Robert Kenny

Securing investment to achieve the Digital Decade infrastructure targets

March 2023

COMMUNICATIONS CHAMBERS

Disclaimer

This is a paper funded by Google. The opinions offered herein are purely those of the author. It does not necessarily represent the views of other Communications Chambers members or of Google.

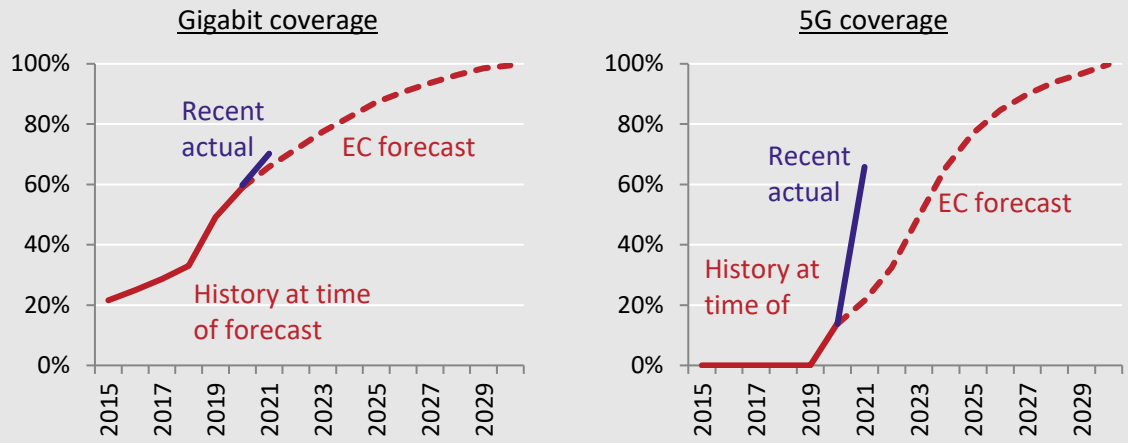
Contents

1 Executive summary

The Digital Decade targets include two related to telecoms – that gigabit broadband should be available to all households and 5G should be available in all populated areas.

Excellent progress is being made on both targets, with coverage ahead of schedule. At end 2021, gigabit coverage was 70% in the EU, up ten points from a year prior (and ahead of expectations). Seven member states were at over 90% coverage. For 5G, coverage was 66%, up 52 percentage points.

Figure 1: Progress on Digital Decade targets vs 2021 forecast[1]



There are certainly some challenges in meeting the 2030 targets, but they are specific to certain member states and certain regions.

Challenges in meeting the Digital Decade targets are specific to certain member states and certain regions – solutions should be too

Investment to meet the targets will come from both incumbent and newer operators, as well as certain infrastructure providers, such as tower operators, that support them. These non-incumbent operators are increasingly important - in France, for example, they provide over 70% of capex.[2] This is a success of the pro-competition regulatory approach in Europe (though this has arguably put pressure on incumbent financials).

Listed companies' statements about improving cashflow, the solid credit ratings of telcos and growing private investment in the sector all suggest that capital should be available for investments to meet the targets. Some have claimed that there is a "€300bn investment

[1] EC, *Commission staff working document accompanying the document Proposal for a Decision of the European Parliament and of the Council establishing the 2030 Policy Programme "Path to the Digital Decade" [SDW(2021) 247 final]*, 15 September 2021; EC, *Digital Scoreboard* [accessed 20 December 2022]

[2] Arcep, *Observatoire des marches des communications electroniques*, 15 December 2022

gap in fibre and 5G".[3] However, this figure is for the *total* capex required, not a gap. Further, based on current run rates we estimate that European telco capex for this decade is likely to total around €650bn, suggesting that €300bn for fibre-to-the-premise (FTTP) and 5G is not unmanageable.

However, telcos (and their shareholders) will need to see these investments as worthwhile, and the regulatory structure should obviously be designed to provide the necessary incentives. Public funding has been and will continue to be an important intervention in this area, with €7.8bn of state aid deployed 2014-2019,[4] and a further nine state aid programmes approved in 2022 alone,[5] together with significant EU-level funding schemes such as the Recovery and Resilience Facility (RRF) and Connecting Europe Broadband Fund.

Traffic charges have recently been proposed as an additional intervention to support investment, but they are an extraordinarily inefficient way to provide investment incentives.

There are two fundamental problems. First, traffic charges provide substantial funds to telcos in regions where gigabit networks and 5G already exist, where charges cannot possibly have incentive effect.

Second, even in regions not upgraded, charges only provide an investment incentive if the investment increases traffic. (If - hypothetically - the traffic from a region with FTTC[6] and that region with FTTP was the same, traffic charges would provide no incentive to upgrade, since the charges received would be the same in both cases). However, the evidence suggests that incremental traffic may be modest, so charges will have little impact on investment.

Worse, on mobile networks the charges proposed are likely to make popular ad-funded video services unviable – the charge per GB is likely to be greater than the revenue per GB to the app provider. If app providers switch off such services in response, this will sharply reduce mobile traffic, and by extension mobile revenues. Both will act to *reduce* incentives to deploy 5G.

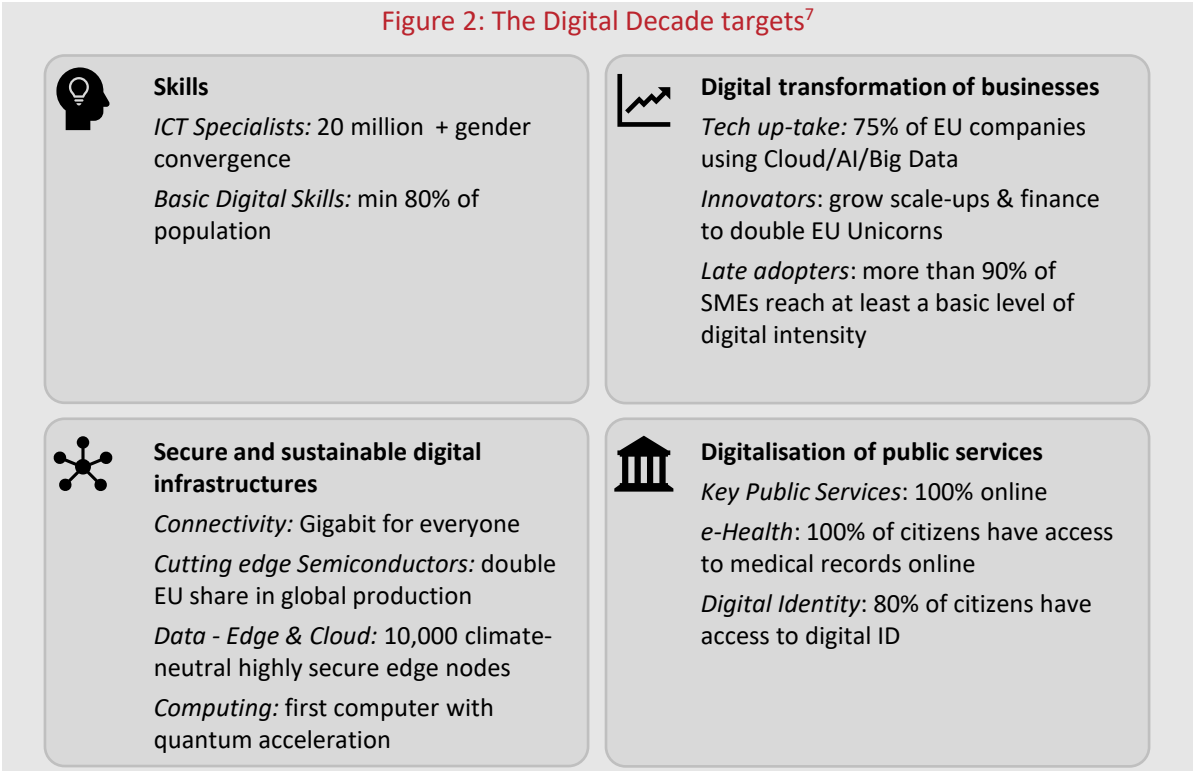
Thus traffic charges are untargeted, inefficient, unlikely to have positive impact on coverage, and indeed may well make things worse. There are far better interventions available to address the limited gaps in the gigabit and 5G targets.

[3] ETNO, *Accelerating fibre and 5G roll-out: ETNO unveils new technical and regulatory reports*, 21 January, 2022
[4] EC, *Evaluation of the State Aid rules for broadband infrastructure deployment {SWD(2021) 195 final}*, 7 July 2021
[5] EC, *Commission decisions on State aid to broadband and mobile*, 10 January 2023
[6] Fibre to the cabinet

2 Introduction

The European Commission has set out a vision for Europe's digital transformation by 2030. This includes a set of 'Digital Decade' targets covering skills, businesses, public services and infrastructure.

Figure 2: The Digital Decade targets[7]



Within infrastructure the connectivity target specifies that by 2030 all European households should be covered by a gigabit network, and all populated areas should be covered by 5G.[8]

Of course, such improved connectivity has no inherent value – rather, connectivity is an enabler of the wider digital transformation articulated by the other targets. Content and application providers (from Europe and elsewhere) will need to invest to support cloud take-up, e-Health, ICT training and so on. Indeed, many of these non-infrastructure Digital Decade targets do not depend on upgraded connectivity to be realised.

In the context of the debate over traffic charges (proposed to be paid by certain digital players to telecoms operators), it has been claimed

[7] EC, *Europe's Digital Decade: digital targets for 2030* [accessed 1 February 2023]
[8] EC, *Proposal for a decision of the European Parliament and Council establishing the 2030 policy programme "Path to the Digital Decade" [COM(2021) 574]*, 15 September 2021

that such traffic charges are needed to ensure Europe meets the Digital Decade connectivity targets.[9]

This paper considers progress to date against the telecoms targets, and what is expected for the years ahead. It then looks at telecoms investment, both by incumbents and others. Finally we consider traffic charges as an incentive to further investment.

[9] See, for instance, GSMA, *GSMA Report Demonstrates Policy Action is Needed for EU to Achieve Digital Decade Goals*, 5 October 2022

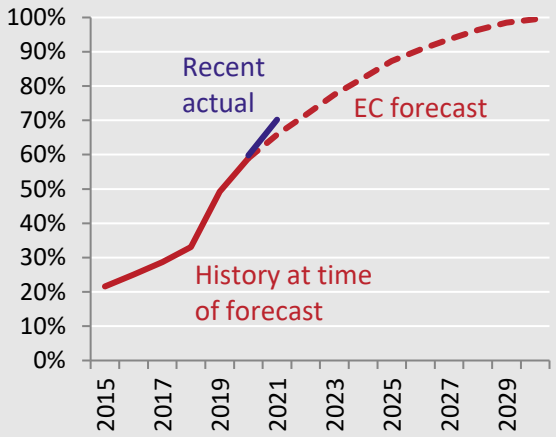
3 Progress and prospects for the telecoms targets

3.1 Gigabit fixed network coverage

We first look at progress towards the universal household availability of gigabit fixed broadband, which can be provided by fibre or DOCSIS 3.1-enabled cable. We begin with fixed since, as ETNO have noted, "the investment required [for FTTP] is far greater than that for 5G."[10]

In September 2021 the Commission forecast the progress of gigabit coverage to 100% in 2030 (Figure 3).[12] Happily, progress has been ahead of the 2021 forecast. At the end of that year, coverage was 70% compared to an expectation of 66%. Not only was this above expectations, it also represented an acceleration in the pace of deployment, compared to the slowing anticipated by the forecast.

Figure 3: EU gigabit coverage forecast (2021)[11]



As might be expected, coverage in rural areas is lower, but rising at an increasing rate. In 2021 it stood at 37.1%, up 8.4 percentage points from 2020. (This compares to a 6.5 point increase, 2019-20).

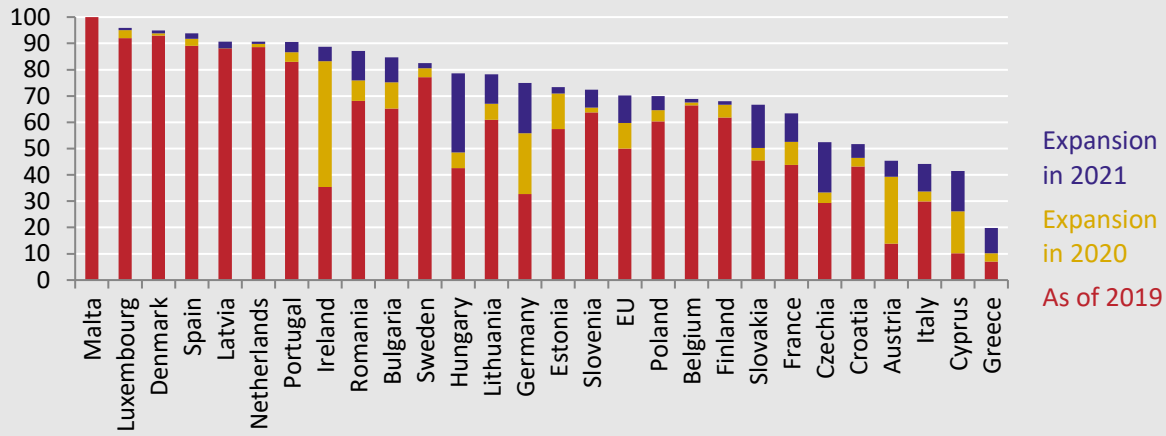
Of course this aggregated picture at the Europe-wide level obscures substantial variation at the country level.

[10] ETNO, *State of Digital Communications 2022*, February 2022

[11] EC, *Commission staff working document accompanying the document Proposal for a Decision of the European Parliament and of the Council establishing the 2030 Policy Programme "Path to the Digital Decade" [SDW(2021) 247 final]*, 15 September 2021; EC, *Digital Scoreboard* [accessed 20 December 2022]

[12] We note that this forecast predated the recent renewed debate on traffic charges, and therefore any purported benefit of such charges to gigabit coverage is presumably not incorporated in the forecast

Figure 4: Gigabit broadband coverage (%)[13]



As Figure 4 shows, seven countries *already* have gigabit coverage of over 90%. At the other extreme, Greece had coverage of 20% in 2021 (albeit that was a ten percentage point increase over the prior year).

Thus there is significant diversity amongst member states. This is driven by a wide range of factors that can affect the economics of deployment, including:

- The nature of housing stock
- Population density
- Labour costs
- Planning and deployment regulations and practices
- Availability of ducts (either owned or on a wholesale basis)
- Presence of cable networks
- Quality of existing telco broadband (for instance, has fibre-to-the-cabinet been deployed?)
- Support for co-build
- Levels of government subsidy

Current coverage and deployment rates many member states are well on track to achieve universal gigabit coverage before the 2030 target date. On the other hand, some member states do not yet appear to be on target to hit the 2030 date, and in some cases may miss it substantially.

Thus while overall the picture for progress toward gigabit coverage is encouraging, there may be challenges at the individual member state level, perhaps due to their own telecoms history, geography and so on. Germany, for instance, is a challenging market for FTTP deployment in part because it faces high labour costs and has a relative lack of ducts, with existing copper often buried directly in the

[13] EC, *Digital Scoreboard* [accessed 20 December 2022]

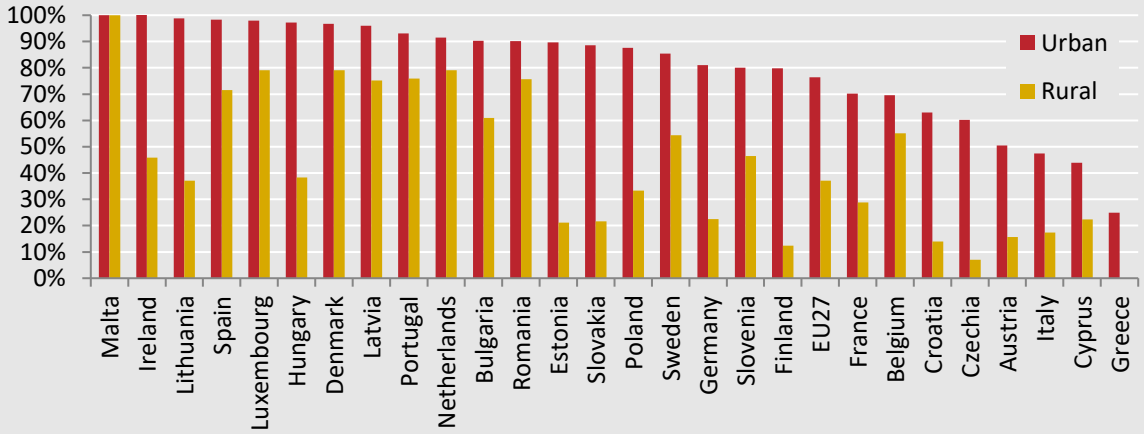
ground.[14] In Italy there has been considerable uncertainty around ownership of fibre-deployment. The government is currently proposing the creation of a single national fibre network through the merger of TIM and Open Fiber's fixed broadband assets, though this has attracted controversy.[15]

Challenges in reaching the gigabit target are specific to certain regions – any solutions should be too

However, the fact that the challenges are not general, but rather specific suggests that any solutions should also be targeted. Any EU-wide intervention to support gigabit deployment is likely to be very wasteful in (say) Malta which already has full coverage, or in the many countries that appear on track to meet the target without any such intervention.

Not only are the challenges different between countries, they are also different within countries. It is widely recognised that the economics of gigabit networks are much more attractive in urban areas. Indeed, average urban coverage in the EU27 was already 76% in 2021 (an increase of 11 percentage points a year higher).

Figure 5: Gigabit broadband coverage, urban and rural (%)[16]



Eighteen countries already had urban gigabit coverage of 80% or more. Even Greece, with just 25% urban coverage, is increasing this 12 percentage points per year, suggesting that it will hit 100% coverage in cities before 2030.

Thus the challenge to address in meeting the gigabit Digital Decade target is fundamentally one of *rural* coverage. This is a further

[14] Analysys Mason [for Huawei], *Full-fibre access as strategic infrastructure: strengthening public policy for Europe*, June 2020

[15] Total Telecom, *Italian govt mull TIM takeover to facilitate creation of single network*, 9 November 2022

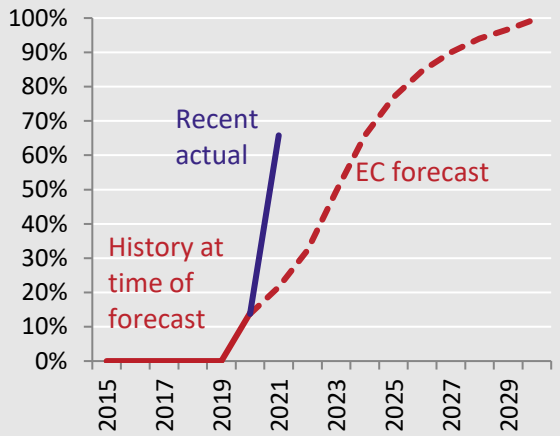
[16] Communications Chambers analysis of data from IHS Markit / Omdia / Pointtopic, *Broadband Coverage in Europe 2021*, 28 July 2022. Note that there appears to be an error in the report's coverage figures for Ireland, which would imply 115% coverage in urban areas. We have therefore assumed 100% urban coverage for Ireland, though the actual figure may be lower depending on the nature of the error

argument for targeted interventions, since blunt regulatory or policy changes that include urban areas are likely to be wasteful. (Existing government subsidies for rural deployment are an example of appropriately targeted interventions).

3.2 5G coverage

In a number of ways the issues of 5G coverage are similar those for gigabit networks. In 2021 the Commission anticipated universal 5G coverage by 2030, based on a "increase of the planned investments in 5G infrastructure (by an approximate factor of 25%)". However, actual coverage has already dramatically exceeded expectations. At end-2021, coverage was 66%, a level not anticipated to be reached until 2024. This is an even greater (and even more encouraging) outperformance than that for gigabit networks. Coverage in rural areas was 34.7% at end-2021, up from just 1.4% a year prior. According to the most recent 5G Observatory report, the "Digital Decade policy goal [for 5G] … does not look so daunting".[18]

Figure 6: EU 5G coverage forecast (2021)[17]



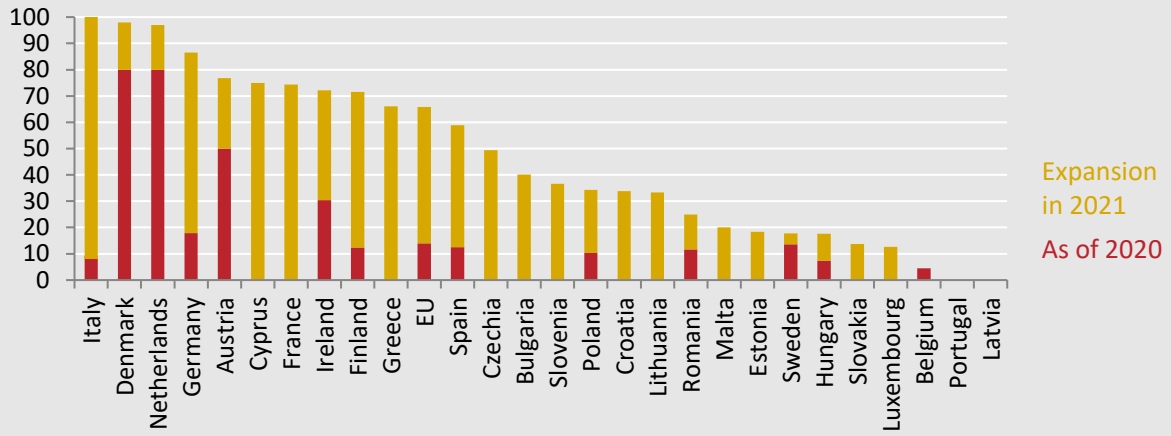
One reason for this is that upgrading existing cells to 5G is relatively quick and cheap – a matter of adding some additional equipment. Adding new cells is more expensive, but a large number of new cells are not necessary to meet the Digital Decade target.[19]

The growth in 5G coverage at the EU level reflects rapid growth across virtually all member states – more than half saw an increase in coverage of 30 percentage points or more (Figure 7).

Coverage has continued to expand rapidly since end-2021. In France, for example, combined 5G coverage (for all networks) was then 74%. A year later, coverage for the Free network alone is over 87%.[20]

[17] EC, *Commission staff working document accompanying the document Proposal for a Decision of the European Parliament and of the Council establishing the 2030 Policy Programme "Path to the Digital Decade" [SDW(2021) 247 final]*, 15 September 2021; EC, *Digital Scoreboard* [accessed 20 December 2022]
[18] VVA, Policytracker & LS [for EC], *5G Observatory Quarterly Report 17*, October 2022
[19] See page 18 for further discussion.
[20] Free, *La couverture réseau mobile Free 3G, 4G, 5G* [accessed 22 December 2022]

Figure 7: 5G broadband coverage (%)[21]

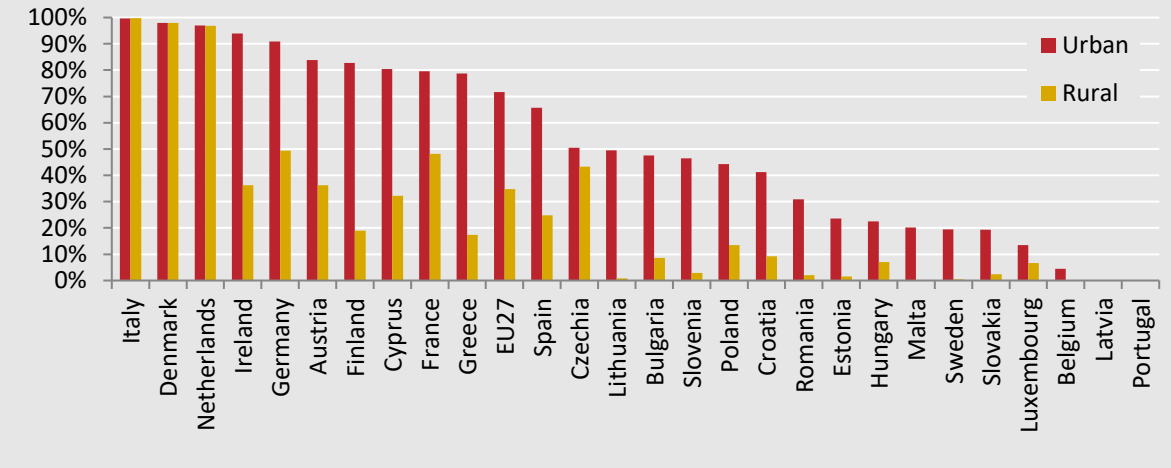


While there are some important differences between member states, some of those with no coverage at end-2021 have since seen very rapid progress. Population coverage in Portugal was 75% as of Q3 2022, for example.[22]

Given this rapid pace of expansion, it seems likely that the great majority of member states will be at or near 100% coverage well before 2030.

As with fixed gigabit services, rural deployment of 5G lags that in urban areas:

Figure 8: 5G broadband coverage, urban and rural (%)[23]



[21] EC, *Digital Scoreboard* [accessed 20 December 2022]
[22] VVA, Policytracker & LS [for EC], *5G Observatory Quarterly Report 17*, October 2022
[23] Communications Chambers analysis of data from IHS Markit / Omdia / Pointtopic, *Broadband Coverage in Europe 2021*, 28 July 2022. Note that there appears to be an error in the report's coverage figures for Ireland, which would imply 115% coverage in urban areas. We have therefore assumed 100% urban coverage for Ireland, though the actual figure may be lower depending on the nature of the error

In aggregate, this suggests that any challenges in meeting the Digital Decade target for 5G is likely to be limited to a very small number of member states, and within these to rural areas.

3.3 Supporting traffic growth

In addition to deploying access networks to provide coverage, European telcos need to spend to support traffic growth. However, this spend (already a modest part of overall capex) is likely to become even less significant as traffic growth slows.

Looking first at fixed traffic per broadband line, Figure 9 shows the average annual growth in the EU (based on an average of those countries publishing data). In the middle of the last decade, growth per line exceeded 30%, but then trended downwards until 2020. The pandemic then brought a sharp spike in growth. However, since then growth has collapsed, with the latest average being just 3%.

Figure 9: Average annual growth in traffic per fixed broadband line, select EU countries[24]

Some of this decline may be due to a hangover effect from the pandemic, which perhaps brought growth forward. However, Hungary is an interesting case, since it was the first country to end lockdowns, and thus has more than a year of post-lockdown reporting. Its latest growth rate was just 3%.

Future growth rates may rise again, but regardless, the evidence is not consistent at all with the claim that "internet traffic is growing by 30%-40% annually".[25] The pandemic aside, this has not been true for many years.

Turning to mobile traffic, here too growth is a slowing (Figure 10). Ericsson expects rates to drop to below 20% around the middle of this decade, compared to rates of rates of over 60% as recently as 2018. This suggests that traffic-driven capex for mobile networks is likely to fall substantially in the coming years

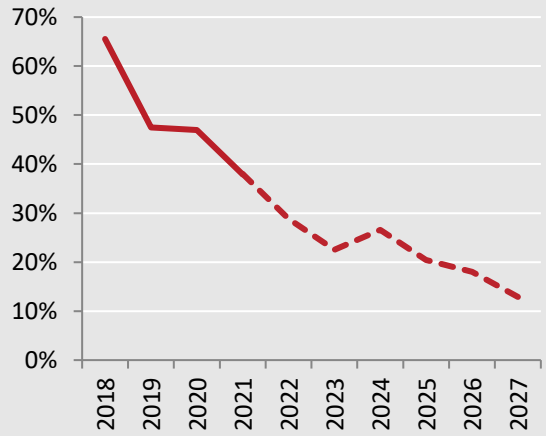
[24] Communications Chambers analysis of data from national regulatory authorities. Average is a simple average of the growth rates of individual countries. Included countries are all those for which we have been able to identify data, namely Austria, Belgium, Croatia, Cyprus, Denmark, Finland, Germany, Hungary, Ireland, Italy, Portugal, Romania and Spain. Note that not all these countries have published data throughout this period.

[25] ETNO, *8 common questions on the "fair contribution" debate*, 8 June, 2022. Note that this claim was about total traffic rather than fixed, but since a very high percentage of all traffic is fixed, total traffic growth rates are not materially different from fixed traffic growth rates

Thus for both fixed and mobile networks, traffic growth is likely to be an increasingly marginal driver of telco capex, and need not be a barrier to achievement of the Digital Decade targets.

Indeed, it could be argued that a *lack* of traffic growth is a looming problem for investment in FTTP and 5G. Without applications that drive increasing consumer need for higher speeds and more traffic, consumers will have less reason to upgrade their services, limiting ARPU and by extension weakening investment business cases.

Figure 10: European mobile traffic growth[26]



3.4 Conclusions

Overall, both progress to date and prospects are very encouraging for the telecoms Digital Decade targets. This is a result both of substantial work by telcos (incumbents and increasingly others), and of a range of regulatory and policy interventions.

These interventions have been multifaceted, varying in type and in scope, with European, national and local governments all playing a role. This diversity is entirely appropriate, given that the challenges in meeting the targets are not general, but rather are specific. Indeed, with coverage targets already being met in some countries, and with a clear path to completion in many others, the challenges are likely to be ever more narrowly focused, and by extension interventions should be precisely targeted.

Figure 11 Select regulatory & policy interventions to support FTTP and 5G deployment

	Geographically targeted	Targeted or national	National
FTTP	• Deployment subsidies • Franchises	• Regulatory relief on wholesale prices • Voucher schemes	• Duct access
5G	• Coverage obligations		• Additional spectrum
Both		• Support for shared infrastructure	• Eased permitting, rights of way etc • Forbearing from retail price controls

Figure 11 sets out interventions that have been used to support FTTP or 5G deployment, split by whether they are typically geographically targeted or of national relevance (or either, depending on how they are designed). Broadly speaking, as the challenges of meeting the Digital Decade targets narrows over time, we would expect interventions increasingly to come from the left side of this table, to ensure appropriate targeting.

[26] Ericsson, *Ericsson Mobility Visualizer*, November 2022

4 Ensuring investment for future progress towards the targets

In this section we consider sources of investment for to support the Digital Decade targets. We begin by considering funding to date, and then turn to future funding and the drivers of the investment case.

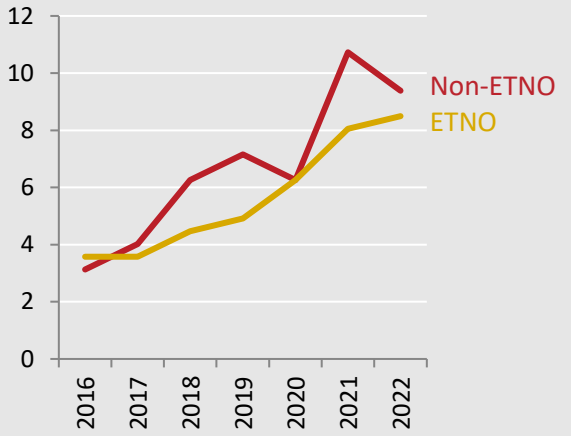
4.1 Sources of investment to date

The sources of funding for telecoms networks in the EU are diverse, and becoming more so.

For gigabit networks there is a complicated picture, with the incumbent, cable operators and new fibre entrants all investing. European, national or regional public funds may also contribute, particularly in rural areas.

While the incumbents are of course important players, they are certainly not dominant in FTTP deployment. ETNO members' investment in FTTP has been less than that by non-ETNO member for a number of years, though both have been increasing robustly (Figure 12).

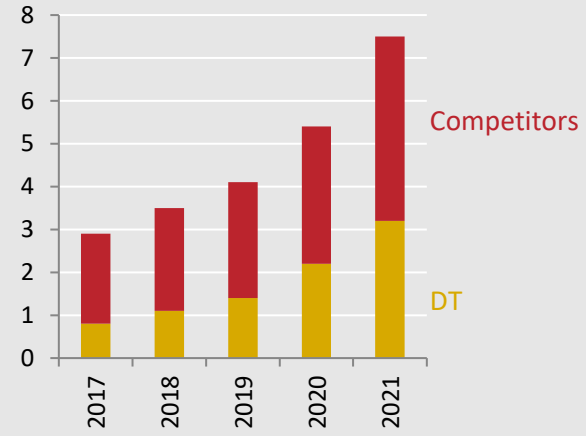
Figure 12: FTTP capex, Europe (€bn)[27]



In Germany, for example, competitors to the incumbent are responsible for almost 60% of homes passed with fibre (Figure 13). Players such as Deutsche Glasfaser and Infrafibre have raised billions of Euros to deploy FTTP.

For 5G, investment comes primarily from the mobile operators in each country, a mix of incumbents and other operators. However, this may be supplemented by capex from tower operators (who then lease their infrastructure to the mobile operators). These tower operators are often backed by pension funds or private equity players, and have become increasingly important.

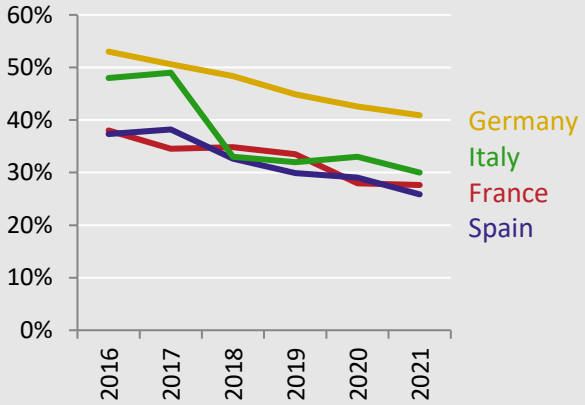
Figure 13: Fibre homes passed, Germany (m)[28]



[27] Communications Chambers analysis, based on ETNO, *State of Digital Communications 2023*, 1 February 2023
[28] Monopolkommission, *Telekommunikation 2021: Wettbewerb im Umbruch*, December 2021

Levels of total capex also demonstrate the increasing diversity of funding in each market. Figure 14 shows the national incumbent's share of telecoms capex (across fixed and mobile) in Germany, Italy, France and Spain.

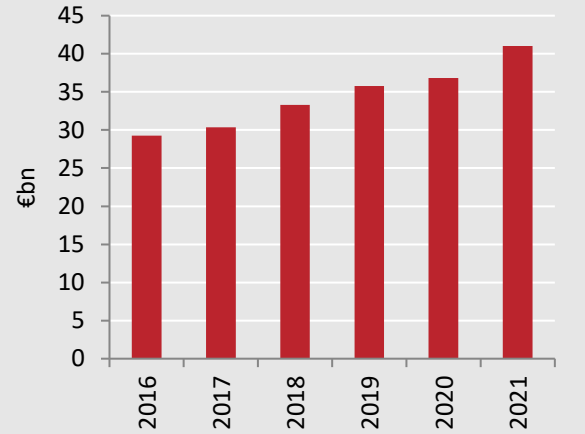
Figure 14:National incumbent share of telecoms capex[29]



In all cases they have been on a sustained downward trend. The generational shift to full fibre access has created an opportunity for substantial market entry by new investors, who have seen a potential for attractive returns from fibre investment. This has likely contributed to the national incumbents' falling share of capex.

(Note though that some markets have significant investment by *non*-national incumbents. In Spain, for example, Orange was responsible for 20% of capex).

Figure 15: Total telecoms capex, DE, FR, ES, IT[30]



Total investment across these four markets has grown at 7% per year since 2016 (Figure 15), driven in part by the once-in-a-generation upgrade to FTTP. While incumbents may have issues of investment capacity or incentives (particularly in their home markets), overall they and other market players have perceived a growing opportunity to put money to work in the telecoms market.

As we have noted, public funds lie behind some of this investment by private entities. There is a long history of support for broadband deployment, by European, national and regional governments. Between 2014 and 2019, Member States deployed €7.8bn of State aid for broadband.[31] State aid in this area continues, with a further 9 notifications approved in 2022.[32] Spain, for instance, notified a programme to support rural broadband with a budget of €88.3m.[33]

These measures are in part funded at the European level. Programmes such as the Recovery and Resilience Facility, the

[29] Excludes spectrum licence charges. Figures for Orange in France are 'eCapex' for 2019 onwards (see filings for definition). Bundesnetzagentur, *Jahresbericht*, 3 June 2022; Arcep, *Observatoire des marches des communications electroniques*, 15 December 2022; Orange, *KPI reports;* CNMC, *Telecomunicaciones Anual Datos Generales* [accessed 22 December 2022]; AGCOM, *Relazione annuale 2022 sull'attività svolta e sui programmi di lavoro - Appendice statistica*, 29 July 2022

[30] Ibid

[31] EC, *Evaluation of the State Aid rules for broadband infrastructure deployment {SWD(2021) 195 final}*, 7 July 2021

[32] EC, *Commission decisions on State aid to broadband and mobile*, 10 January 2023

[33] EC, *State Aid SA.102847 (2022/N) – Spain – RRF - Spain- Support for connectivity in rural areas*, 17 November 2022

European Regional Development Fund, the Connecting Europe Facility and the Connecting Europe Broadband Fund will in combination provide hundreds of millions of Euros per year for broadband deployment.[34]

Such investment is generally carefully targeted at areas where there is no prospect of commercial deployment. This avoids crowding out private investment, or subsidising investment that might have happened anyway.

4.2 Required future investment

ETNO claims there is a "€300bn investment gap in fibre and 5G",[35] based on a research from BCG.[36] However, according to the research this figure is the *total* capex required, and so doesn't represent a 'gap'.

As we have seen, telco capex in the EU4 totals €41bn per year. If we scale this on the basis of GDP, this would very roughly suggest €65bn in total for the EU, though not all this spend is on FTTP and 5G. Over the ten years from 2021 (the date of the report) to 2030 (the 'due date' for the Digital Decade targets) this run-rate would imply total telecoms capex of €650bn. Thus even taking the €300bn figure at face value, it does not look unduly problematic.

Of the €300bn total, €150bn relates to 5G. But this is not just for the universal population coverage sought by the Digital Decade target, but to support the full range of services enabled by 5G, such and IoT and other industrial applications. These services will both generate their own additional revenues to cover the investment (BCG estimates 35% of total mobile revenues) and are almost entirely unrelated to the businesses of the large American players targeted by traffic charges.

4.3 Prospects for future investment

Some have argued that future investment by telcos is under threat. Axon, for example, have described a virtuous circle of new digital service leading to users seeking improved connectivity, which in turn leads to telco investment, which then enables further services. Axon says "the breakdown of this virtuous cycle is … apparent when comparing the financial performance of OTTs with that of network

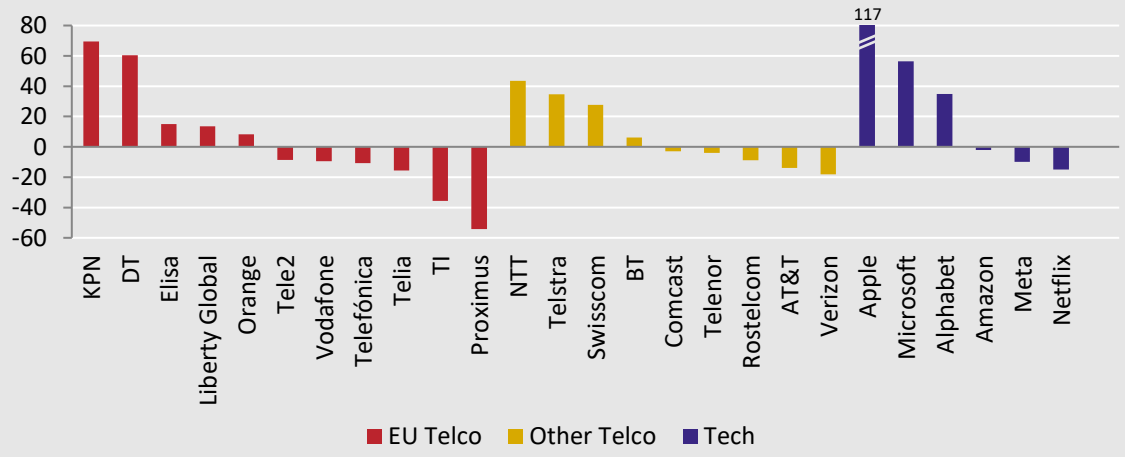
[34] EC, *EU funding for broadband 2021-2027*, 24 February 2022
[35] ETNO, *Accelerating fibre and 5G roll-out: ETNO unveils new technical and regulatory reports*, 21 January, 2022
[36] ETNO/BCG, *Connectivity and beyond*, 25 March 2021

operators", and cites data on the declining market capitalisation of EU telcos compared to digital players and telcos elsewhere.[37]

There are however several problems with this argument. Firstly, by arguing from market capitalisation, it entirely excludes unlisted companies. As we have seen, non-incumbent capex is now an important part of the EU total, and many non-incumbents are not listed (being backed by private equity or pension funds rather than the public markets).

Secondly, while listed EU telcos have on average undoubtedly performed poorly, there is enormous variation. Individual EU telcos are amongst the best *and* worst performing major telcos globally over the last three years. (We note that the share price of DT, the second best performing telco in our group, is materially driven by its US mobile assets – North American sales are over 60% of DT's total).

Figure 16: Three-year shareholder return (%), EU and other listed telcos[38]



There is also significant variation amongst the tech companies, with some also seeing substantial negative returns. Most the EU telcos have outperformed Meta over this same period, for example. (Just since the year-end 2021 figures used in Axon's report, Meta's market capitalisation has fallen $486b, or 52%). KPN and DT have outperformed all the tech companies except Apple.

Thirdly, some of the pressure on the share prices of EU incumbents is a result of increased competition as other players have invested in competing fixed infrastructure. The transition to FTTP has significantly eroded the de facto fixed monopolies and duopolies that historically have been a feature of many markets.

[37] Axon, *Europe's internet ecosystem: socioeconomic benefits of a fairer balance between tech giants and telecom operators*, May 2022

[38] Koyfin. Total shareholder returns, 3 years to 2 March 2023

An increasingly competitive fixed market, with investment by a range of players, has been an objective of EU regulation for many years, and the investment figures set out above (Figure 14) show that this has been successful. Pro-competition regulation in the EU has been to the detriment of incumbents, but investment has risen steadily. Thus Axon's 'virtuous circle' appears to be in good health, albeit unevenly distributed.

Poor share price performance for certain incumbents is in large part a consequence of Europe's pro-competition regime – and overall investment has grown steadily

None of this is to suggest that investment incentives for incumbents are not important for the achievement of the Digital Decade targets. These companies will continue to be key contributors to overall investment, and they need the opportunity to make a return that fully reflects the risk of their investments.

Further, factors such as excessive competition or overly tight price controls will discourage investment by both incumbents *and* newer players. However, interventions to support the targets need to be seen through the lens of *all* likely investors, not simply the historic telcos.

4.4 Incumbents' views

These historic telcos anyway see their future capex requirements falling. As we have seen, in many countries the heaviest costs of FTTP deployment are already behind us. Deployment of 5G is not far behind. Though of course much work remains to be done for both.

Incumbents report that their capex peaks are past, and that cashflows are improving

Orange has noted that it anticipates a "significant decrease" in capex, because the "FTTH deployment peak [has] passed".[39] Telefónica has also said its "3-year investment programme passed its CapEx peak in FY 21".[40] Telia anticipates its capex to fall from 17% of revenue to around 15%, after a peak driven by network modernization and 5G.[41]

Even companies earlier in their deployment of FTTP anticipate capex declining soon. Proximus sees its "capex reaching its peak level over the years 2022-2023, and gradually decreasing afterwards".[42]

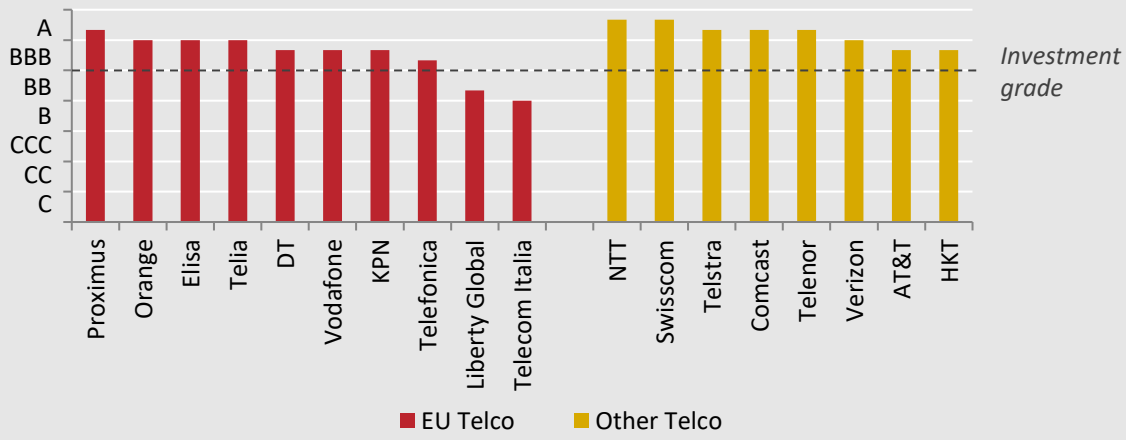
[39] Orange, *Orange financial results, H1 2022*, 28 July 2022
[40] Telefónica, *Results January-December 2021*, 24 February 2022
[41] Telia, *Q3 Interim report, January – September 2022*, 21 October 2022
[42] Proximus, *Proximus announces ambition to extend fiber coverage to 95% of Belgian premises, with the ambition to offer Gigabit coverage for 100% by 2032*, 29 June 2022

(The GSMA also sees declining mobile operator capex, despite the needs of 5G deployment. They predict that capex as a portion of revenues will fall from 22% in 2021 to 18% in 2025.)[43]

That these companies expect capex to fall does not necessarily mean they face no capital constraints going forward, but it is suggestive that they are unlikely to be constrained. The availability of capital from third-party investors for co-investment with telcos provides further comfort. Deutsche Telekom, for example, brought in IFM investors in a 50/50 JV, GlasfaserPlus, to deploy fibre in rural Germany. IFM provided €900m of capital.[44] Such steps, as well as the wider health of its business, mean that Deutsche Telekom expects its free cash flow (that is, after capex) to increase from approximately €10bn in 2022 to over €18bn in 2024.[45]

Credit ratings provide a further perspective on investment capacity and the sustainability of European telcos.

Figure 17: Credit ratings, EU and international telcos[46]



Europe's leading telcos all have investment-grade credit ratings, aside from Liberty Global and Telecom Italia. They are also in a broadly similar range to telcos internationally, albeit slightly lower on average. Credit ratings reflect a company's ability to meet its debt obligations, after funding the operational needs of the business. Thus the fact that European telcos are generally seen as a good credit risk suggests that they are not facing unsustainable capex.

[43] GSMA, *The mobile economy Europe 2022*, 7 October 2022
[44] TelecomTV, *Deutsche Telekom attracts €900m co-investor for rural fibre rollout*, 5 November 2021
[45] Deutsche Telekom, *Investor presentation*, November 2022
[46] S&P Global ratings, for local currency long term debt. As of 1 February 2023

Of course, even if a company has capacity for a given investment, it will only proceed if it anticipates a healthy return.

4.5 Drivers of return on future investment

In broad terms, a telco's return on a future investment will depend on the necessary capex, the revenue and opex impacts and the cost of capital. We consider these in turn, in the context of incremental FTTP and 5G coverage.

FTTP

Future capex costs for FTTP will be driven by a number of factors. As-of-yet unserved regions are likely to be more rural, and thus have higher costs per premise. This may be partially offset by continued efficiencies in deployment, which are steadily driving down the cost to pass a given premise. Government subsidies in rural areas act to reduce the net cost of reaching premises. Co-build or use of existing infrastructure (such as poles) will also reduce the cost to an operator.

FTTP revenue is driven by ARPU[47] and penetration. ARPU for FTTP and other gigabit services has generally only been moderately higher than that for other broadband technologies. On average, the price difference between a 12-30 Mbps service and a 200+ Mbps service is around €6 per month.[48] If consumer interest in higher speeds grows, then it may be possible to increase this premium, improving the investment case. (The premium is particularly important for the incumbent business case, since it represents the incremental revenue associated with the investment – a new entrant will instead consider the total price of the service, since they start from a zero base).

However, regulation and competition are also important factors. Any regulation that disallows higher prices for FTTP deployment in more expensive regions is clearly going to discourage investment. However, price competition is perhaps less of a concern in more rural areas, simply because only one FTTP network may be viable there.

Penetration for FTTP in rural areas is likely to be better than in urban areas, for two reasons. Firstly, if the area in question is indeed a natural FTTP monopoly, then the first to deploy will be able to pick up all the relevant customers. Secondly, existing infrastructure is likely to be less satisfactory. For example, a rural customer with ADSL on a long copper tail may be experiencing poor bandwidth and

[47] Average revenue per user

[48] Figure 24 of empirica & TÜV Rheinland [for EC], *Mobile and Fixed Broadband Prices in Europe 2021*, 28 July 2022

reliability, and so will be more eager to upgrade to fibre than (say) a customer in a town with access to cable or good FTTC.

FTTP penetration may also be improved by growing speed requirements, and this will gradually improve the investment case over time.

Regarding opex, while FTTP has lower costs that copper, for an incumbent these are incremental costs as long as it must be run in parallel with the existing network. Savings (and hence a benefit for the investment case) crystalise when the copper network can be switched off.

In summary, for a given region the investment case for FTTP is likely to improve over time, driven by capex efficiencies, stronger demand and (for incumbents) nearer prospects for copper switch-off. However, the regions still needing FTTP are likely to be more expensive, albeit more likely to be natural monopolies.

Over time FTTP is pushing into higher cost areas, though this is partially offset by improving deployment efficiency and the possibility of natural monopolies

5G

Capex for 5G falls into two broad categories – upgrading existing (lower band) cells to 5G, and densifying the network using mid band spectrum.

Upgrades are comparatively low-cost, and provide 5G coverage to meet the Digital Decade target. They provide modest increases in both speed and capacity. Since 4G coverage in Europe is 99.8% in the EU,[49] simply upgrading existing cell sites to 5G will provide near universal 5G coverage,

Cell site upgrades to 5G are relatively cheap, and will go a very long way to delivering the Digital Decade target

Densification provides much greater increases in speed, but at a much higher cost. As the 5G Observatory has noted, the improved performance is primarily of value to industry, rather than to consumers.[50]

However, BCG (in a report for the GSMA) found that 5G densification to support traffic growth could be handled roughly within the existing capex envelope of operators. Higher capex would only be triggered by enhancements such as high-bandwidth 5G coverage in rural areas and deployment of micro-edge centres.[51]

[49] IHS Markit / Omdia / Pointtopic, *Broadband Coverage in Europe 2021*, 28 July 2022
[50] VVA, Policytracker & LS [for EC], *5G Observatory Quarterly Report 17*, October 2022
[51] BCG [for GSMA], *Realising 5G's full potential: Setting policies for success*, March 2020

Analysis of the incremental revenue associated with 5G deployment is complex. In practice, operators have found it challenging to charge a premium for higher speeds. More generally, mobile ARPUs have stayed broadly flat even as users have enjoyed improving performance and data allowances. Regarding consumers, therefore, 5G is in part a defensive investment for operators. It allows them to meet growing traffic demand and provide competitive network performance, so that customers do not leave for competitors.

However, 5G is also anticipated to bring increased revenue from industry. It is expected to enable an array of Internet of Things applications for industrial and commercial operations. These are likely to be the key drivers of incremental revenue from 5G, though the performance and coverage requirements will depend on the application in question. For example, factory automation is unlikely to be relevant to the business case for deploying 5G in a rural area.

The opex impact of 5G deployment again is very different for site upgrades vs densification. The impact of the former is moderate – it need not add materially to site rental, for example. However, a more dense network will add materially to both.

In conclusion, mobile operators generally seek to upgrade individual cell sites as their utilisation approaches capacity. Going forward, the most efficient upgrade is likely to be to deploy 5G technology on that cell, and this will over time drive 5G deployment across the entirety of the existing network, providing very high levels of coverage, thereby substantially meeting the Digital Decade target.

Network densification is a different matter. Particularly in rural areas the investment case is very challenging. However, the benefits of dense networks in rural areas are marginal – there simply isn't the population density to need them. Thus a lack of rural densification shouldn't generally be seen as a problem.

Cost of capital

We treat cost of capital separately, since it applies to both FTTP and 5G business cases. Recent investment – particularly into FTTP by financial players – has been boosted by very low interest rates. The low cost of capital has meant that even business cases with a long pay payback period[52], such as FTTP, have been attractive.

However, rates are now rising, with key ECB rates rising 2.5 percentage points in the second half of 2022. The immediate impact on deployment will be modest, since the money being spent to build

[52] The length of time before an investment recovers its initial outlay

was generally raised over lower rates. However, over time it may mean that as-yet-unbuilt regions that were commercially viable cease to be so.

4.6 Conclusion

Europe has seen growing investment in telecommunications, with an increasing proportion coming from competitors to the incumbents. That said, in many countries it seems likely that peak capex has passed, since FTTP deployment is now well advanced. (Certainly incumbents are expecting slowing pace), This suggests that there is likely investment capacity for the remaining expansion of coverage, and the sustainability of the sector is not in doubt. Listed companies' statements about improving cashflow, the solid credit ratings of telcos and the growing private investment in the sector all support this conclusion.

Investment capacity is a different matter from an investment case. For FTTP, coverage into rural areas will undoubtedly be more challenging due to higher costs for less dense areas (though there are a number of offsetting positive factors). For 5G, there is likely to be a business case for near universal coverage (the Digital Decade target).

These conclusions echo those from the analysis in the earlier discussion of coverage progress to date. While there may be challenges in reaching the targets, they are likely to be particular to certain countries and certain regions in those countries.

5 Traffic charges and investment incentives

We now turn to traffic charges, and their potential impact on investment incentives.

Giving money to an organisation without conditions does not encourage it to invest. Certainly when governments have made grants to telcos to improve broadband coverage, they have (rightly) been very careful to make the money contingent on meeting specific roll-out plans, by a given date, using certain technologies and offering wholesale access.

Some have suggested that a transfer of value from large digital companies to telcos would, in itself, support telco investment. However, unless the transfer in some way changes investment incentives, it is unlikely to change investment levels. (If the challenge were purely one of investment capacity, the additional funds might enable investment in opportunities that were already financially attractive. However, as we have seen investment capacity is not the key issue).

In this section we consider how traffic charges might – or might not – change investment incentives. The critical issue is:

> "Would extra revenue from traffic tip the investment case from unviable to viable in a given area?"

If the answer to this question is 'no' for the area in question, then traffic charges have no impact – the investment would either go ahead (or not) regardless of traffic charges.

5.1 Impact on FTTP investment

We start by considering the impact of traffic charges on the FTTP investment case.

Limited zones where charges may have an impact

A first critical point is that traffic charges can have no incentive effect in areas where FTTP *has already been deployed* by the operator in question. For such areas, any traffic charges associated with the operator's lines are simply unencumbered money.

As we saw in section 3.1, gigabit coverage was already 70% at the end of 2021, and is likely to be appreciably higher by the time any hypothetical traffic charges are implemented. Thus for the great majority of the EU, it is impossible for traffic charges to have *any* incentive effect.

Similar logic applies to areas where operators have not yet deployed gigabit networks, but plan to do so even *without* traffic charges. Traffic charges can't improve coverage in these areas if there was going to be coverage anyway. In such regions, charges may improve operator economics, but they do not 'tip the balance' Thus in these regions too, traffic charges will have no incentive effect.

A third category is regions where deployment is uneconomic *even with* traffic charges. In remoter areas, the likely modest contribution of traffic charges will simply not be enough to make investment profitable. Once again, charges will have no incentive effect.

This leaves a narrow zone of special cases, where investment is *almost* viable, and traffic charges may make the difference. However, this highlights the wastefulness of traffic charges as an intervention. The vast majority of the funds transferred are unencumbered money, with only a small portion actually supporting the policy goal of improved infrastructure.

Traffic charges can't help coverage either where there is already going to be FTTP (most regions of most countries), or where FTTP is uneconomic *even with* charges (most of the remainder)

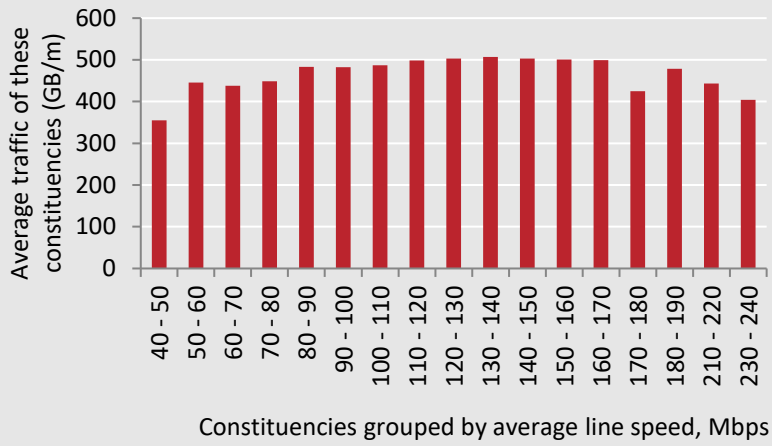
Importance of considering incremental traffic

Further, what would motivate investment would be *incremental* traffic charges. An incumbent considering upgrading its copper network in a region would not factor in *all* the traffic charges that might be associated with FTTP lines, but rather only the *additional* charges received as a result of the upgrade. If the incumbent were to do nothing it would still receive traffic charges associated with the usage of the copper lines, so it would only be the increase in usage that would bring additional revenue to justify the FTTP investment.

However, the linkage between increased capacity and increased usage is very weak. Looking at the UK for example,[53] Figure 18 shows how average traffic in a parliamentary constituency varies with the average line speed in use in that constituency.

[53] We are not aware of equivalent data for an EU country

Figure 18: Traffic vs speed for UK parliamentary constituencies[54]



For constituencies with an average line speed of 80-90 Mbps, traffic per line is 483 GB/month. For those with an average line speed of 150-160 Mbps, traffic is only fractionally higher, at 501 GB/month. In other words, despite having an average line speed 70 Mbps higher, there is minimal additional traffic.

This suggests that the incremental traffic - and hence incremental traffic charges - that an incumbent might expect from upgrading its network to FTTP is likely to be minimal. This further weakens the scope for traffic charges to incentivise fixed network deployment. (This is less of an issue for a new entrant deploying FTTP in competition with an incumbent, since for this company *all* traffic is incremental).

Traffic charges only encourage an upgrade if the upgrade generates additional traffic – but FTTP's impact on traffic seems to be minimal

Minimal impact on break-even cost for deployment

Another way to look at this issue is to consider the impact on the break-even cost-per-premise-passed. Operators considering FTTP deployment will assess whether they can recover the cost of deployment, and deploy in the areas where they believe they can.

Traffic charges may increase the break-even cost (by delivering greater revenue to cover the cost). However, the impact is likely to be small. Traffic costs are a small percentage of operators' total costs. By extension, any revenue stemming from charges to recover these costs is likely to be a small percentage of their revenues.

Since traffic costs are small portion of telcos' total costs, charges to recover them will make little difference to telcos' overall revenues

ENTO's own figures support this conclusion, as Figure 19 below shows. Frontier (for ETNO) have provided an estimated range of incremental cost per line associated with traffic. If, for the sake of

[54] Communications Chambers analysis of data from Ofcom, *Fixed performance parliamentary constituency data*, 15 December 2022. Figures are for May 2022. Note that sample sizes are small below 50 Mbps and above 160 Mbps

discussion, we accept this range and take the mid-point, we arrive at an incremental traffic cost of €1.67 per line per month.

The large American players on which ETNO wishes to impose traffic charges represent 55% of traffic, and thus the portion of traffic cost that might hypothetically be recovered from such charges is €0.92 per line per month. (This is a highly simplified estimate, and does not consider differences by market).

However, as discussed above, telcos would receive substantially all of this whether or not they upgraded their network. We assume that the incremental traffic charges associated with a network upgrade would be 10% of this, or €0.09 per line. (This is potentially generous, since Figure 18 above suggests there is almost no incremental traffic generated by network upgrades).

Figure 19: Illustration of potential ARPU uplift related to traffic charges from FTTP upgrade, based on ETNO figures

ETNO/Frontier estimate of incremental traffic costs per fixed line	
Range[55]	€11 - €29
Midpoint (per year)	€20
Midpoint (per month)	€1.67
Portion of traffic related to large digital platforms[56]	55%
Attr'n of incremental traffic costs to large digital platforms *(For the purposes of this illustration, this is assumed to become the traffic charge)*	€0.92
Traffic uplift from upgrade to FTTP	10%
Incremental revenue per line per month associated with upgrade to FTTP	€0.09
Current broadband ARPU[57]	€21.50
Impact on ARPU	+0.4%

This €0.09 compares to the average European broadband ARPU of €21.50 – representing an uplift of just 0.4%. In other words, even the traffic charges ETNO seeks make virtually no difference to the incremental revenue associated with FTTP deployment, and by

[55] Frontier [for DT, Orange, Telefónica and Vodafone], *Estimating OTT traffic related costs on European telecommunications networks*, 31 March 2022
[56] Axon, *Europe's internet ecosystem: socioeconomic benefits of a fairer balance between tech giants and telecom operators*, May 2022
[57] ETNO, *State of Digital Communications 2022*, February 2022

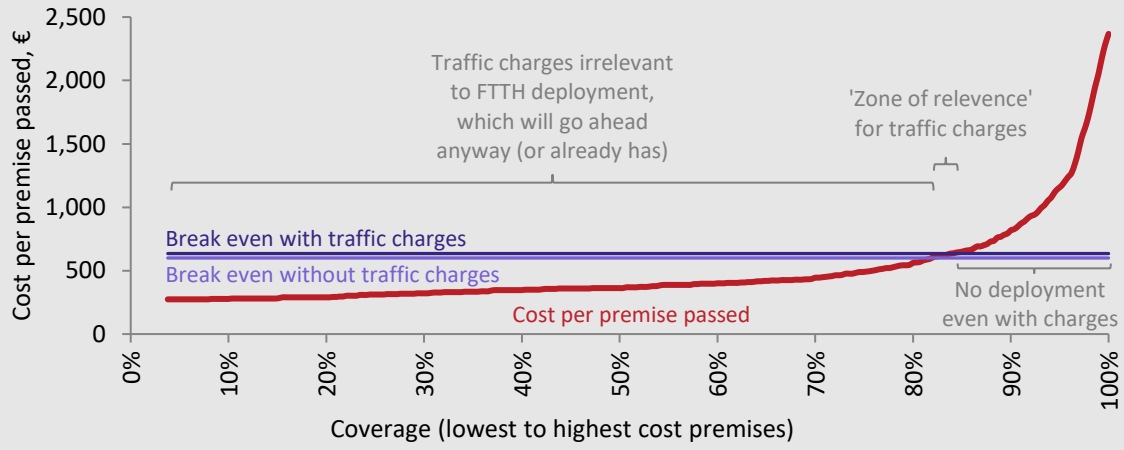
extension will have almost no impact on the incumbent FTTP investment case and resulting coverage. Even for new entrants (without existing traffic) they represent just a 4% uplift, and are likely to have only modest impact. Thus at best traffic charges will have marginal impact on the FTTP Digital Decade target.

Conclusion

Figure 20 summarises our conclusions. We can consider premises ranked from the cheapest to serve with FTTP, to the most expensive. As we move to the right on the chart, the cost per premise passed rises, with a sharp increase at the tail, representing increasingly isolated rural properties.

The horizontal lines represent the break-even cost. This is the current value of future profits from a home passed – if the cost is below this, then the operator has a financial case to invest. In our illustration, roughly 85% of premises (on the left) are below the 'break-even without traffic charges' line, and so are commercially viable regardless. Traffic charges have no benefit to roll-out here. On the right side of the chart are almost 15% of premises that are above the 'break-even *with* traffic charges'. These premises are commercially *unviable* regardless, and again traffic charges have no benefit.

Figure 20: FTTP deployment break-even (illustrative)[58]



That leaves a very narrow 'zone of relevance' in the middle where traffic charges might conceivably incentivise additional deployment.[59] But this zone is narrow precisely because the revenue impact of the charges is so small – it makes only marginal difference to break-even cost. However, even for this small benefit, traffic

[58] Costs are illustrative, but the cost curve is based on Ofcom, *Promoting competition and investment in fibre networks - Initial consultation on the approach to modelling the costs of a fibre network*, 21 June 2019

[59] The likely size of this zone is exaggerated in our illustration, simply so it is visible in the chart

charges wastefully provide unencumbered money across all the other premises in the left and right hand zones.

5.2 Impact on 5G investment

We now turn to the 5G investment case. In broad terms we can split the benefits and revenues of 5G into two categories:

- It will support continued 'business as usual' traffic growth, enabling mobile networks to continue to provide quality service even as usage of existing applications increases.
- It will enable new applications, primarily serving particular industry verticals

No impact of traffic charges on investment for 5G to support new applications

It is the second of these categories that has perhaps attracted most attention for 5G. The Commission has said that

> "availability of 5G services will dictate the pace of development of many new services and applications that have a potentially high economic and societal value, in particular vertical industry use cases".[60]

According to ETNO

> "5G is … expected to be more than just a new generation of technology, but rather a key component and enabler for innovation in many areas including medicine, manufacturing, transportation and agriculture"[61]

Some of the most economically important applications of 5G will not generate traffic charges, so such charges won't encourage the relevant investment

However, in the current context, these applications are almost irrelevant, since the associated traffic will not attract traffic charges. For example, if 5G networks are used to support self-driving cars, then the traffic is likely to flow to and from BMW or Renault, not the large American companies targeted by traffic charges. Thus traffic charges will bring no incremental revenue to support investment to enable these applications. By extension, such charges would make no difference to network capabilities or coverage focused on enabling this critical benefit of 5G.

[60] EC, *Commission staff working document accompanying the document Proposal for a Decision of the European Parliament and of the Council establishing the 2030 Policy Programme "Path to the Digital Decade" [SDW(2021) 247 final]*, 15 September 2021

[61] ETNO, *5G and us: A European story*, 29 June 2020

Minimal impact for 5G to support 'business as usual'

Might then charges on 'business as usual' traffic encourage investment? As with our analysis of FTTP, a critical question is whether 5G will drive (as opposed to enable) incremental traffic. If deployment of 5G at a given site does *not* drive incremental traffic at that site, then there is no *increase* in income from traffic charges, and therefore no change in investment incentives. (The operator would in either case receive traffic charge revenue on the existing traffic base).

Note that this logic applies even if 5G is necessary to meet demand growth in the cell in question. In this scenario, the 5G upgrade *enables* extra traffic, but doesn't *drive* extra traffic (in the sense of creating incremental underlying demand). However, with or without traffic charges, operators are likely to upgrade such cells to 5G. This is because marginal traffic is already profitable for operators – it would be irrational of them to choke off traffic growth by refusing to upgrade. Thus additional traffic charges (which simply serve to make this marginal traffic *more* profitable) are not relevant to the investment choice.

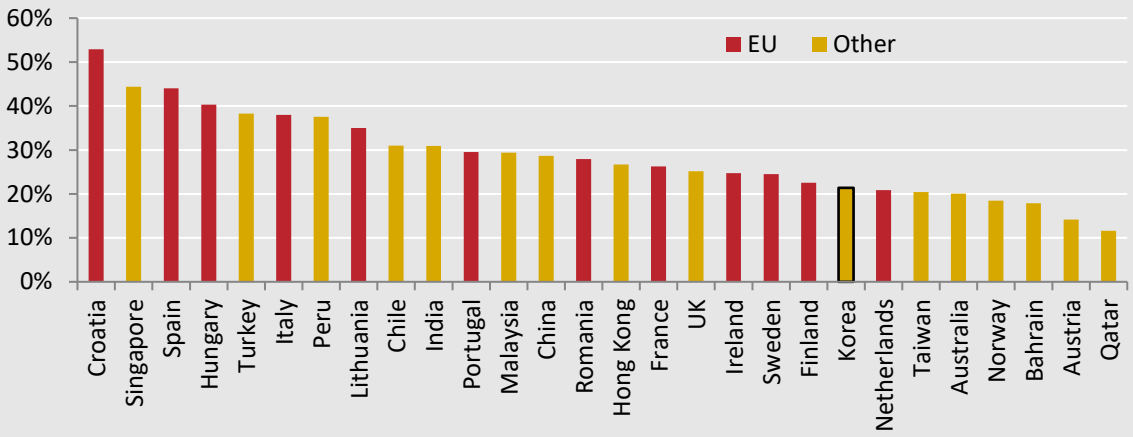
What are the prospects for availability of 5G driving additional traffic? Certainly 5G users have higher usage than 4G users, but this is a heavily self-selected group – those with the latest phones and (where relevant) those who have selected a 5G enabled plan. It is likely that these individuals would have had higher usage even if they had stayed on 4G.

To avoid this issue of self-selection, we can instead look at overall traffic growth of countries that have been early to deploy 5G. If 5G drove additional traffic, we might expect such countries to have higher growth.

The clear market leader in 5G deployment is South Korea, with 3 times the number of 5G base stations per capita of its nearest rival (China).[62] However, since Korea's launch of 5G, its traffic growth has been modest, at 21%, well below that for almost all EU countries for which we have comparable data:

[62] VVA, Policytracker & LS [for EC], *5G Observatory Quarterly Report 17*, October 2022

Figure 21: Annualised growth rate in traffic per SIM, H1 2019 to H1 2022[63]



This is not to say 5G has no benefit for traffic demand, only that such benefits might be modest. (These benefits are separate from the 'new service' benefits discussed above). By extension, the incremental revenues associated with traffic charges will be modest, and so too will their impact on 5G deployment.

As with FTTP, mobile traffic charges will also be wasteful as a way to encourage 5G deployment, since they will also apply in the great majority of cell sites, where a 5G upgrade will or will not happen anyway. Again, such charges are unencumbered money.

Substantial risk traffic charges reduce *incentives for 5G upgrades*

The above suggests that traffic charges will only provide minimal incentive to upgrade networks. However, there is a substantial risk they actually reduce incentives to upgrade, making it *harder* to reach the Digital Decade targets.

This is because of the effects the charges are likely to have on application providers. Charges of the level sought by ETNO may well make some major applications unviable – the traffic charge per GB on mobile networks is likely to be greater than the revenue per GB earned by the application provider. In this circumstance, the only commercially rational response for the application provider would be to cease to offer the application. (This is not hypothetical - in Korea, where content providers face traffic charges, Twitch has withdrawn from the market entirely).

[63] Communications Chambers analysis of data from Tefficient

The implications of this for network deployment are potentially disastrous. Video is a key driver of demand. In such a scenario, customer usage would drop sharply, and customers would reduce their spend on mobile. This would badly damage mobile operators, and more specifically greatly reduce their incentives to upgrade their base stations to 5G.

By sharply reducing mobile traffic, traffic charges could damage mobile operators and make it harder to achieve the 5G coverage target

Thus far from supporting achievement of the Digital Decade 5G target, traffic charges are likely to make it unachievable.

6 Conclusion

The claim that traffic charges are a useful intervention to support the Digital Decade infrastructure targets does not stand up to scrutiny.

As we have seen, Europe is well on its way to meeting these targets, and is appreciably ahead of the trajectory forecast just over a year ago. No intervention can make a difference to the achievement of targets that have already been met. That is not to say that there are no areas of concern – but the challenges are specific to certain regions of certain member states.

Good interventions would be targeted to these regions. They would also be efficient; be conditional on delivery; have meaningful impact on delivery of the targets; and would not have negative side effects. Traffic charges fail all five of these tests.

- They are utterly untargeted, providing substantial sums to telecoms operators nationwide, including in the majority of regions that already or will shortly have FTTP and 5G
- Associated with this, they are inefficient, providing telcos with enormous sums to achieve a very small impact on coverage
- They are unconditional, and as such are largely unencumbered money – as proposed, telcos would not need to deploy a single strand of FTTP or a single 5G base station to receive massive proceeds from traffic charges
- They will not have meaningful positive impact on coverage targets, because they do not materially change investment incentives – such changes depend on incremental traffic driven by FTTP and 5G upgrades, which are likely to be small
- They potentially have catastrophic side effects, making popular services unviable on mobile networks, to the detriment of consumers, application providers *and* network operators

Both the Commission and member states have far more effective interventions available to them, many of which are already in use. Where support is needed to close remaining gaps in the Digital Decade targets, these interventions should be the focus, not the counter-productive experiment of traffic charges.

COMMUNICATIONS CHAMBERS

+44 773 858 2227
info@commcham.com
www.commcham.com