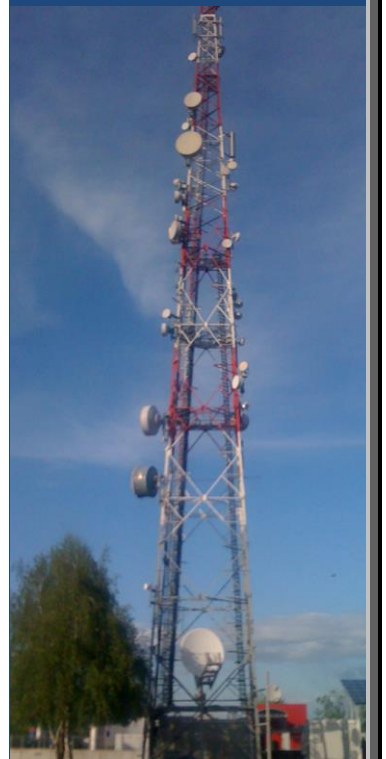


# Telzed Limited

## Fixed line broadband substitution by mobile – examination of claims

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A discussion  
paper





# Fixed line broadband substitution by mobile – examination of claims

## Notes on some claims that mobile (and 5G) could replace fixed broadband

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Details: A discussion paper mainly based on UK data and claims, but the points are relevant to many countries

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This paper notes some of the claims that mobile will take over, or substitute to a significant degree, for fixed line broadband. Certainly, increased usage of mobile is an obvious trend and some substitution occurs. More use of fixed is *also* seen: traffic, broadband penetration and the number of fibre lines have been increasing globally. M&F can grow together and have synergies. **Questions arise about claims that mobile will cause mass substitution of fixed lines and fixed traffic – realistically, this will NOT happen in the UK (and in many similar markets).**

There are deeper questions raised about why such claims are being made. Further, are *related* claims really sustainable, i.e. there will be transformational changes: in the telecoms industry; in the ways that all businesses act; and in the daily lives for customers (far beyond the 20+ year steady increase in use of mobile)? Such claims are not addressed here, but are highly relevant – unsustainable claims for fixed line substitution weaken other claims.

## Divergent views exist

Two views can be defined:

- Mobile will replace much of the fixed line broadband and there is therefore no need for fibre to the home (or close to the the home - FTTH, FTTP or FTTx). The mobile proposition.
- We need fixed broadband over superfast fixed line services *plus* mobile to cover the additional peripatetic use. Mobile-only will also exist for a minority of customers who a) can afford large volume mobile data use or b) do not have large volume needs or c) do not wish to be tied to a fixed line contract<sup>1</sup>. This is the existing situation in most developed countries – the fixed-centred proposition.

In this paper we define mobile here to mean normal mobile services and *new* applications of 5G to deliver effectively a Fixed Wireless Access (FWA) service to customers. Fixed broadband is defined here to cover *already existing* FWA services. These existing FWA networks are not common, but exist in some countries and regions, and may use 3G or 4G technology but are in effect a fixed broadband service. New 5G based FWA services are effectively a new mobile service and are a key focus in strategic discussions – will this technology replace the copper/fibre, fibre or fibre-coaxial technologies of the fixed lines? It is acknowledged that FWA and FTTx converge as they both use fibre to the street or block: one uses radio for the last drop to the premise (tending towards shared-premise WiFi) and the other uses fibre or copper for the last drop.

The limits of mobile and FWA substitution are discussed more fully in Telzed papers<sup>2</sup>. This contrasts with some claims, that are the focus of this paper

The two propositions are put forward but cannot be both right in the same country or region. They each might work in different markets. It is vital that industry leaders understand the options and if they are sustainable. Perhaps more importantly they need to understand why some claims are made, if they will surely/probably not happen. Contact Telzed/R Steele to discuss this deeper issue – policies, national welfare, investments, jobs and industry-credibility depend on informed decisions. These require understandings of: the markets; trends; and why only some outcomes are really sustainable.

## The mobile proposition

Among the claims are:

- From Three in the UK. *“5G mobile data will be so reliable and fast most homes will no longer need a separate home broadband connection, according to one of the companies planning to launch a UK service. Three UK’s chief executive told BBC News there would be enough capacity on 5G to cope with demand, meaning households would be able to save money by ending their fixed-line contracts. He*

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<sup>1</sup> This covers many who move location frequently or have access to other WiFi and fixed services

<sup>2</sup> See [Telzed](#). “Fixed-line broadband substitution by mobile,” and other papers

*predicts consumers will use 13 times as much mobile data in 2025 as today.*<sup>3</sup> Also Ovum, in a related report: “...claims future 5G technology will deliver home broadband speeds of 80-100Mbps. Furthermore they predict that it could “replace traditional connections” for 85% of the UK’s 26 million fixed line ISP customers, with “equal or better speeds.”<sup>4</sup> Three and Ovum were widely reported on. The ISPReview comments of November 2018 verge on a debunk.

- Verizon: “The 5G network Verizon announced is essentially a replacement for wired fiber optic internet. It’ll bring the same kind of quantum leap in bandwidth speeds to your home without the messiness of ripping open your walls for complicated and expensive network installations.”<sup>5</sup> Or “Verizon is piloting what it calls 5G wireless home Internet with customers in 11 markets in the first half of 2017...Verizon says it can deliver gigabit broadband speeds over wireless by bringing fiber closer to homes without the expense of bringing fiber all the way into each building...It’s cheaper not to bring fiber to each home” and Verizon CEO Lowell: “Now we’re going to drop off six or eight strands to every streetlight in every neighborhood. That allows you to deliver a gigabit of throughput into the home and allows you to do things like intelligent transportation grids, intelligent electric grid management, water system management... That does not work without 5G.”<sup>6</sup>
- Commscope: “Fixed wireless access, however, has emerged as among the first 5G applications to be deployed. FWA enables wireless carriers to compete for more share in the residential broadband market. 5G speeds are fast enough that FWA can be used for streaming home internet traffic, including over-the-top video. So, in addition to going to a traditional cable TV provider, you could have the choice to go to a wireless provider for home internet and television plus wireless voice services. The first commercial services of FWA are becoming available in countries around the globe, including Australia, the United Kingdom and the U.S. We expect it will take until 2020 or so for widespread deployment of mobile and fixed 5G broadband, with the technologies hitting maturity around 2025.”<sup>7</sup>
- O2 with Juniper Research issued: “The value of 5G for cities and communities<sup>8</sup>.” This paper does not directly make claims that 5G will replace fixed lines. It does identify a range of benefits of 5G. Some of these might become value propositions, though some can be delivered over fixed lines or 4G, or else are “over the top” internet

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<sup>3</sup> BBC November 2018 <https://www.bbc.co.uk/news/technology-46127712> or <https://www.ispreview.co.uk/index.php/2018/11/three-uk-study-5g-to-do-100mbps-broadband-replace-fixed-lines.html> downloadable from <http://www.threemediacentre.co.uk/news/2018/5g-wireless-home-broadband-predicted-to-double-internet-speeds-for-uk-households.aspx>.

<sup>4</sup> Ovum report: “5G Wireless Home Broadband: A Credible Alternative to Fixed Broadband.” The Ovum claims were repeated at Connected Britain in June 2019. It would need ~400,000+ masts each of 1Gbit/s run at close to maximum, to carry the fixed traffic. There are ~50,000 in the UK at present. See Telzed papers. Contact R Steele for further country-specific analysis

<sup>5</sup> <https://mashable.com/2017/11/30/verizon-5g-home-internet-2018/?europe=true#NRFd3MT1yqqj> – a not atypical blog/press interpretation

<sup>6</sup> <https://arstechnica.com/information-technology/2017/04/verizon-spends-1b-on-fiber-but-its-for-5g-wireless-not-more-fios/> Arguably this is possibly more of a converged FTTx solution with 5G as the “drop wire” equivalent to a few houses

<sup>7</sup> The 5G Future Begins Now. January 2019. [Commscope](https://www.commscope.com/)

<sup>8</sup> Smart cities report <https://d10wc7q7re41fz.cloudfront.net/wp-content/uploads/2018/03/Smart-Cities-Report.pdf>

services that are probably not directly addressable by the mobile operator. It is relevant to understanding the wider context of the claims for mobile and 5G. It states for example: “*The high bandwidth and speed of 5G will support services such as ultra-high definition video streaming, large file downloads and virtual reality applications. Peak data rates are estimated at 10Gbps, allowing people to easily stream 4K and 8K videos on smartphones.*” As noted in Telzed papers, such an outcome would need vastly increased numbers of masts, each of ~1Gbit/s, if such usage was the equal of fixed line usage.

- “[In the context of Telenor’s truly unlimited smartphone data plans in Hungary and 5G] Bandwidth will grow hugely. **I think fixed-line internet won’t be needed anymore**” – Telenor Hungary CEO and group EVP<sup>9</sup>. Emphasis added.

No further comments are made in this paper on the above sources. We can summarise the mobile proposition as: mobile-only technology is sufficient for most users who then need limited or no use of fixed broadband networks such as home or business WiFi/broadband. This mobile technology can also be deployed in a FWA mode that is aimed at providing broadband to a single location, with the option of using the same terminal devices when away from the home location.

The mobile centred proposition assumes that the traffic can be carried. This is known to often grow ~10x every 6-7 years, *even without considering any major movement of fixed line services to mobile* or radically new ways of using mobile. Large growth is normal. The proposition also assumes major *additional* traffic.

It is certainly fair to note the huge increase in use of mobile networks and mobile devices. We all use mobile more, but the traffic volume in fixed networks has also grown. There has not been a major move away from fixed in developed countries, and globally fixed broadband is *increasing*. Since 2G started, everywhere has been using mobile more. There is no recent massive “new move to mobile” with an implied *major move away* from fixed.

Most mobile devices extensively use fixed line networks – for example >95% of traffic is fixed, in the UK. Countries with mobile traffic that is comparable to fixed or even exceeds fixed lines are common however – but, *they usually have low total traffic per person*. They are probably few, if any, advanced Internet usage countries where data is 60-100Gbyte per person per month that are predominately mobile based. See for example Cisco VNI data. A few mobile-leading exceptions may exist (~30+Gbyte per month mobile downloads and mobile has ~30%+ of total traffic), but these are not clear indicators that fixed networks will be overtaken globally. Such mobile-leading countries *can also* be leaders in FTTx. *Some* countries or regions therefore *can* be mobile dominant, but are likely to be special cases, worthy of more study. See also Telzed papers.

A new “move to mobile” as a new primary strategic priority in developed telecom markets is a pointless target as the move to fixed has *already happened*. It is pointless to aim for mobile first. Fixed broadband exists, fibre exists or is being deployed. Fixed traffic dominates (in developed economies). There is not a *major* move away from fixed services, even if the increase in mobile traffic rises at a faster rate. More mobile traffic and more use of mobile devices *has not caused a major reduction in fixed line numbers or traffic in developed*

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<sup>9</sup> <https://www.linkedin.com/pulse/volume-based-mobile-data-monetisation-unsustainable-pal-zarandy/>

*countries*. There may be a *few* exceptions. Surely a significant fixed broadband penetration *reduction* is now unlikely. This past growth and investment in fixed cannot realistically be undone. It is a tall order even for mmWave 5G to deliver FWA and fixed line traffic volumes – note the key factor is *traffic*, not speed (mobile/5G can deliver a satisfactory speed). Could it significantly replace *pre-existing* fixed broadband?

If services were to move to mobile, there are many possible commercial replies from the fixed telcos to any major service substitution. This does not lessen the move to expand: the ways that we use mobile; use more mobile data; have more services when peripatetic; and to use more mobile devices. There is also a short-term opportunity for 5G FWA to be used by some, rather than fixed, until the traffic levels rise to cause mast overloads. This still cannot replace the fixed network for most premises as that would need fanciful numbers of masts (e.g. in UK), each with huge capacity. There are many other reasons why mass substitution of fixed is not realistic – see Telzed papers or contact author. The fundamental reason comes down to the basic physics/engineering and business economics. A quart will not fit into a pint bottle – mobile masts have fundamental capacity limitations. The majority of future traffic has to go over a fixed line network. Also, more masts need the fixed network for backhaul (line of sight multi Gbit/s microwave will not always work) – backhaul fibre is only cheap if shared with fixed lines. Both networks are vital and converged approaches are needed.

## The fixed proposition

This assumes that mobile devices play a major role (it is really a fixed *and* mobile proposition), but the primary way for most consumers in developed economies to move most data is to use fixed line services. Mobile is an additional requirement to meet mobility-based needs and for a minority to use as their exclusive broadband medium. It meets most users' need for *low volumes* of traffic.

The fixed proposition is not in opposition to mobile (both are needed) – it assumes continued expansion of fixed will happen, with more FTTP (or close to premise) alongside mobile. The majority of traffic will continue to be carried over fixed.

Fixed lines need to deliver >~100Mbit/s and up to ~1Gbit/s for some premises. This needs fibre to premise or very close to. This encompasses fibre-based cable TV solutions.

The marginal cost of 1Gbit/s over 100Mbit/s with FTTP, is low. The marginal cost of 1000Gbyte per month over 100Gbyte per month is also low. In contrast *mobile* 1Gbit/s is only now just possible and it would be shared (subject to slow downs), so cannot be relied upon. The marginal cost of more mobile traffic is significant – it directly translates to more masts and/or higher-capacity masts. Elementary analysis shows that if mobile traffic rises from ~3Gbyte/month/device to 30Gbyte then this will consume the capacity of all existing UK masts even if they increase to 1Gbit/s. To carry a significant fraction of the ~95% fixed traffic would require a huge increase in mast numbers.

Once the technical step to fibre-based fixed line access is made (as already made in many places globally or is underway in others), the traffic volumes have low cost impact.

The fixed line proposition is based on c200-300Gbyte per month downloads, as seen in many countries today, rising to several 1000Gbyte per month per line in just a few years: fixed traffic will also rise by ~10x every ~7 years (like mobile traffic). It is unlikely that mobile could carry such traffic except in special local or national situations or for a relatively few customers. The likely outcome is far more than 1000Gbyte/month average in 7 years, plus the real impact is even higher as the traffic is video centred and this tends to be more concentrated at the

busy hour, which has little impact in fixed networks but *directly increases the required mast numbers* in mobile (see Cisco VNI predictions and Telzed papers).

This dual support for fibre and mobile is clear in many countries. Vodafone also has a dual play approach:

*“Fixed-wireless access is something often talked about. We have spent a lot of time on this over the summer – all the different business cases, all the different permutations. Ultimately, we don’t see the business case for fixed-wireless access when you have NGN fixed broadband in place with ARPUs at the levels they are in Europe. We look at the complexity of huge data growth. You’re talking a fixed-data customer is 50 times a mobile customer, so putting that strain on the network, that cost of delivery with those sorts of ARPUs, doesn’t make economic sense to us, especially when we want to be known for the best-quality network. So, what we want to do is more of an outside the NGN fixed footprint. We see an opportunity for more targeted propositions, which we will be rolling out over our markets.”* See: CEO comments<sup>10</sup>.

The fixed proposition is based on having additional/complimentary mobile services, that are not expected to substitute for major customer numbers in developed internet economies. The limitations (as well as benefits) of 5G are also recognised in recent papers. Statements from UK government (DCMS), FCC, Ofcom, ITU<sup>11</sup> and others all generally align. They are part of a proposition that has both fixed and mobile both playing appropriate roles with fibre as a key foundation.

The role of mobile traffic in the future is also clear in Cisco VNI data – mobile is a low percentage of total future traffic in most countries, especially in developed Internet economies. Predicted global mobile traffic is still only ~20% in 2022, and this is likely caused by many populous countries each low total Internet usage per person. These often do not have a major fixed line legacy, so they grow mobile in preference. With economic growth they will tend towards more data in total, but probably with a lower percentage on mobile. This follows from the fundamental mast-traffic-cost relationship and the fact that a fixed line has huge traffic and speed potential, with low marginal cost for more traffic. Of real interest is how this dynamic change may happen and how/why there are countries and special situations where mobile/FWA really *can* be the primary solution – these do/will exist even if not realistic in many other countries (UK and similar).

In some countries a larger percentage growth in mobile per year (say, 50% compared to fixed growth of 25%) follows the long-standing global trend to make more use of mobile. Note however that this is not a sign of major service switching to mobile as the mobile total traffic is often only 3-10% of the total: faster growth is not a major issue for the fixed operators. UK data (Ofcom 2019<sup>12</sup>) shows mobile traffic has been an almost consistent ~3.1% of total fixed plus mobile traffic and *both* grow at an almost identical rate per year [~10x every 6/7 years] – ***there is no UK evidence of any major movement of services or traffic from fixed to mobile.*** Fixed line numbers still increase ~3% pa. Of course more things are done on mobile networks (and more significantly on “mobile devices” even if they are used on a “fixed” network), but there is no significant substitution. See also footnote 2. The UK is likely to

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<sup>10</sup> Half-Year Results 2019 Analyst and [Investor Conference Call](#)

<sup>11</sup> Setting the Scene for 5G: Opportunities & Challenges 2018. [ITU](#)

<sup>12</sup> <https://www.ofcom.org.uk/research-and-data/multi-sector-research/cmr>



reflect many developed-communication countries. Note: it is emphasised that the outcomes can be very different in some countries, especially in less developed markets with lower traffic and in “city states.”

## Summary

The actual traffic; trends; technical limitations; cost drivers; and some traffic theory, all need to be understood. Technical and economic calculations underpin the network investment and possible margins. A critical view of claims is vital. In most developed markets, fixed operator CEOs are surely not losing sleep worrying that mobiles and 5G will put them out of business. *In theory* we all could use just mobile, but only if *major* factors are addressed. The laconic answer to such claims is: “If.”

It is sensible to understand *why* some fanciful claims are being made for mobile and 5G. Or are they “simply” mistaken claims? This covers the “mass substitution” of fixed services and traffic, but perhaps more significantly, the wider claims for new “use cases” and transformations in the way mobile/5G is used. Are some of these also fanciful? This is a realistic possibility – in a 3G license business plan, ~100 new telco and information services were analysed. Essentially none happened, other than voice, messages, and basic Internet data access, plus some ring tones.

Note that the move to 5G (like that to 4G) and the emergence of new services, are not in doubt. Increased use of mobile has been a trend for over 20 years. “10x more traffic in ~6/7 years” is simply the norm – needed just to remain in business. There are always new ways of using mobile emerging – everyone does so much more when mobile. But, how many will be telco-chargeable services and not be “simply” OTT Internet data?

Decision makers *et al* must deal with the conflicting views. A further complexity is that the outcomes do vary by country/location: *mobile-only can be a solution* for some, but in other situations it cannot be widespread without a number of factors aligning – which are unlikely in some markets (UK). Mobile versus fixed may be complicated: e.g. mobile usage can be both high or low, in high fixed-penetration countries. Therefore, decisions need in-depth understanding of the markets, trends and technology to identify the best/realistic outcomes.

The key questions are firstly over the huge demand for *mobile* Internet access – broadband data. This dominates investment: can 5G/mobile cope? It *should* with the better capacity. Secondly, can 5G/mobile substitute significantly for *fixed* Internet access? The answers should be clear, but are complicated by the fact that outcomes in UK-like economies, mobile-leading, city states, and emerging economies may be different. Thirdly, will claims of huge changes in the telecoms industry, with new telco-chargeable services and revolutionary changes in the way consumers and business work, actually happen? If so, will they give revenues to enable the additional masts when 10x more *normal (non-substitutional) mobile* data, at faster speed, will itself probably result in negligible revenue? A fourth question is over why some parties might make various claims – this is a more subtle but perhaps deeper issue that requires decision makers to evaluate the claims, data and alternative outcomes with great care.

*Please contact Telzed (R Steele) for discussions and further assistance with these and related issues. This includes identifying the list of factors that would need to be overcome if mobile were to significantly substitute for fixed, or where mobile may continue to dominate over fixed.*

