

Your response

Question 14: Do you agree with our assessment of internet access services provided on aeroplanes, trains, buses and coaches and our proposed approach?

IET Response to Ofcom's Net Neutrality Review Consultation

About the Institution of Engineering and Technology (IET)

The IET is a trusted adviser of independent, impartial evidence-based engineering and technology expertise. We are a registered charity and one of the world's leading professional societies for the engineering and technology community with over 155,000 members worldwide in 148 countries. Our strength is in working collaboratively with government, industry and academia to engineer solutions for our greatest societal challenges. We believe that professional guidance, especially in highly technological areas, is critical to good policy making.

Key Points

- The internet should remain 'open to all', and free of charge for small content providers (CAPs) and UK public broadcasting services
- Legislation should be brought forward to give Ofcom the power to charge large CAPs for the mobile network capacity they use
- The funds raised by this charge would enable levelling-up the UK's mobile network infrastructure

Introduction

The IET strongly supports a net neutrality that ensures the Internet remains "open to all", not just to and from homes and offices but to and from those on the move across the entire UK. There is an enormous challenge for Ofcom to head off an emerging high capacity 5G (fast 5G) digital divide where a large part of the UK does not receive any of the benefits of a high capacity Internet for users on the move. To meet this challenge Ofcom needs to be given all the necessary tools to carry out its role, including powers for Ofcom to allow mobile access providers to charge large content and application providers (CAPs) for the capacity they use will be one such vital tool. The lead time to acquire this power is long and so it would be timely for Ofcom to make the request to the Government and Parliament, now. The measure proposed by the IET is narrowly focussed only on mobile networks and would ensure Internet access remains free of charge for smaller CAPs and UK public service broadcasters. The most pertinent consultation question that addresses our concerns is Question 14 that specifically addresses users on the move.

Ofcom makes the point (in 9.31) that consumers want to be able to access the internet wherever they go and whenever they need it, including when travelling on aeroplanes, trains, buses and coaches. The IET agrees with this. Furthermore, people would also want to do this in their motor vehicles and commercial transport when safe to do so (for example as passengers and, in the future, in their self-driving vehicles). The IET's concern is a widening digital divide for those *on the move* outside of urban areas, where there is compelling evidence of an impending market failure to provide *fast 5G* across 70% of the UK landmass. (This term is used to describe 5G deployments at mid band and above. The key attribute is the exploitation of a wide radio channel of 80 MHz or

wider). The solution, discussed in more detail later, is very targeted at bandwidth constrained mobile infrastructure only and, in a way that ensures the Internet remains “open to all” and free of charge for smaller CAPs and UK public service broadcasters.

Ofcom recognises (in 9.45) that “Internet access services are subject to capacity constraints that are often outside of the ISP’s control”, and they “consider it unlikely that capacity constraints will be resolved **in the short term**”. This specific focus on the short term is the IET’s principal concern. Section 3(2) of the Communications Act 2003 requires Ofcom to secure the availability of a wide range of electronic communications services **not just in the short term** but the medium and long term as well. Further, this is required not just where Ofcom’s current regulatory model makes this commercially viable but **throughout the UK**. Therefore, we argue that conclusions drawn from an incomplete analysis are not sound. Ofcom needs to lift the time and geographic limitations they have applied to this issue. If they do so, different conclusions would emerge.

This particularly applies Section 7, where Ofcom considers the arguments for and against allowing ISPs to charge fees to CAPs. Ofcom concludes that “*A charging regime would be a significant step and we have not yet seen sufficient evidence that such an approach would support our objectives at this time*”. The IET concurs with this conclusion for the estimated <10% of the UK’s landmass where the population density is generally favourable for advanced wireless infrastructure deployment on a commercial basis. But that does not take full account of consumers living in, visiting or travelling through over 90% of the UK from a future with a wireless infrastructure able to support a wide range of high data usage, electronic communications services *and particularly for those on the move*. The potential size of this investment gap has been the subject of a recent report by Frontier Economics [1] and our own analysis is broadly in line with their conclusions.

*By looking at the general mobile market perspective, the IET concludes that this mobile wireless infrastructure is unlikely to get delivered at the current levels of investment in the foreseeable future. We examine the sources of investment that could make significant difference, suggest a funding model that provides a solution matched to the challenging economic circumstances the country faces and conclude with a plea to Ofcom to give the UK a better wireless broadband future by recommending to the Government and Parliament that legalisation is brought forward to give Ofcom the powers to introduce a charging regime applied to **large** CAPs.*

A) General mobile and content market perspective

Like many other markets, the internet is a two-sided market: on one side consumers who want to consume content and content providers on the other side who want to reach consumers. It would typically be considered economically efficient to have the freedom to charge both sides of the market, however this is prevented under existing EU Net Neutrality regulations adopted by the UK. As it stands Net Neutrality regulations severely weaken the bargaining position of telcos, with prices set to zero on one side of the market. This has enabled the growth of global content businesses (primarily from the US) which in turn have impacted competition across many digital markets.

This current approach forces communication providers to make a choice when faced with increased capacity demands, either (1) increase consumer prices to generate revenue (limited by competition) or (2) take investment from other programmes to fund the capacity investment (limited by competition in those other areas), or (3) not carry out the investment, letting the connectivity experience degrade for consumers (the most likely default scenario). All these choices have negative impact on consumers.

It is telling that prior to the EU intervention on net neutrality, Ofcom itself felt the UK did not require additional net neutrality rules. As far back as 2010 Ofcom said: “discriminatory behaviour is only a potential issue where firms have substantial ‘market power’ and could discriminate in favour of their own services” [2]. Given the lack of co-ownership between content owners and networks in the UK and the highly competitive nature of the UK’s fixed and mobile retail markets, this seemed a proportionate response. Ofcom stated at that time that their “current view is that we should be able to rely on the operation of market forces to address the issues of blocking and discrimination” [3]. The industry has firmly been in favour of providing transparency safeguards to ensure consumers understand the scope of the services being offered by their provider, with Competition Law enforcement being available in the unlikely event that any concerns arise.

The most efficient way to enable delivery of investment, before considering a tax or public/other funding regimes, would be to allow the market forces to act as far as possible. That would mean introducing net neutrality rules that set clear standards of what the open Internet requires and then allow ISPs to charge users on all sides of the market, in a way that the economy works for other areas.

This may result in some instances in lower prices to end users or in higher investment. And lower prices to end users could lead to greater usage, supporting economic growth, while CAPs’ larger contribution would reflect the larger value they gain from connectivity. This way there would be a pricing mechanism that can be deployed so that those who value the connectivity more, pay more, and fund more of the investment needed. Whereas those who value it less, pay less, but still benefit.

The existing UK Net Neutrality regulations are preventing the commercial market from operating effectively, harming price signalling to guide sound investment decisions. It is difficult for the UK mobile network operators to achieve efficient levels of investment and/or investment in the right types of service. The current rules act, together with other adverse regulatory conditions, as a barrier to enough investment to deliver the innovation benefits of fast 5G universally. That is the problem to be solved.

B) the mobile wireless infrastructure that is unlikely to ever get delivered at the current levels of investment conditioned by the current regulatory model

The wireless infrastructure technology/spectrum band solution able to sustain a wide range of data hungry electronic communications services over the next 20 years is fast 5G.

The Frontier Economics report mentioned earlier concludes that an extra £3-5bn of investment would be needed over and above the likely MNO investments to 2030 of c. £9bn to deliver fast 5G in urban areas (0.1% of landmass) alone and basic 5G in other areas that currently receive 4G. A further £10bn would be needed to also cover semi-rural areas with fast 5G (i.e., extending to 30% of landmass).

Current levels of investment are not sufficient for fast 5G to reach even 30% of UK landmass by 2030; it would be more like 2040. At the same time 70% of the country would still be waiting for fast 5G to arrive, even by 2040. This is how the IET concludes the 70% figure.

This 30%-70% mobile digital divide split is illustrated in Figure 1 on a plot of the total spectrum capacity as a function of geographic area of the UK. The critical point from this

illustration is just how little total spectrum (18%) must support the growth of traffic across 70% of the UK landmass.

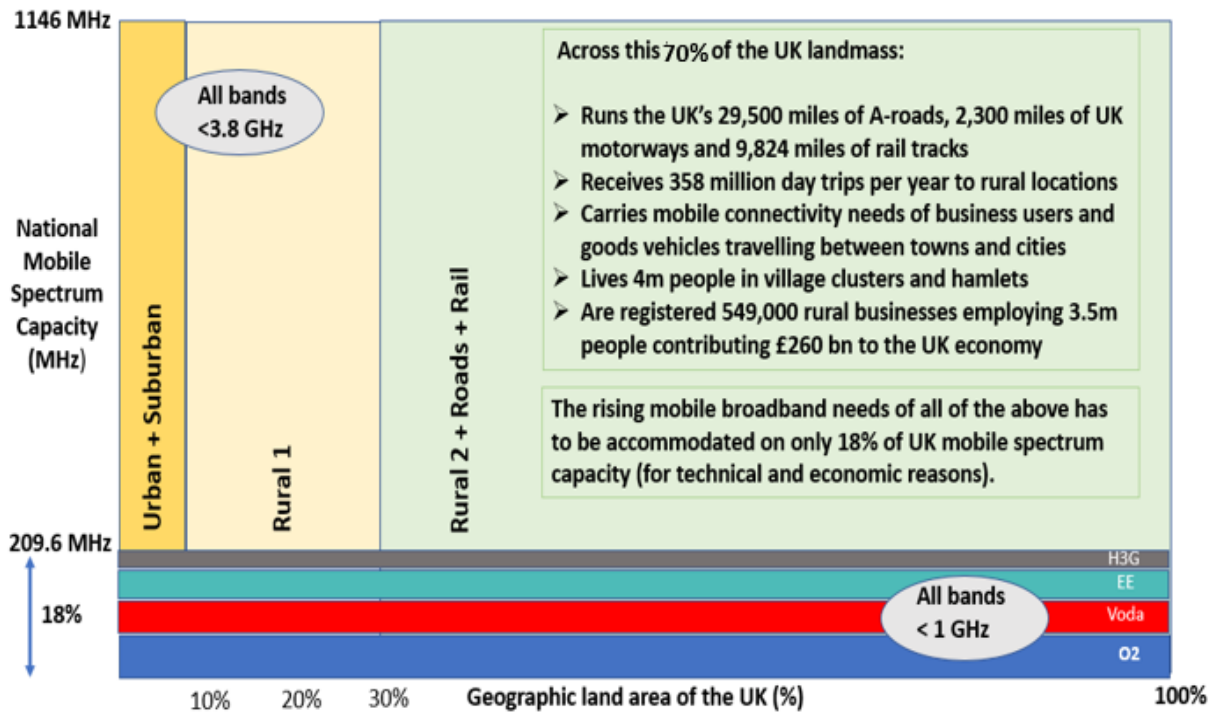


Figure 1 - Analysis of the fast 5G investment/spectrum deficit driven by radio spectrum techno-economics

The IET has cross checked this 30% break point in dimensioning the fast 5G digital divide against some data from 3G coverage history.

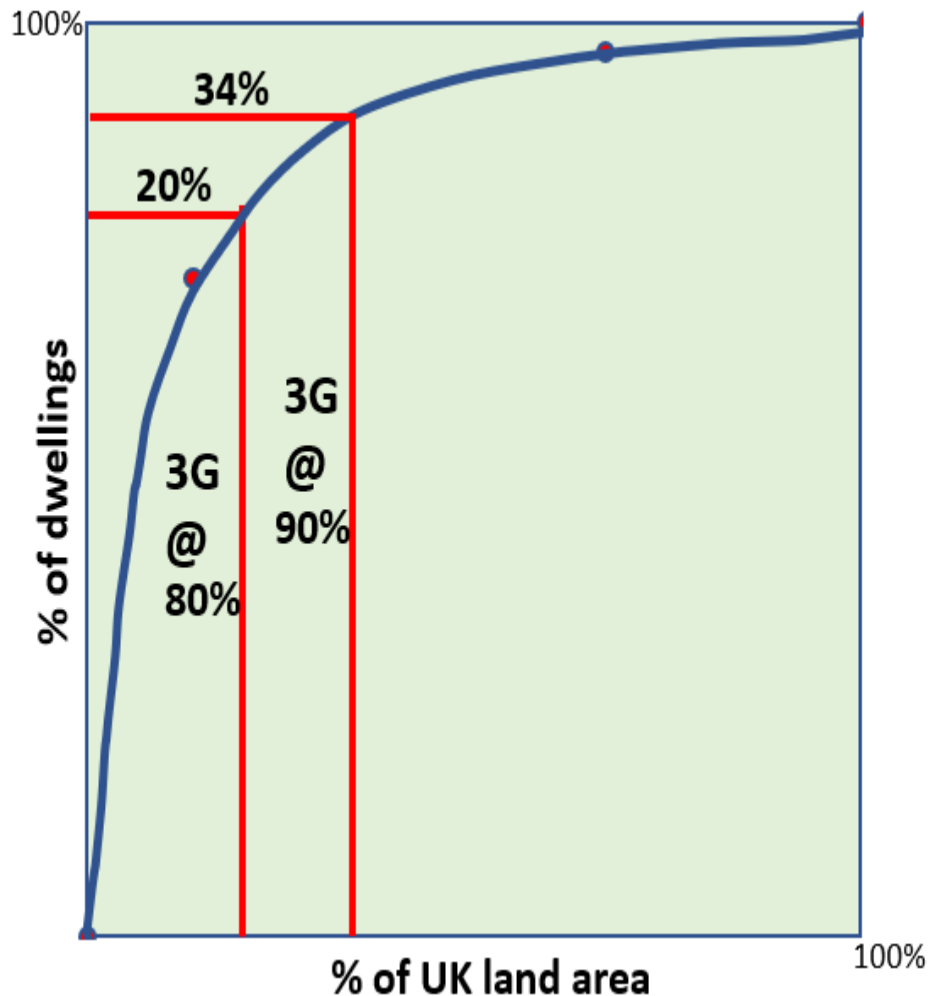


Figure 2 – 5G at 3.6 GHz is likely to result in less coverage than 3G at 2.1 GHz

In 2003, few anticipated how limited mobile coverage would turn out to be at 2.1 GHz, the band chosen for 3G. The original 3G coverage obligation was 80% of the population or around 20% of the UK landmass. The obligations were retrospectively tightened up to 90% of the population (or around 30% of the UK landmass) following extensive consumer complaints about poor 3G coverage. The industry struggled to meet this second coverage obligation. Figure 2 illustrates where the knee of the curve is roughly positioned that leads onto a law of diminishing returns for commercially driven investments.

Fast 5G uses spectrum at 3.6 GHz and therefore geographic coverage shrinks (on a like-for-like basis) compared with 2.1 GHz. The 30%-70% mobile digital divide therefore appears to be in the right ballpark and the conclusion that the current levels of investment are not nearly sufficient is robust.

The “do nothing” option leaves a universal (guaranteed) mobile broadband data rate, where mobile broadband coverage exists, as 2 Mb/s down and nothing in the return path. These numbers come from the specification of the Shared Rural Network. Previously this may have been a good solution as opposed to nothing. Today it is not good enough for consumers, commerce or industry on the move.

Ofcom notes in Section 9.40 the efforts from the Department of Transport (DfT), Network Rail, the Department for Digital, Culture, Media & Sport (DCMS), the train operators and the UK Space Agency seeking to address, in the future, the reduced customer experience on trains. The IET wholeheartedly endorses this endeavour but cautions that satellites have inherent capacity limitations arising from their very high altitude (leading to poor spectrum reuse). The right solution is a mix of satellite and cellular mobile networks (the network of networks) where traffic is lifted off satellites whenever users are within range of a mobile base station. This frees up satellite capacity to better address the needs of all those users totally out of reach of fast 5G base stations.

The list of examples as a result of the investment deficit given in Figure 1 is not exhaustive, however, the UK needs not only more extensive high-capacity infrastructure and climate change requires further investment for resilience and green energy. Thus, even if new sources of investment can be found, choices will still have to be made by the Government and Ofcom on priorities and what will never get done.

C) Sources of investment that could make significant difference

The IET has identified four potential sources of investment in UK wide fast 5G wireless infrastructure:

Mobile Network Operators – Competition is helpful in driving investment but is fundamentally limited by the extent MNOs can raise the necessary capital. Telecommunications operators in Europe are unable to raise new capital through rights issues for new UK wireless infrastructure investment. The financial markets will have noted that some UK MNOs are not covering their cost of capital. The Bank of England is making that capital more expensive by raising interest rates. Within this much tighter financial environment all MNOs are having to make choices between investment in more capacity over existing 5G cells or investing to extend fast 5G coverage. In addition, two of the MNOs have extensive fixed wireline broadband networks and must make choices between investing in fibre to the home or 5G within a stretched fixed company capex budget.

These factors taken together lead to the conclusion that competition has reached a limit in driving any higher levels of mobile infrastructure investment from MNOs.

The Taxpayer – The Shared Rural Network programme set a precedent for the Government to redress the rural coverage market failure through a taxpayer subsidy of £500m. The Government is also providing £5 billion of support in their *Gigabit* fibre project, which the IET supports.

Since then, the Covid lockdown and the energy crisis have increased fiscal pressures. The financial market turmoil after the mini budget is evidence of this.

Whilst all governments would want to see Ofcom able to fully meet its remit to secure the availability of a wide range of electronic communications services across the UK, this source of new investment for 5G is maxed out.

The Consumer – In 2009 the Government proposed a 50p per month levy on phone lines to create a next generation fund to pay for faster broadband across the UK. This was unpopular at the time and would therefore imply this is an unlikely option in the current cost of living crisis.

Large CAPs – Content providers have historically paid a carriage fee for infrastructure providers to deliver TV content to consumers. To suggest that this is now appropriate for delivery of large CAPs' high data usage video content over bandwidth and investment constrained mobile broadband networks is therefore not breaking new ground. **The overwhelming case for doing it now is that all the other investment possibilities are exhausted**, and the large CAPs are at or near the top of the list of highly profitable enterprises driving the demand for ever greater data capacity over mobile networks. Large CAPs would gain greater reach with better performing and more reliable connectivity to their customers on the move by investing. That in turn benefits all the smaller CAPs.

D) An investment solution matching the challenging economic circumstances

Under financial pressure it is often the choice to do without. However, for something like a wireless infrastructure, that is essential to supporting future economic growth, doing nothing significantly impacts the >90% of the UK by 2030 identified in the Frontier Economics report or the 70% in Figure 1 (where the time horizon has been pushed out to 2040).

An investment solution matching the challenging economic circumstances of today is a twin track approach of finding new sources of investment that will inevitably be at relatively modest levels, and to sustain them over a long period of time, so that they accumulate to deliver the final desired outcome. The modular nature of a cellular mobile network makes this very feasible. Some resilience measures, such as battery back-up, can also be done incrementally over a long period of time.

One of the only feasible sources of new investment left is the large CAPs paying for the investment in capacity they are consuming¹. This incremental funding approach not only drives out fast 5G beyond urban areas but also sustains skills and provides immediate incremental benefits to consumers, citizens and economic growth.

A final point to note is that it is taking Ofcom and Government a long time to adjust their mobile policy framework to the address that a sharp step up in investment needs to follow a sharp step up in the radio spectrum of the mobile bands brought into use, if the benefits of higher performing mobile broadband are ever to extend over the existing mobile coverage area. It is not rational to be looking at mmWave or Terahertz bands to meet future national mobile broadband growth or roll out even more advanced technologies. Ofcom needs to support the provision of more suitable mid-band spectrum bands (e.g., 6 GHz) for 5G network evolution and 6G, or mobile networks will face even more severe capacity constraints in offering fast 5G services towards the end of this decade (at current rates of increase in demand), thus further increasing the gap between areas with and without 5G/6G. This alone does not solve the investment shortfall being addressed in this contribution.

E) Other considerations

When video streaming services across Internet begun, both the market and industry were in a nascent state. There was public policy case for local access providers to absorb the cost of transporting their video content to allow the industry and market to establish itself. Today, a very mature streaming (and gaming) industry and market exists. As is the nature of very

¹ This includes significant traffic that not even the end user requests, such as unsolicited advertising content.

open markets, the industry broadly breaks down into a handful of giant companies that have secured global scale and a long tail of very small niche CAPs. **The IET proposes that only the large CAPs to contribute financially for the capacity they are consuming. It would be for Ofcom to define what constitutes “large” and ensure charges were fair and reasonable. The IET does not seek to change the status quo for smaller enterprises, interest groups and free speech platforms, nor to place any burdens on the streaming content from the UK public service broadcasters, whom the mobile industry has an interest to encourage gradual migration from linear terrestrial TV to on-line delivery.**

The IET recognises a strongly held views by some to maintain the status quo for the version of net neutrality that was established more than a decade ago. However, that is proving unsustainable today as the cost of high capacity wide area coverage for bandwidth constrained mobile networks increases quite dramatically.

The IET is not proposing a reversal of net neutrality principles impacting the openness of the Internet for all, nor anything that calls for charging of smaller enterprises or UK public service broadcasters or which affects free speech or favours large enterprises over smaller ones. The IET is proposing that Ofcom should seek from Government and Parliament the powers to permit a proportionate measure to be applied only to the wealthiest large CAPs to pay a fair and reasonable price for the capacity they consume over UK bandwidth constrained mobile access networks. There will be an inevitable long lead time to achieve this as primary legislation is needed. Therefore, Ofcom’s assessment has to encompass not just the situation today but a judgement, based on the evidence in this submission and others, of the position in 3-4 years from now... the likely lead time to acquire any new powers.

Conclusions

The IET wants Ofcom to give the UK a better wireless broadband future for everyone by recommending to the Government and Parliament that legalisation is brought forward to give Ofcom the powers to introduce a charging regime applied to large CAPs so that they proportionately pay their way for the wireless infrastructure capacity they are consuming over bandwidth constrained mobile access networks.

The IET has professional expertise and extensive networks across the engineering and technology sectors. For further information, please contact please contact sep@theiet.org.

References:

[1] Frontier Economics, “The investment gap to full 5G roll-out”, Sep 2022, <https://www.connectivityuk.org/wp-content/uploads/2022/09/The-Investment-Gap-to-Full-5G-Rollout.pdf>

[2] Ofcom, "traffic management and net neutrality", June 2010, https://www.ofcom.org.uk/_data/assets/pdf_file/0026/55556/netneutrality.pdf

[3] Ofcom, “Ofcom’s approach to net neutrality”, November 2011, https://www.ofcom.org.uk/_data/assets/pdf_file/0011/50510/statement.pdf