of announced and launched services is higher than the figures shown in **FIG5.11** (which depicts the number of operators that have announced launches or trials of one or more services). A number of operators are offering multiple variants of edge cloud service. In Europe more than half of the operators that have announced or launched edge cloud offers are Connect Europe members.

Provision of AI services

Some telecoms operators are positioning themselves as AI infrastructure and services providers for enterprises, with the aim of generating new revenue streams or expanding existing ones at the same time as supporting a new wave of AI-led innovation by their customers. They have been quick to bring a wide range of products and services to market covering the full AI stack. Products and services that have been commercialised by telecoms operators include:

AI infrastructures

- AI data centre hosting - datacentre facilities designed to support AI compute services and marketed with strong AI branding.
- GPU-as-a-service - access to GPU resources on an as-a-service basis.

AI models

- Owned/co-developed large language models (LLMs) - bespoke LLMs developed either solely by the operator or in collaboration with partners (excludes customer-specific LLMs).
- Host to third party LLMs - hosting of third-party LLMs within an operator's own infrastructure, often with support such as low-code, no-code tools.
- Access to public platforms for third party LLMs - curated access to a platform that allows for access to publicly available models, often including integrated pricing and access to a library of prompts.

Data management

- Data management tools - Products and tools for enterprises to use for data management.
- Data management services - Professional services to support enterprises' data strategy, platform design and management.

Data and insights

- Data and AI/analytics using operator data - Use of telco data (for example mobility data) and AI tools developed based on telco data to deliver customer insights.

AI applications

- Bespoke AI applications - Bespoke AI applications developed either solely by the operator or in collaboration with partners.
- Resale of third party AI applications - Provision of third-party AI applications (e.g., Copilot) with little or no customisation by the operator.
- AI-enhanced applications - Provision of third-party applications for which AI has significantly enhanced their capabilities (for example meetings applications with AI-generated meeting summaries).

AI professional services

- AI consulting/training/application development - Professional services to support AI assessments, service development and implementation. Excludes professional services related to data management.

AI connectivity

- Specific offering for AI - Connectivity services marketed with strong AI branding.

Connect Europe members are among those telecoms operators that are leading the way. For instance significant announcements in 2025 included Deutsche Telekom working with NVIDIA and SAP to build an industrial AI cloud in Germany[31]; Fastweb+Vodafone launching a new FastwebAI suite of services based on its own LLM trained on Italian language data sets[32]; Telefónica Tech launching its GenAI platform to help customers create customisable virtual assistants[33]; Orange Business partnering with NVIDIA to address demand for sovereign AI solutions[34] and launching a comprehensive GenAI solution[35]; Telia Company partnering with Accenture to offer sovereign AI solutions in Sweden[36]; and Telenor cooperating with NVIDIA to build an AI factory in Norway[37] (non-exhaustive list).

[31] https://www.telekom.com/en/media/media-information/archive/launch-industrial-ai-cloud-with-nvidia-1098706
[32] https://www.fastwebvodafone.it/area-media/comunicati-stampa/intelligenza-artificiale-fastweb-vodafone-prima-telco-italiana-a-lanciare-sul-mercato-servizi-ai-proprietari-per-aziende-e-pubbliche-amministrazioni/?lng=EN
[33] https://www.telefonica.com/en/communication-room/press-room/telefonica-tech-launches-generative-ai-platform-create-customisable-virtual-assistants/
[34] https://www.orange-business.com/en/press/orange-business-nvidia-strengthen-strategic-collaboration-deliver-trusted-sovereign-ai
[35] Orange Business launches "Live Intelligence": a range of plug-and-play GenAI solutions for businesses - Newsroom Orange Group
[36] https://press.telia.se/news/telia-cygate-och-accenture-krokar-arm-foer-saeker-och-suveraen-ai-i-sverige-501088
[37] Telenor Builds Norway's First AI Factory, Offering Sustainable and Sovereign Data Processing | NVIDIA Blog

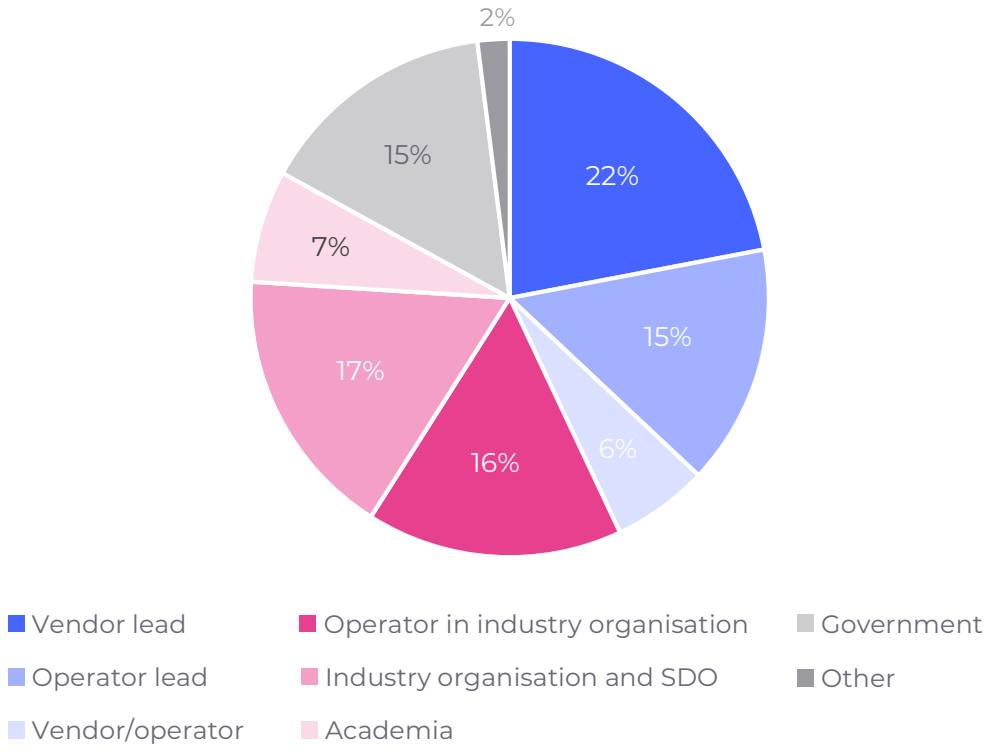
OPERATORS ARE ACTIVE IN DEFINING AND DEVELOPING 6G

The mobile ecosystem is already starting to consider what the next generation of technology and standards, or 6G, will look like. This is at an early stage – work on standards has not yet begun and foundational decisions about spectrum allocations and network architecture are still to be made. Vendors and some governments are keen to progress a new generation, in part to address some of the shortcomings of 5G in performance and monetisation terms. Analysys Mason's operator survey indicates that most operators do not have firm roadmaps for introducing 6G as yet. Respondents were asked 'if 6G equipment were commercially available in 2030, how quickly would you plan to deploy it?' Only 5% said they would deploy in 2030-2031, while 63% said they did not know. As the industry is still focusing on how to monetise 5G investments, it is clear that operators will not invest in a new generation unless the business case is very compelling. Despite their caution, large operators are active in 6G-related R&D projects, because they want to influence the definition of new standards and ensure these align with their commercial goals.

FIG5.12 shows the important influence of operator participation in 6G-related initiatives. Of over 250 active 6G-related projects, the majority are collaborative efforts between representatives of different groups. When looking at the lead players within each group, 21% of 6G projects are led by one or more operators, and a further 16% by industry organisations in which operators are the main players. Vendors lead in 28% of projects, while government initiatives, academic projects and standards development organisations are also important sources of 6G work.

21% of 6G projects are led by one or more operators, and a further 16% by industry organisations in which operators are the main players and 38% are led by vendors.

FIG5.12 : 6G R&D projects by type of organisation taking the lead role
[Source: Analysys Mason, 2025]



There are also several EU-driven initiatives that have been launched in the past year to focus on 6G, and on securing European influence in the roadmap. These include the Smart Networks and Services Joint Undertaking (SNS JU) framework to support 6G R&D, which was enhanced in early 2025 by the launch of the SNS CO-OP project to coordinate the efforts of 79 different SNS JU research projects. Telenor, Orange and TIM are among the operators that are leading the CO-OP effort. The EU has also established a fund worth EUR104 million to advance 6G research.

There are two debates related to 6G that will be particularly important in shaping its future, and leading European operators are vocal in both, as well as major MNOs from North America and south-east Asia. One is how far 6G will be a continuation of 5G, as opposed to a brand new RAN and core architecture. 3GPP has said that Release 20 of its standards, which should be completed in 2027, will be a crossover release between 5G and 6G, which indicates the desire of the 3GPP membership to build 6G on 5G foundations. One industry camp is setting out a roadmap in which 6G runs on the 5G SA core, while supporting new spectrum bands and AI-driven radio technologies in the RAN. However, other players argue that a more radical approach to the core would better enable 6G to support very advanced new use-cases and spectrum bands.

The second, related debate is how far 6G needs to be AI-native, and how far AI will define the new generation of technology, rather than being introduced gradually from 5G-Advanced onwards. Some operators argue that an AI-native platform is the best way to achieve full network automation, adaptability and resource efficiency and therefore reduced TCO with improved quality of experience. 6G will also need to be green and secure by design.

It is clear that 6G, whatever its architecture, will need to be deployable in a far less capex-

intensive way than 4G and 5G, if it is to gain widespread adoption before 2035. Many large operators, especially in Europe, have publicly stated that they will not sustain another big-bang upgrade that entails a major capex spike. Capex levels at most major operators have fallen in the past 2-3 years and are not expected to return to pre-2021 levels.

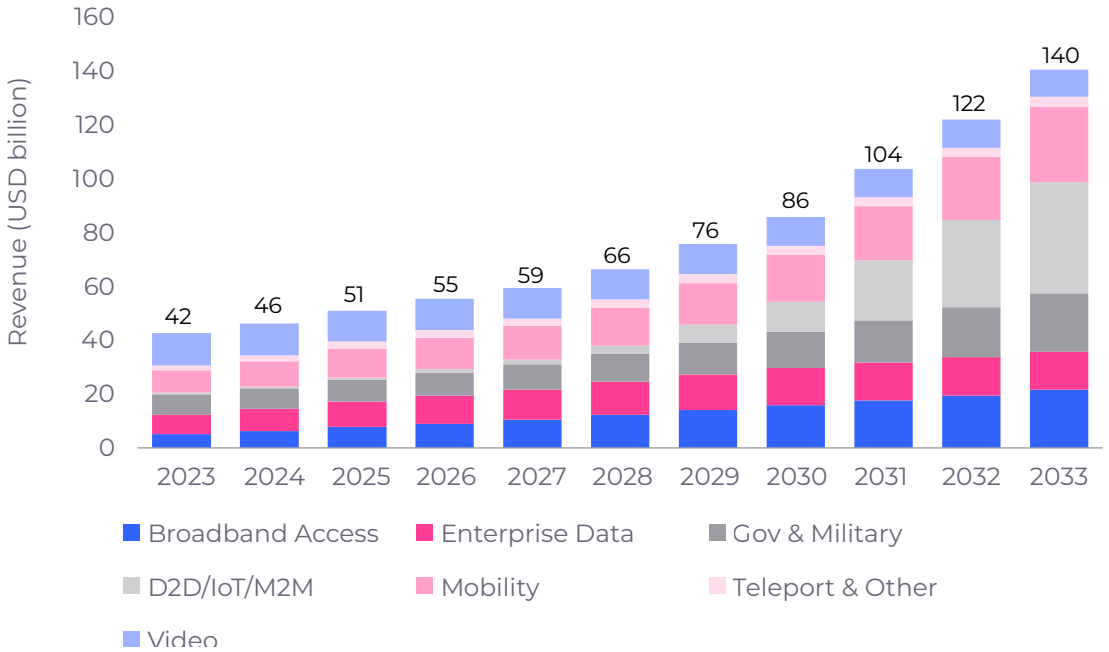
SPACE AND 5G TERRESTRIAL COMMUNICATIONS NETWORKS ARE BECOMING INCREASINGLY INTEGRATED

The broad coverage of satellite constellations can be a valuable complement to terrestrial mobile networks whose operators are constrained by the limited reach of their signals. This is another frontier of the European tech sovereignty debate, as governments and companies are looking to ensure enough European alternatives to dominant non-EU players in this field. The emergence of low earth orbit (LEO) satellites, which come with significantly lower cost and latency than traditional satellites, has improved the business case for using this technology to fill gaps in mobile or even broadband coverage and support applications that require ubiquitous coverage, such as emergency communications or some wide-area IoT services.

European operators are starting to form strategic partnerships with satellite providers, though their use of this technology remains low compared to that of telcos in Asia due to the higher geographical and population coverage and high quality of terrestrial mobile and fixed networks in Europe. According to Analysys Mason, European satcoms revenues in 2024 were EUR7.5 billion, compared to over EUR320 billion in telecoms. However, satcom revenues will grow at a CAGR of 8% between 2023 and 2029, compared to under 2% for telecoms in the same period, so telcos will be looking for new revenue-generating services and partnerships.

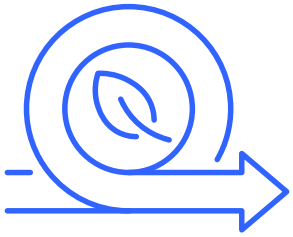
The focus on satellite/terrestrial integration will be driven by the implementation of 5G non-terrestrial network (NTN) standards in satellite infrastructure and in mobile devices, allowing 5G direct-to-device (D2D) services to be offered by telcos with LEOsat partners. Several European operators plan to introduce D2D services in late 2025 or early 2026, including Deutsche Telekom and Orange with Skylo Technologies, Vodafone with AST SpaceMobile, and Virgin Media O2 and Telefonica with Starlink. Regulators are also working to enable D2D services, with the UK's Ofcom taking a lead.

FIG5.13 : Satellite and space communications market revenue by segment, worldwide 2023-2033 [Source: Analysys Mason, 2025]



Analysys Mason believes D2D will be the biggest driver of revenue growth in satcoms globally. Satcom revenue is forecast to increase 3.3 times between 2023 and 2033, while the figure in D2D will be 60 times, rising from 2% of the total in 2023 to 29%, the biggest share, in 2033. Revenue in the broadband access and mobility segments will also grow at an above-average rate, fuelled by the aggressive growth strategy of LEO operators, and mobility will contribute the highest proportion (20%) of total revenue over the whole of the forecast period.

The first D2D offerings have focused on messaging, especially for urgent communication in remote areas, with targeted users including hikers or farmers. The next wave of D2D announcements is likely to extend to IoT applications and voice calls.



OPERATORS ARE FOSTERING THE EMERGENCE OF A SUSTAINABLE ECONOMY

Telecoms operators can help their customers transition to more sustainable business models in a variety of ways. The starting point is improving the sustainability of their own operations; the progress that Connect Europe members are making in this regard is discussed in Chapter 4 above.

Sustainable digital infrastructures can have an enabling effect, by helping organisations to digitalise and automate processes, to enhance energy efficiency, and to reduce carbon emissions. Telecoms operators and the networks, cloud and AI services, and digital platforms have a significant role to play in facilitating sustainable transformation in other industries. Operators have developed solutions or applications that their customers' organisations can use to support their own ESG initiatives.

Examples of sustainability-supporting products and services being brought to market by operators include carbon calculators, carbon network dashboards, distributed energy storage solutions, decentralised small-scale renewable energy management systems, energy and carbon optimised freight management tools, device energy management, and building energy management solutions. Looking at sustainability more widely, they also include a variety of environmental monitoring tools for crop management, water usage, and ecosystem surveillance.

Orange AI Carbon Value Navigator[36] , has been designed to support decision-makers and operational stakeholders in determining whether a project incorporating AI aligns with the financial and carbon reduction objectives of each business unit or division of the company. The objective is to compare the economic potential for value creation (revenue generation and cost savings) of implementing the AI system against its impact on the overall carbon footprint of the solution into which it must be incorporated.

Telefónica's project with Repsol[39], a global multi-energy company, aimed to transform product management in its external finished-product warehouses and optimise operations at Repsol's chemical plants. The initiative focused on establishing efficient systems for locating, transporting, and delivering products to end-customers. Thanks to the combination of AI, Big Data, and data analytics, Repsol has automated complex logistical tasks, reduced storage and transportation costs (with lower emissions), increased stock rotation, avoided waste associated with product ageing or deterioration, and strengthened overall sustainability.

[38] AI Carbon Value Navigator to estimate financial/carbon benefits of AI
[39] Repsol: Artificial intelligence at the service of logistics and sustainability

06

Telecom operators should not be hampered in becoming a stronger force in the European digital economy

There are opportunities for European operators to scale up and reestablish themselves as drivers of prosperity through investment and innovation. Unless major reforms intervene to support the need for operators to achieve scale in their sale of products and services, it is likely that most operators will, over the remaining years of the decade, have lower capex intensity for major fixed and mobile network renewals, although with different timelines in different markets.

There remain sector-specific challenges and obstacles to benefiting from improved efficiency (without seeing margins competed away), and therefore to investing improved cashflow into areas of growth. The main route to achieve better cashflows has hitherto been to cut opex. Going down this route will not ensure investments in the long run, but will deliver short-term improvements. Allowing operating groups to scale up is likely to deliver greater investment.

There is an opportunity to address these challenges and obstacles in the Digital Networks Act as well as in the upcoming review of the EU Merger Guidelines. In the meantime, the financial state of the sector is slightly stabilised over 2023, but without changing the historically established picture of a sector characterised by lower returns compared to its global peers.

THE UNDERLYING FINANCIALS FOR THE SECTOR IN 2024

Overall European revenue growth both for Connect Europe members and for European operators as a totality grew 2.9% in 2024. Overall revenue includes all revenue from all sources, unlike the growth figure in FIG6.1 above, which counts only mainstream fixed and mobile services. The annual growth-rate in overall revenue is up from 2.2% in 2023. Given that the CPI rose 2.6% this represents a miniscule level of real-term growth, but it nevertheless represents a change from previous years, where real-term growth has been negative, and the nominal growth still represents a declining share of nominal GDP.

FIG6.1 : Connect Europe members' European revenue growth[40], total European operator telecoms revenue growth, CPI, and nominal GDP growth, Europe, 2018-2024 [Source: Analysys Mason, 2025]

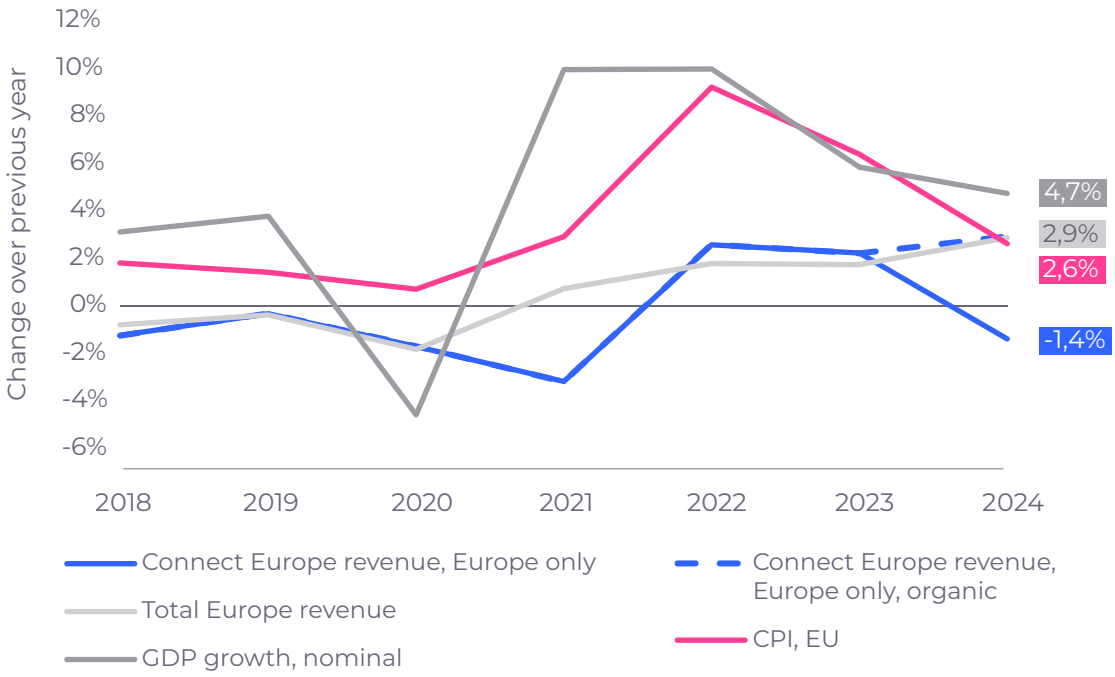
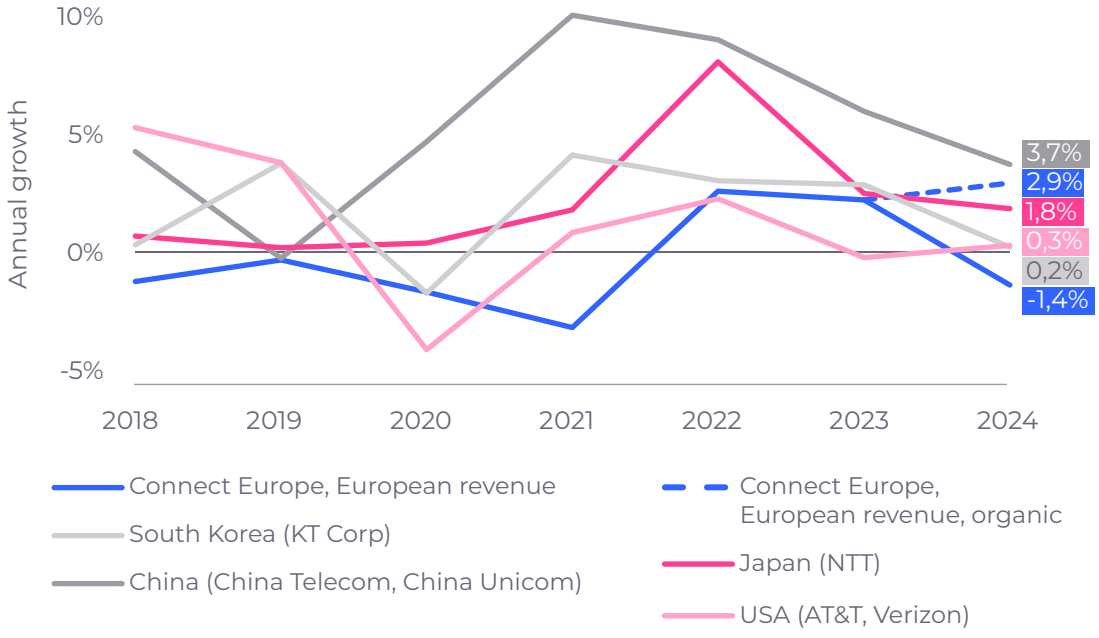


FIG6.2 below shows that low growth among leading telecoms operators is not confined to Europe. However, even with already low revenue per capita, for the six years to 2023, Connect Europe member revenue growth was still either last or close to last among the peer operators in five comparator markets.

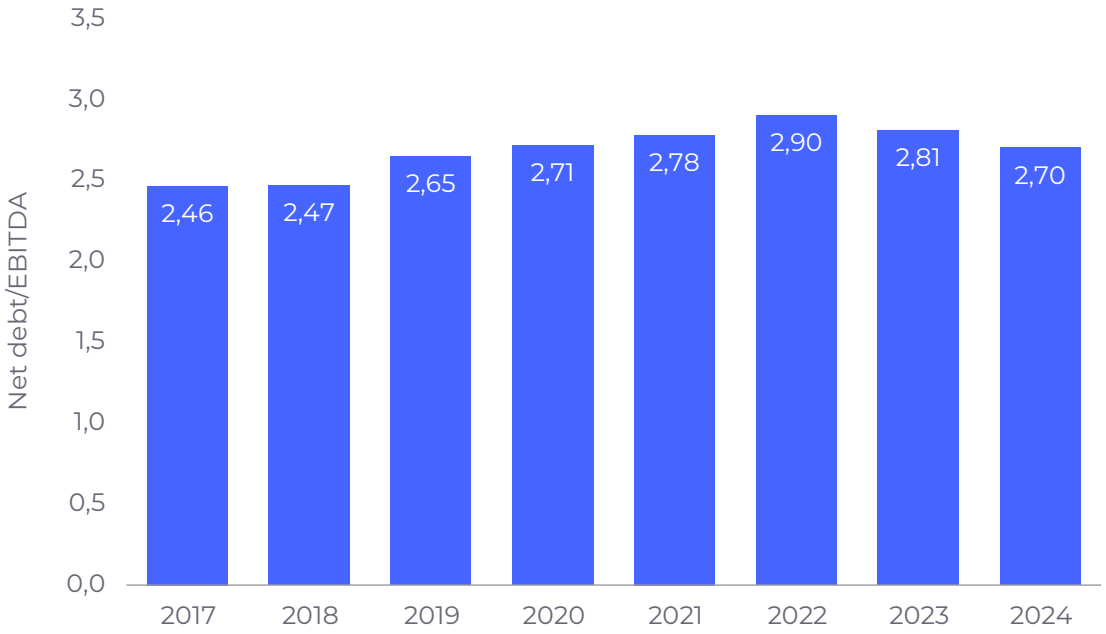
FIG6.2 : Connect Europe member European revenue growth and comparator operator revenue growth, 2018-2024 [Source: Analysys Mason, 2025]



[40] Organic growth excludes EUR7.7 billion revenue in 2023 for businesses divested in 2024 and now outside Connect Europe.

High and rising levels of debt of European operators has been a long-term concern, but the aggregate net debt/EBITDA ratio for Connect Europe members fell in 2024 for the second year running. This fall was caused by two main factors: slow, hard-won margin improvements and the reduction of debt through the sale of physical assets.

FIG6.3 : Net debt/EBITDA, Connect Europe members at group level, 2018–2024
[Source: Analysys Mason, 2025]



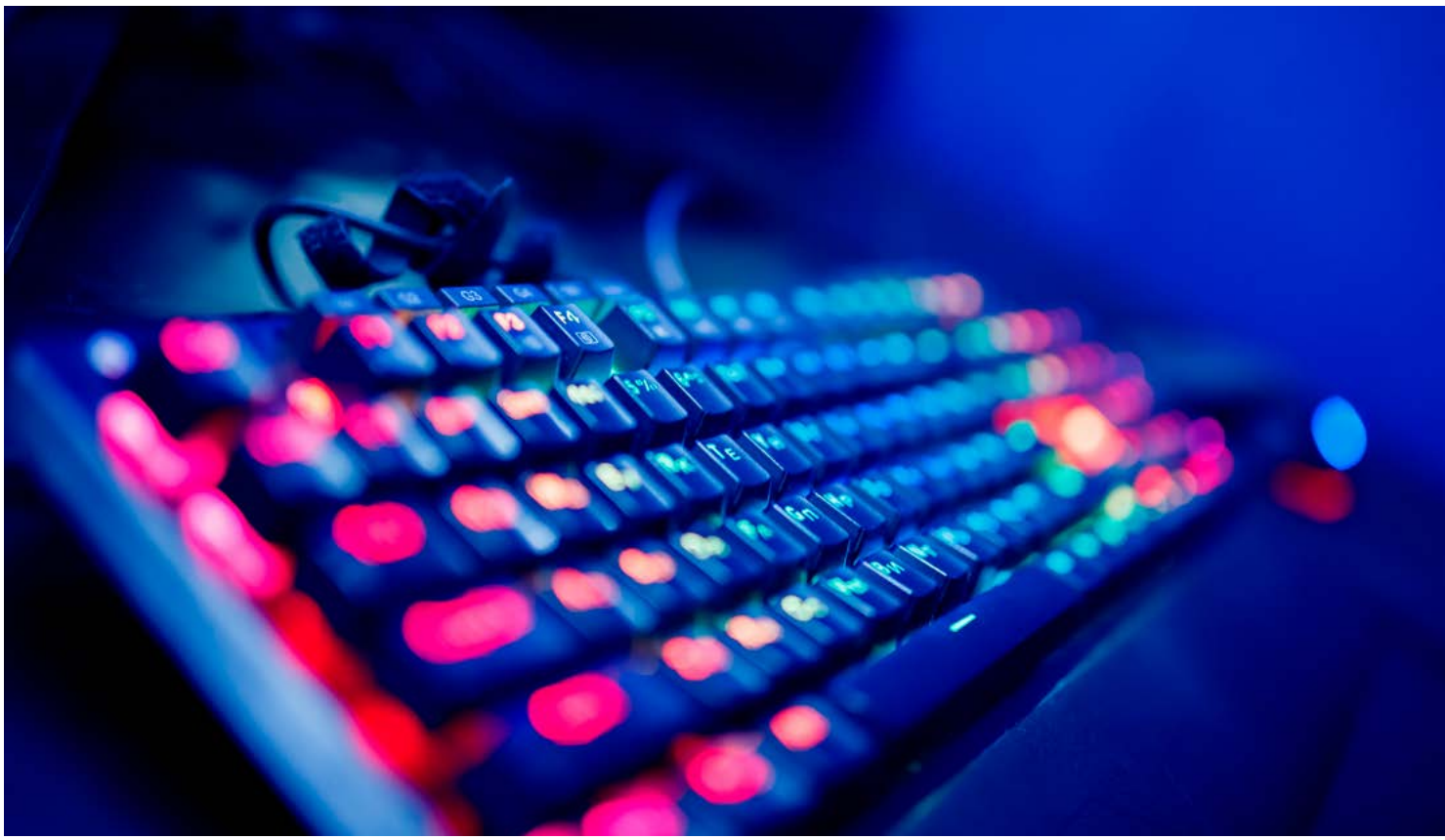
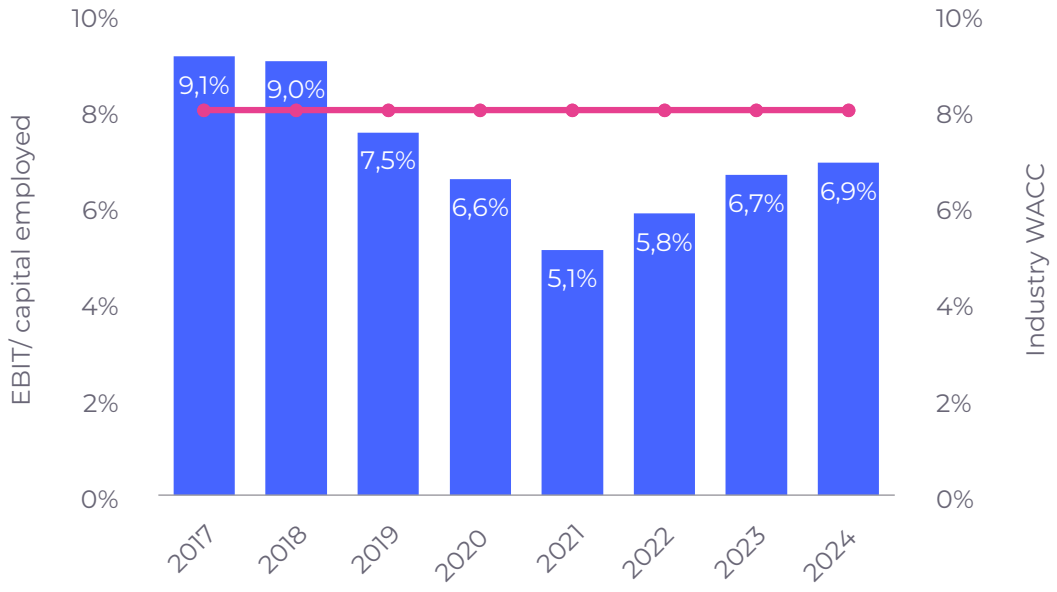


FIG6.4 shows return on capital employed (ROCE) from 2017 to 2024. While ROCE[41] has improved since 2021 the aggregate returns many operators make on their investments are lower than the weighted average cost of capital (WACC) they face. This structural gap makes an industry unsustainable.

FIG6.4 : Aggregate ROCE, Connect Europe members, 2017-2024 and industry WACC
[Source: Analysys Mason, Barclays, 2025]



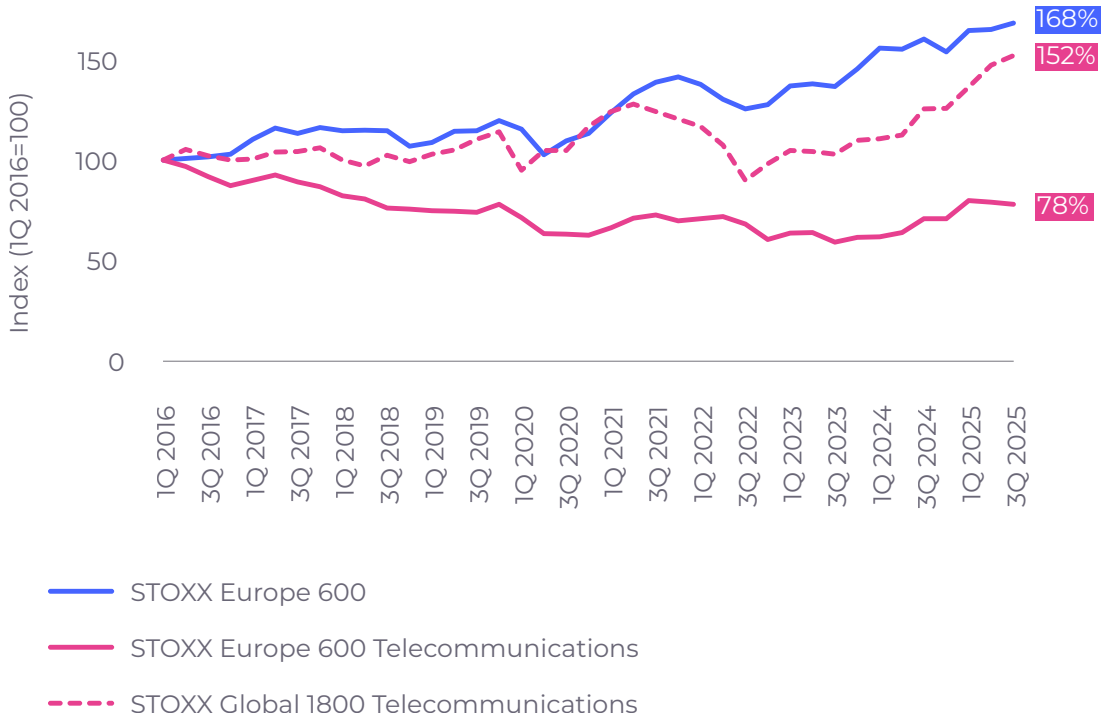
While ROCE has improved since 2021 the aggregate returns many operators make on their investments are lower than the weighted average cost of capital (WACC).

[41] The ROCE calculations are based on the following formula: EBIT divided by capital employed (total assets minus current liabilities). This formula includes goodwill in capital employed. If goodwill (the premium paid in an acquisition over the asset value of the business acquired) is excluded, ROCE is higher.

MARKETS HAVE STARTED TO BE MORE RECEPTIVE BUT EUROPEAN TELECOM STOCKS ARE STILL DOWN 22% ON WHERE THEY STOOD AT THE START OF 2016

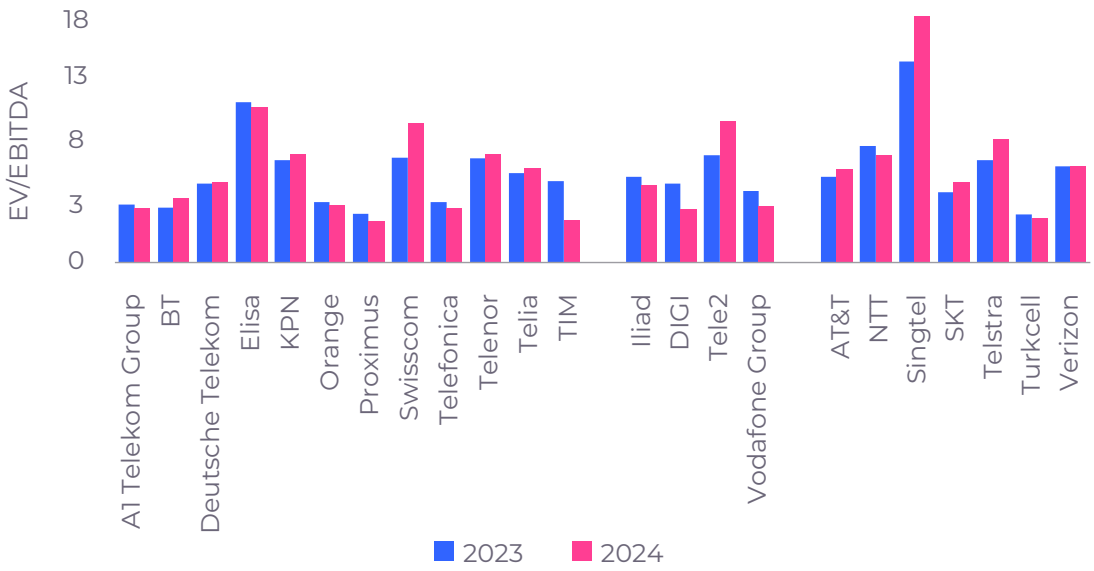
European telecom stocks had a better year in 2024 and the first three quarters of 2025 than for many years, although this has to be seen in the context of improvements in European stocks as a whole, and in the context of improvements in telecoms stocks globally. Nevertheless, they are still down 22% on where they stood at the start of 2016.

FIG6.5 : STOXX Europe 600 index, STOXX Europe 600 index for telecoms and STOXX Global 1800 index for telecoms, where the value in 1Q 2016 is set to 100, 1Q 2016-3Q 2025 [Source: STOXX, 2025]



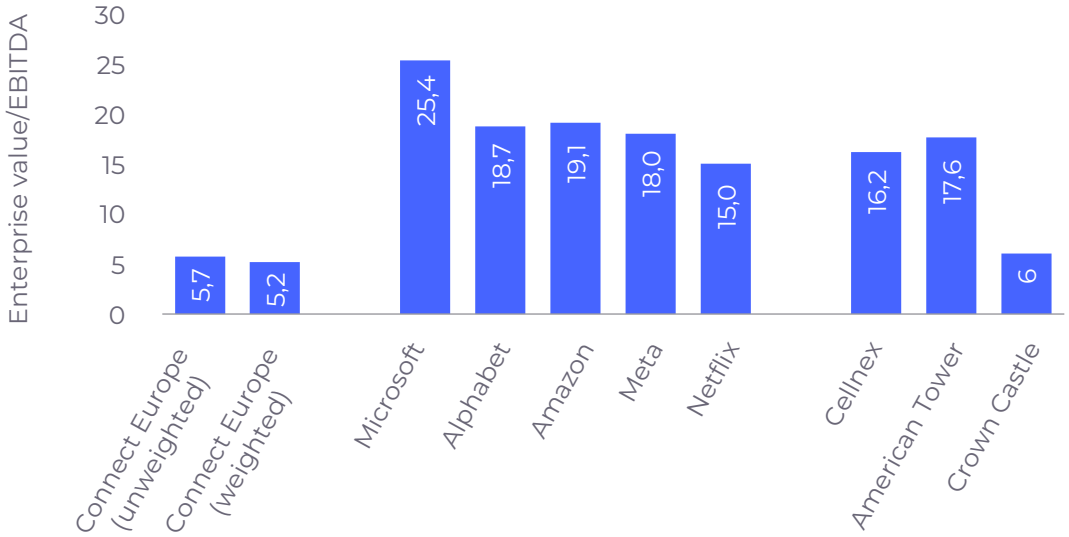
The ratio of enterprise value (net debt plus market capitalisation) in relation to EBITDA for operators in Europe, and elsewhere, showed no consistent pattern in 2024. Many European operators still have low multiples.

FIG6.6 : Enterprise value/EBITDA, larger Connect Europe members and other operators, worldwide, end of the last full financial year [Source: Analysys Mason, 2025]



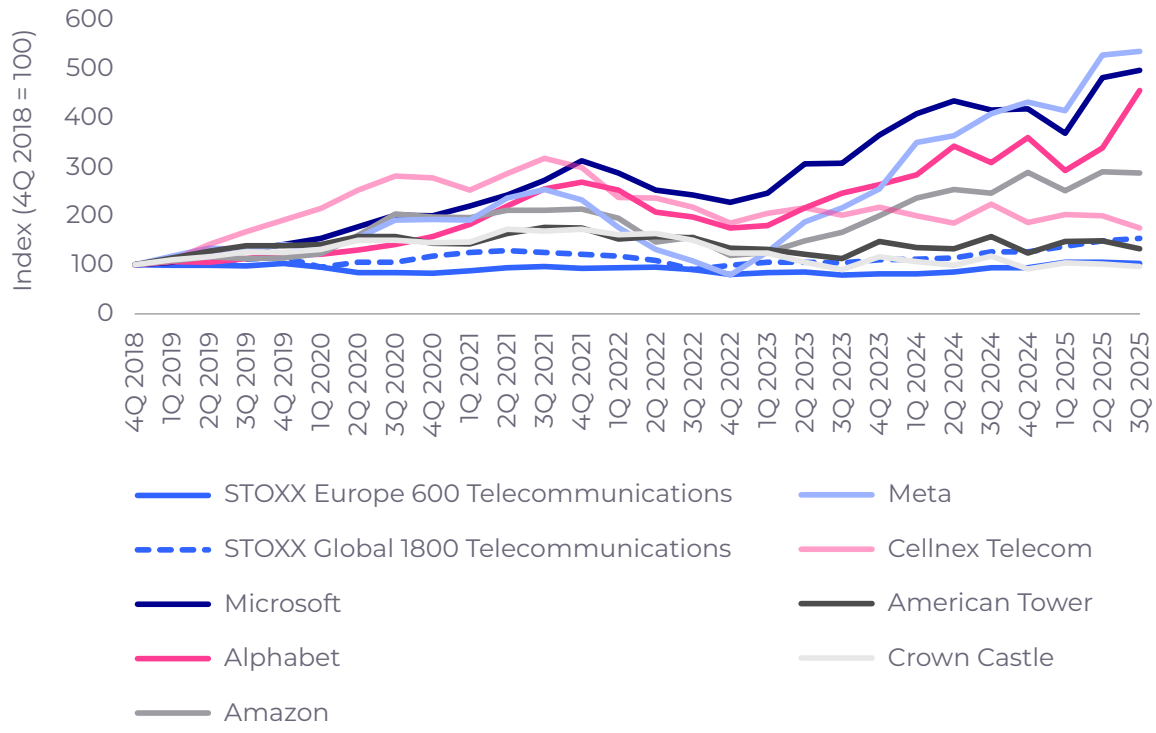
Relative to hyperscale CAPs and major infrastructure businesses, telecoms operators have significantly lower valuations relative to EBITDA than either players principally at the service end of the value-chain (the US hyperscalers) and relative to infrastructure businesses.

FIG6.7 : EV/EBITDA multiples, Connect Europe members, selected hyperscale CAPs and major telecoms infracos, worldwide, 2024 [Source: Analysys Mason, 2025]



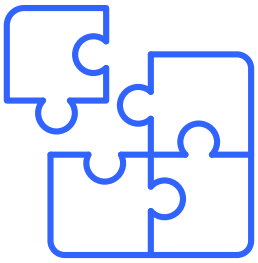
Operators have long been concerned that part of their historical value as service providers is being ceded to hyperscale content and applications providers (CAPs). Among the aims of the Draghi Report on Competitiveness is addressing structural imbalances in the internet ecosystem by enforcing an arbitration system that requires CAPs to negotiate fair terms for data transport services, backed by a binding dispute resolution mechanism.[42] At the same time, network operators have come under pressure to improve their balance sheets, and have consequently taken decisions to sell various assets, including stakes in towers and FTTH, or to enter into joint ventures for investment in FTTH networks, thereby transferring part of the debt burden to third-parties. Thus they have ceded large parts of their mainly physical asset-base to infrastructure-focused businesses, for example towercos and wholesale-focused fibrecos. **FIG6.8** compares European and global telecoms stock performance against these other types of business in the digital communications chain: four hyperscale businesses, and three large communications infrastructure businesses.

FIG6.8 : STOXX Europe 600 index for telecoms, STOXX Global 1800 index for telecoms and stock values for hyperscalers and towercos, where the value in 4Q 2018 is set to 100, 4Q 2018–3Q 2025 [Source: STOXX and Analysys Mason, 2025]



While the infrastructure businesses' performance has fallen back somewhat since a peak in 2021, CAP businesses have roared ahead.

[42] See The Draghi report on EU competitiveness, Part B.



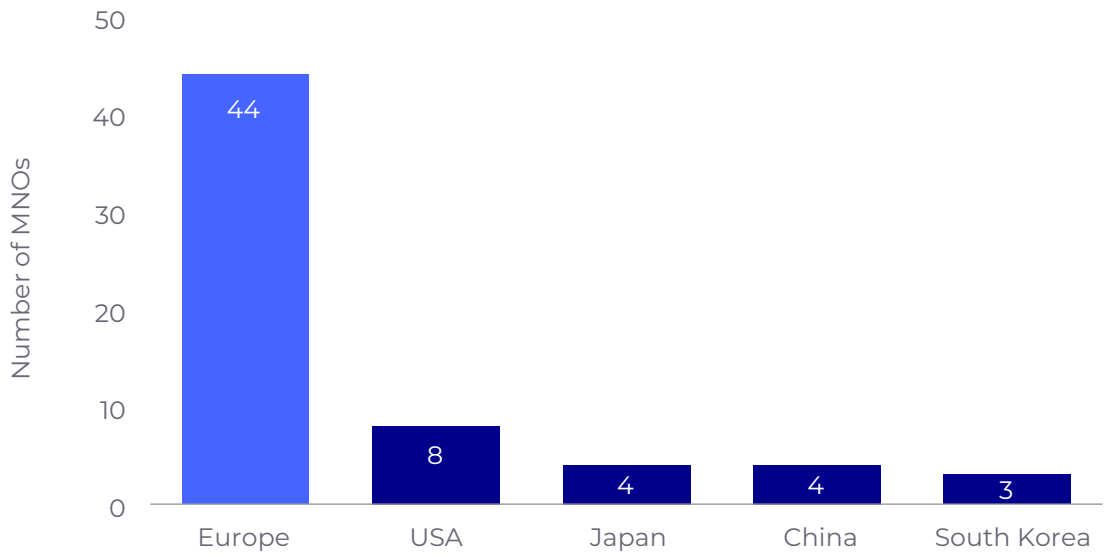
THE EUROPEAN TELECOMS LANDSCAPE REMAINS EXTRAORDINARILY FRAGMENTED

There are as yet few signs of the kind of consolidation that would create powerful and ambitious players. The observation of the Letta Report Much More than a Market still holds true. "Despite the implementation of the Telecom Single Market Regulation, the EU still includes, currently, 27 distinct national electronic communications markets. This enduring fragmentation hinders the scale and growth of pan-European operators, limiting their ability to invest, innovate, and compete with their global counterparts".[43] At 2Q 2025, Europe had 44 operating groups with a mobile subscriber base of over 500 000, compared with 8 in the USA and fewer still in China, Japan and South Korea. There is no truly European-level MNO. The total figure varies because of the 500 000 subscriber threshold, but notable changes in 2024 and 1H 2025 were:

- The completion of the demerger of Swiss MNO **Sunrise communications** into a separate business outside of Liberty Global.
- The completion of the creation of **MasOrange**, a merger of MasMovíl and Orange Spain. In December 2025 Orange announced a binding agreement with Lorca, the owner of the other 50% stake, to acquire Lorca's stake and full ownership of MasOrange, although this will have to be cleared by competition authorities.
- The completion of the merger of **Vodafone UK and Three** (on 1 July 2025). Vodafone has a 51% stake in the merged business, which is now fully consolidated into Vodafone Group. Post-Brexit, the UK has somewhat more room for manoeuvre than EU member states. The UK Competition and Mergers Authority (CMA) imposed remedies based on commitments on network investment and quality, and although they reinforce MVNO-level competition in the short term, importantly they do not release spectrum to a potential new MNO entrant.

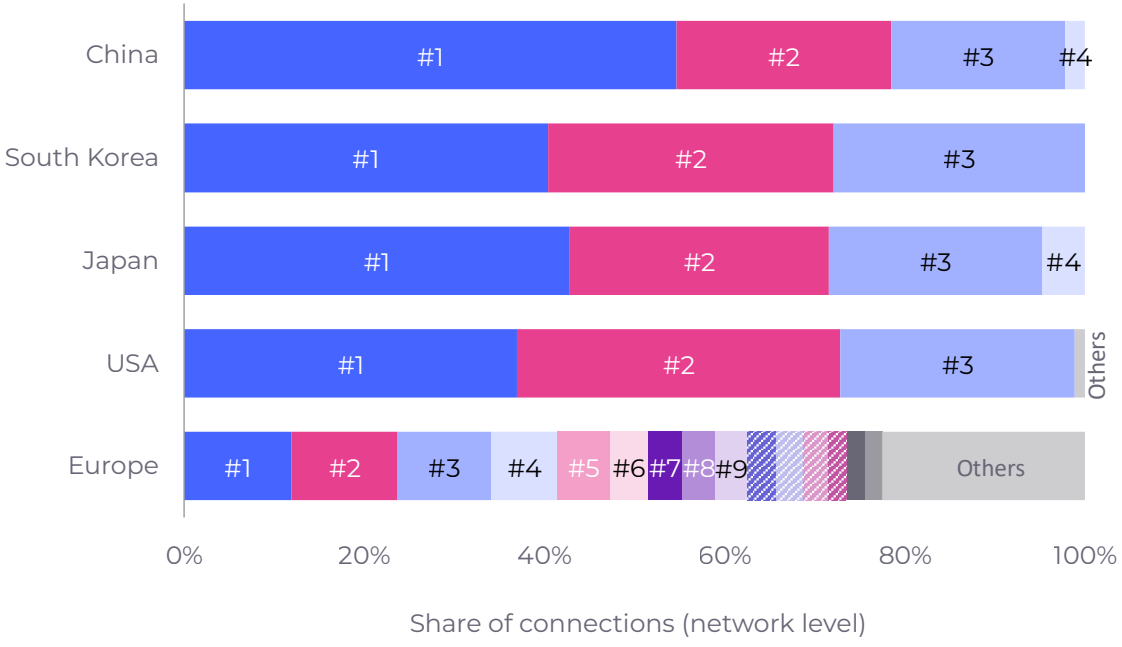
[43] Much more than a market, April 2024, page 52.

FIG6.9 : Number of MNO groups with over 500 000 connections, Europe, China and USA, 2Q 2025 [Source: Analysys Mason, 2025]



The largest group now accounts for just 11.9% of the total European subscriber-base, down from over 13% in 2Q 2024.

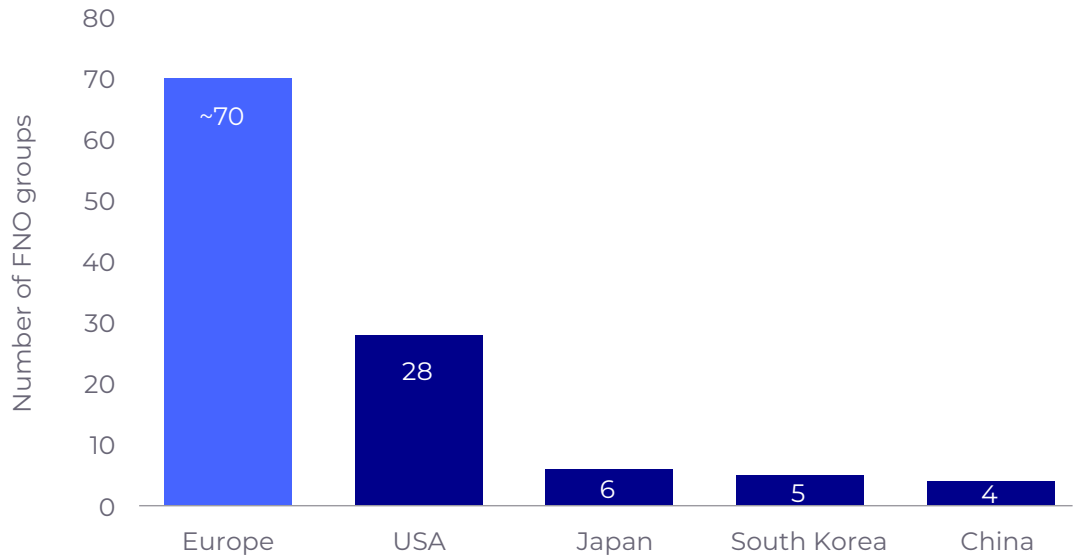
FIG6.10 : Split of mobile connections, network level, Europe, China and USA, 2Q 2025 [Source: Analysys Mason, 2025]



The fixed network operator landscape in Europe has an even longer tail than mobile. Over the past decade a plethora of infrastructure-based altnets and wholesale-only fibre network operators has emerged to claim first-mover advantage in FTTH build, resulting in a patchwork of overlapping and overbuilt operations across the continent. There are around 70-75 ownership groupings with over 500 000 premises passed, and vastly more at a smaller scale. The overall number will eventually shrink because consolidation among the sub-scale or heavily overbuilt players is inevitable. The USA also has a long tail of very small fibre networks operators (FNOs) (about 1200), but the USA has far less overbuild than Europe, or than Japan and South Korea.

Lack of scale also stymies service innovation beyond simple connectivity, although some new players' business models play down service innovation, focusing instead on utility-like connectivity.

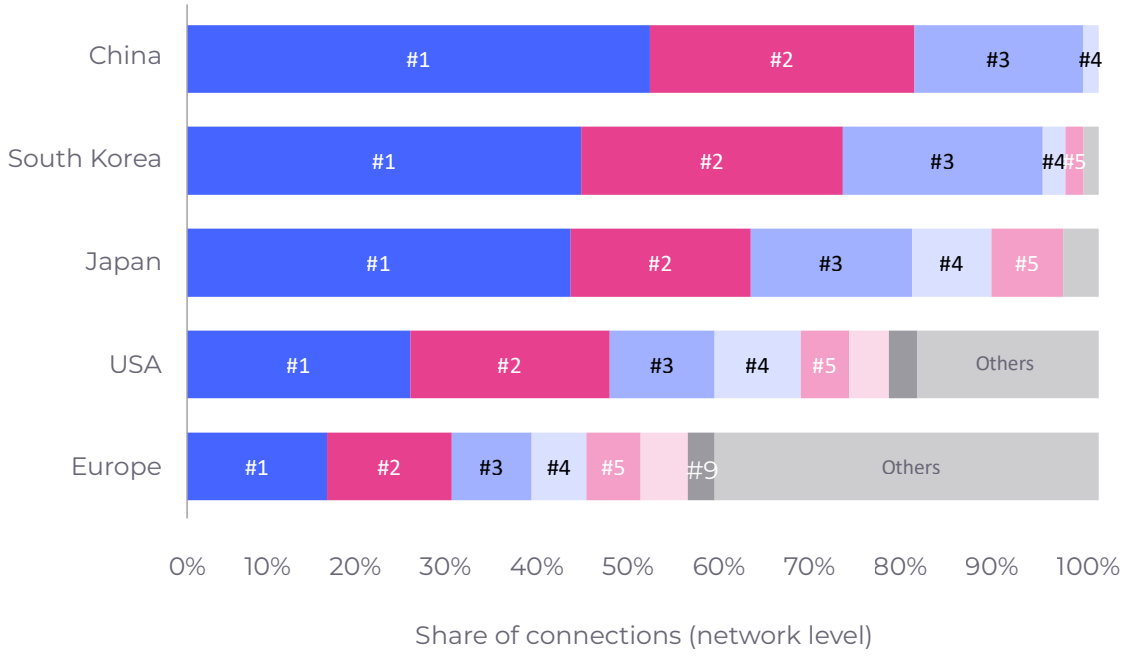
FIG6.11 : Number of FNO groups with over 500 000 gigabit-capable premises passed, Europe, China, Japan, South Korea and USA, 2Q 2025
[Source: Analysys Mason, 2025]

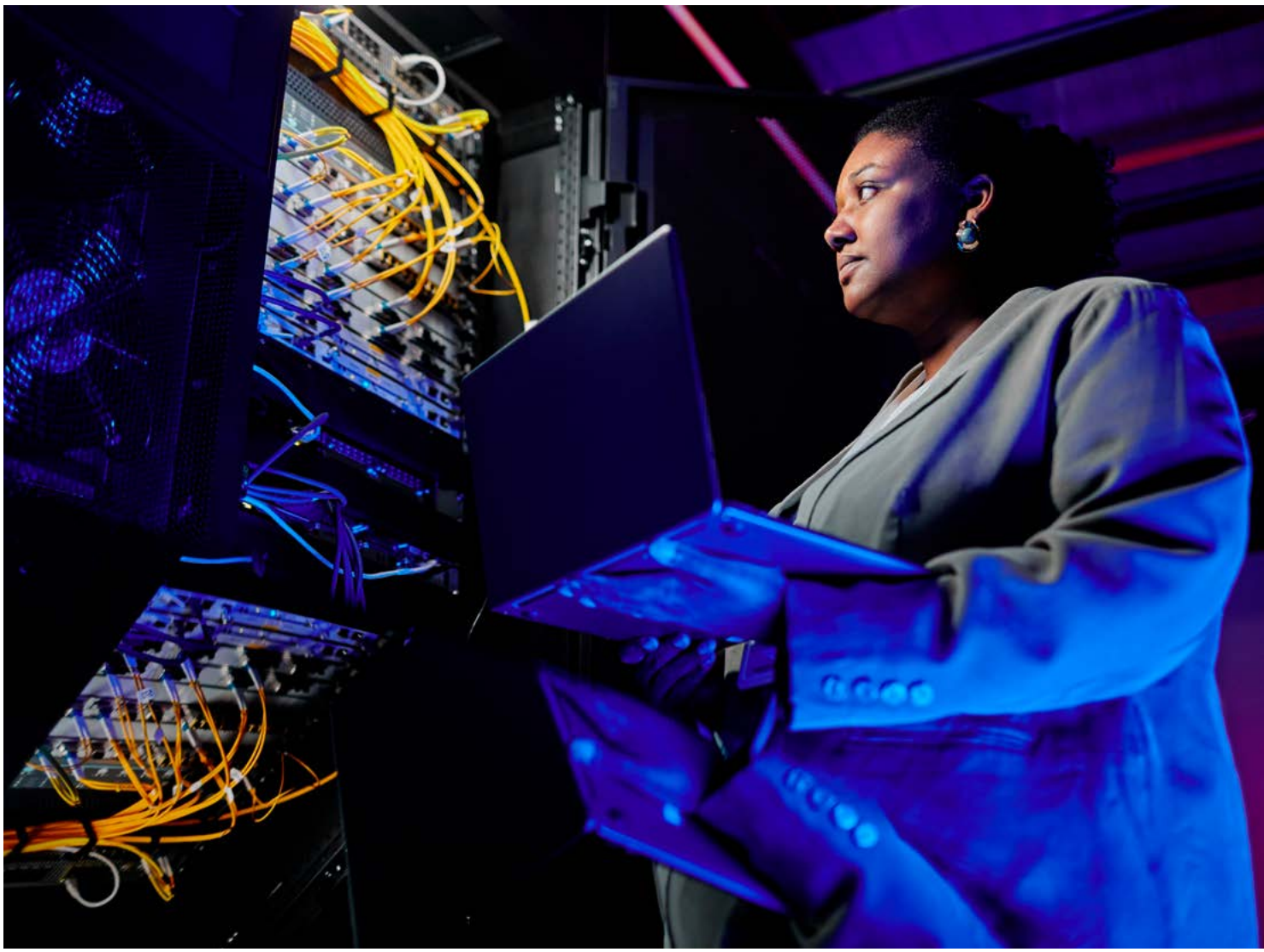


The largest ownership group in European fixed broadband owns the infrastructure for just 15% of active connections (retail and wholesale).

There are around 70-75 ownership groupings with over 500 000 premises passed, and vastly more at a smaller scale.

FIG6.12 : Split of fixed broadband connections, network owner level, Europe and USA, 2Q 2025 [Source: Analysys Mason, 2025]





INFRASTRUCTURE INVESTORS CONTROL ABOUT 24% OF THE VALUE OF EUROPEAN TELECOMS

Over the past decade, a substantial proportion of European telecoms infrastructure assets have been sold to specialist infrastructure investors such as Macquarie and KKR, or to independent entities such as Cellnex, with the operator leasing back those assets over a fixed term. The principal asset-classes that have been sold are towers and FTTH networks, but further sales have been made in facilities, backbone networks and datacentres. The sales of assets were mostly driven by the need to drive shareholder returns in an industry in which organic growth has either been forbidden by strict regulatory approaches or limited by technology disruptions.

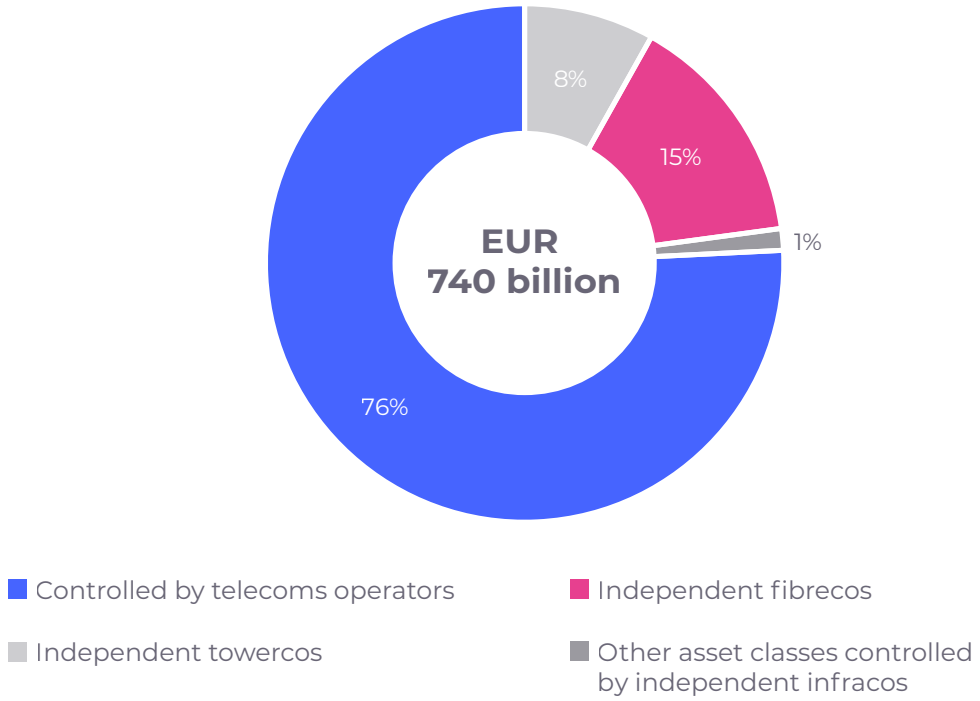
Independent towercos (where the original operator does not have a controlling stake)[44] accounted for about 39% of the approximately 620 000 towers (including rooftops) in Europe at the end of 2024. This share did not substantially grow in 2024, but the long-term trend has been upwards. Assuming an average enterprise value of EUR250 000 per site, that equates to a total enterprise value of about EUR60 billion in the control of infrastructure entities.

Independent fibrecos (where the original operator does not have a controlling stake) accounted for about 25% of the 291 million aggregate premises passed. Assuming an average enterprise value of EUR1500 per premises passed, that equates to a total enterprise value of about EUR110 billion in the control of infrastructure entities. As with towers, the volume of deals in Europe has continued to slow in 2024, and there has been at least one example of a buyback. Moreover, the average valuation per premises passed in deals has fallen, in part because of excessive FTTH overbuild.

This figure can fluctuate greatly with market sentiment. Thus a reasonable estimate of the proportion of the value that has been ceded to infrastructure entities is 24%.

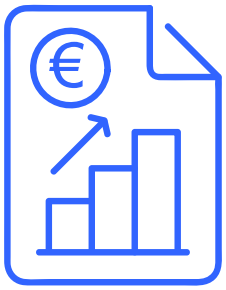
[44] In both cases there is a fine line either side of a 50% stake between control and non-control, so these figures do not estimate the equity stake of infrastructure investors, but rather the value of the entities over which they have control.

FIG6.13 : Infrastructure investor controlled entities share of total enterprise value of European telecoms, 2024 [Source: Analysys Mason, 2025]



The sale of assets to infrastructure investors is often part of delayering exercises (the creation of separate network and service businesses with a contractual relationship between one another), which are intended first to release cash in a sell-leaseback and second to create operational benefits (focus for growth and operational efficiencies).

The total enterprise value of European telecoms was around EUR740 billion at the end of 2024.



THE OPPORTUNITY TO STRENGTHEN AND TO SCALE UP REMAINS AND SHOULD NOT BE SQUANDERED

Most European telecoms operators will become less burdened by traditional infrastructure capex over the next decade, although how quickly that happens will vary between European countries. There will remain requirements to invest to ensure resilience, cybersecurity or modernised AI based and 5G standalone networks. The pattern of falling telecoms infrastructure capex is evident from other advanced markets, where operators, often burdened by less pro-competition regulation, now invest a higher proportion of their capex on datacentres and edge, on Cloud stack, on AI gigafactories and other areas outwith physical networks.

Yet this alone will not be enough, as advantages could be frittered away in further artificially-induced competition. Operators need to operate in an environment that allows them to capture these new opportunities, one that is less burdened by regulatory measures that have driven telecoms spending down to levels not seen anywhere else. Greater market harmonisation is essential to enable scale, efficiency and ambition.

How, and to what extent, the Digital Networks Act incentivises a more growth-oriented outlook will be critical.

Annex

FIG A.1 : Number of active wide area IoT connections by vertical industry, Europe 2025 and 2031f [Source: Analysys Mason, 2025]

Million	2025	2031
Agriculture	12.44	23.77
Health	12.06	20.44
Industry	13.57	23.48
Smart buildings	36.97	83.58 -
Smart cities	25.81	45.84
Tracking	30.52	58.07
Utilities	75.38	141.73
Automotive	127.64	205.41
Retail	10.70	17.86
Other	29.67	39.80
Total	374.75	659.98

FIG A.2 : Number of active wide area IoT connections by vertical industry, USA 2025 and 2031f [Source: Analysys Mason, 2025]

Million	2025	2031
Agriculture	29.80	50.97
Health	19.73	27.06
Industry	4.94	7.78
Smart buildings	44.90	73.46
Smart cities	23.26	39.33
Tracking	31.83	49.88
Utilities	95.41	134.34
Automotive	84.62	100.84
Retail	11.30	17.53
Other	22.83	29.51
Total	368.62	530.71

Albania

Austria

Belgium

Bosnia and Herzegovina

Bulgaria

Czech Republic.

Croatia

Cyprus

Denmark

Finland

France

Germany

Greece

Hungary

Hungary

Iceland

Italy

Italy

Luxembourg

Malta

Malta

Netherlands

Netherlands

North Macedonia

Norway

Poland

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