IET Response to Question 8 in the Ofcom's Discussion Paper - Ofcom's Future Approach to the Mobile Markets

1. Introduction

This response addresses Question 8 - Are there any other potential barriers to the delivery of good outcomes over the next five to ten years that we have not considered? If so, please outline what these are.

The two potential barriers we suggest are:

a. The natural failure of competition to address the coming 5G digital divide

b. The scale of investment needed to level up that digital divide and how that is to be achieved.

Ofcom's parallel discussion paper "Meeting future demand for mobile data" is an outstandingly good analysis of the likely demand and offers a credible technical framework for meeting it. This may be thought of as one side of an investment ledger that totals-up the drivers of the outgoings side. This discussion document, on the mobile markets, may be thought of as the other side of the ledger, as it addresses the regulatory framework for delivering the levels of investment needed. The two sides of the ledger are not balancing by a considerable margin, as we propose to show.

2. The natural failure of competition to address the coming 5G digital divide

Ofcom's heading above their paragraphs 6.19 – 6.22 states: "*The evidence suggests that MNOs plan to continue to invest significantly in their networks for at least the next few years*". This heading can usefully be turned into a question "Does the evidence suggest that the MNO's plan to continue to invest sufficiently in their networks for at least the next few years? Ofcom's paragraph 6.21 identifies the "sufficient for what" issue, namely, those in low demand areas potentially not experiencing the same very high speeds and responsiveness as in high demand areas. What the Ofcom discussion document is missing is dimensioning the relative size of those areas. Why this is important, is that underserved areas jump by an order of magnitude for mobile networks operating in mid band compared to those operating in low band. It is a facet of 5G requiring a mind-set change.

Also, mobile demand is no longer quite so aligned with the demographics of dwellings. Much demand in the home has been off-loaded onto WiFi. This makes the "percentage of the population" (where people live) a less useful measure for consumers and businesses than where they travel. Therefore, "percentage geographic coverage of the UK" needs to be used in order not to obscure the size of the challenge.

Figure 1 (below) uses data from an early Ofcom infrastructure report to illustrate the relationship between where the percentage of the population reside, and the corresponding geographic area of the UK covered. The flattening of the curve shows the expected law of diminishing returns. Added to figure 1 is where the competitive market is likely to fail to deliver "the best" 5G performance to all citizens of the UK for each of the three 5G pioneer bands.

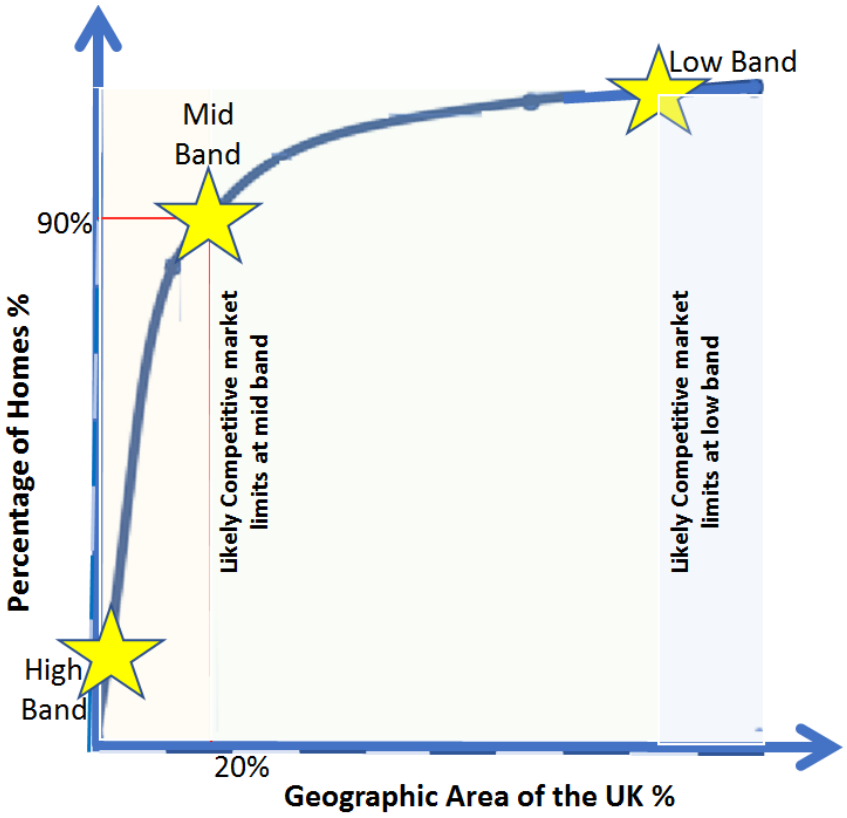

Figure 1 – Competitive market failure to deliver coverage as a function of the spectrum band

The capacity that can be delivered, as a function of spectrum band, is the inverse of the curve in figure 1.

2.1 Limits of the competitive market to deliver "high band" mobile coverage

Delivering contiguous coverage using high band 5G is hugely expensive. A recent Spectrum Policy Forum 26 GHz study done by Real Wireless suggests the coverage at 26 GHz is highly likely to be a low "single digit" percentage of the UK.

2.2 Limits of the competitive market to deliver mid band mobile coverage

Mid band is the main work horse of high capacity 5G networks. Ofcom data on what happened with 3G coverage at 2.1 GHz gives a good starting point for estimating the

competitive market driven limits of mid band 5G. The first UK 3G coverage obligation was 70% of the population and was easily met. But Ofcom then tightened this up to 90% of the population in the face of substantial consumer complaints of poor 3G coverage. The 90% figure proved to be very economically challenging at the time. Evidence showed that one quite well-resourced MNO struggled to meet it. Mid band 5G is an even more economically challenging spectrum band than the 2.1 GHz band used for 3G. But off-setting this is much improved antenna technology used for 5G. If the assumption is made that two factors broadly cancel out, a figure of nearly 20% of the UK emerges (that embraces 90% of homes) and over which the competitive market may, in the fullness of time, deliver the very high performance that 5G is capable of. Within this will be a new generation of partial not spots.

2.3 Limits of the competitive market to deliver low band mobile coverage

The area of coverage market failure at low band has already been well established and the Shared Rural Network is a policy response that will deliver a data speed that would have been welcomed 20 years ago but will become an extreme of digital data poverty in the coming 5G digital divide.

2.4 Consequences for users where the competitive market fails to deliver the best 5G performance.

It so happens that the memory capacity of today's top end smartphones could accommodate a complete season of the Game of Thrones. This offers an easy-to-understand measure of the coming 5G digital divide and huge scale of investment that would be needed to level up that divide.

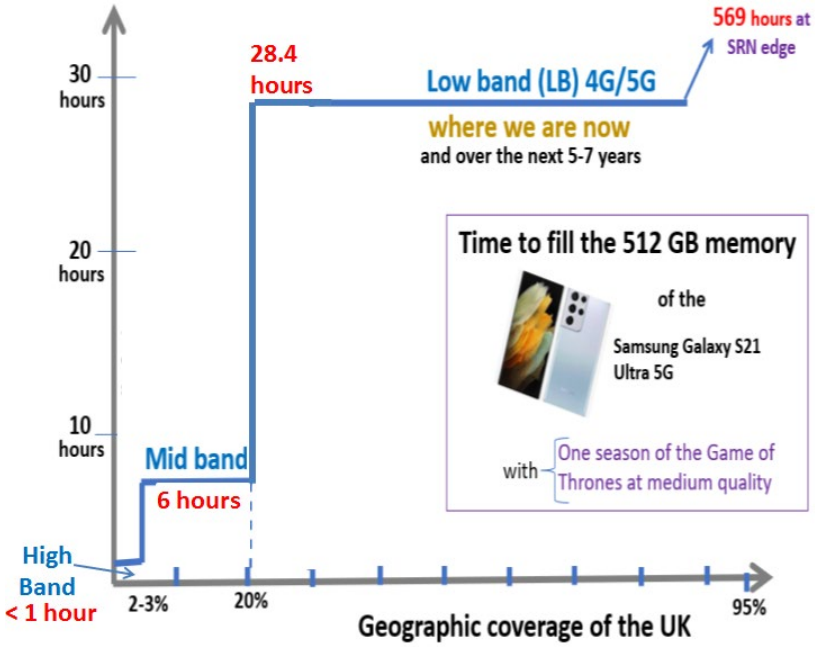

Figure 2 – Time to fill the memory of today's top end smartphone to illustrate the coming 5G digital divide

The blue lines show the best and worst times it will take to download content to fill the entire memory of one of today's high end 5G smartphones *depending on where a user happens to be in the UK*. The download time varies from under 1 hour within tiny islands of high band coverage to over 500 hours at the edge of the shared rural network. Between the extremes, the "haves" with mid band 5G coverage will enjoy a 6-hour download time but the "have not's" in the other 70—80% of the UK will have to wait nearly 30 hours. Ten years from now smartphone memories will be many times larger, along with an even bigger demand for mobile data (as illustrated by Ofcom in their concurrent discussion document "Meeting Future Demand for Mobile Data").

Whilst the example is purely illustrative, figure 1, fairly accurately dimensions the likely scale of the 5G digital divide "disparities" across the country. It also suggests that the UK is already behind the curve in terms of investment to redress it.

2.5 Summary

The evidence we have presented points to the competitive market delivering fantastically high performing 5G in high band across a few percent of the UK. Excellent performing 5G at mid band across 20% of the UK's geographical area (90% of the population), and underperforming 5G (or existing 4G) over some 80% of the UK's geographic area (last 10% of the population) leaving some regions in mobile data poverty.

The question we wish to pose back to Ofcom is whether they view this outcome as good enough in meeting their duties to all parts of the United Kingdom? *If it is not good enough, it follows that the current levels of MNO investment are also not good enough*.

3. The scale of investment needed to level up the coming 5G digital divide.

Ofcom has identified three of the elements that can contribute to a stepping up of the scale of investments in 5G infrastructure:

a) A review of how the UK's net neutrality framework is functioning.
b) Continuing to review the appropriate fees for the range of spectrum bands
c) Having an open mind on MNO consolidation

What is missing from the discussion document is:

d) How Ofcom could strengthen the "Market Expansion Model" set out in the last DCMS Future Telecoms Infrastructure Review. This is where the right conditions are created for other sources of investment to go into in those areas that MNO's decide not to cover for commercial reasons.

e) The balance between spectrum auctions and other means of allocating spectrum that do not subtract from network investments.

f) The balance between MNO's competing in the use of their spectrum and cooperating in order to achieve considerably higher spectrum efficiency in the coming Artificial Intelligence managed spectrum world.

g) The taxpayer subsidy needed to make up any shortfall of what the market will deliver within Ofcom's proposed regulatory framework and what the government's levelling-up and other ambitions are, including security, resilience and net zero objectives, all competing for the same investment. The £400m going into the Shared Rural Network is only getting those areas to where they might have been 20 years ago and not where they need to be 20 years from now.

Whilst the reviews Ofcom have in mind on points a), b) and c) are a helpful if a cautious start, a far more certain "*good outcome"* would be for Ofcom to up its ambition and take all of the elements a) through g) together into *a New Economic Model for a universal 5G Mobile Broadband service for all of the UK*. This could be further optimised if it were within a single national wireless infrastructure strategy bringing together the distinctive contributions of Ofcom and the government.

It is our view that this would lead to a 10 to 20-fold improvement in performance over the least digitally well off 10% of population (80% of the UK's geographical area) and ignite the most exciting UK wide 5G to 6G mobile revolution since digital mobile was introduced.

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