

# Why the applications foreseen for 5G will not raise significant revenue for the operators

*Professor William Webb*

## *Introduction*

At a high level a business case is pretty simple - the revenue needs to exceed the investment over the period considered. The 5G business case has a significant investment - in spectrum licenses, in equipment, in marketing, in network upgrade and potentially in new core networks and edge computers. The timescales to recover the investment are probably ten years - the typical time between generations of cellular technology (although between 4G and 5G there has only been eight years). But where is the revenue?

Most accept that there will not be more revenue from consumers. Cellular ARPUs have been in gentle decline for years, the transition from 3G to 4G did not result in any uplift, and 5G does not have compelling benefits for consumers. Some operators are already offering 5G at no additional cost.

This means that the 5G business case is predicated on finding new sources of revenue. There are few, if any, potential customers asking for 5G capabilities, so the wireless industry has been taking its solution - 5G - and searching for a problem that might need it. Over the last few months I have been looking at the applications that the industry is hoping will provide the revenue to balance the business case and in this article I bring together those pieces of analysis. The results are not pretty.

## *Applications overview*

The table below lists the key applications quoted by a wide range of papers, companies and commentators as being the most promising for 5G. I have not listed “enhanced mobile broadband” as this is a better consumer service, but as discussed above, will not lead to more revenue. The table provides a quick overview of my findings along with references to more detailed discussion. I then provide a little more commentary below.

<b>Application</b>	<b>Finding</b>	<b>Further information</b>
Autonomous cars	Not needed, and autonomous cars not likely to be widespread until at least 2030	See paper on Webb Search publications page <sup>1</sup>
VR	Headset sales only 6m, less than 1% of cellular handset market and unlikely to grow dramatically	
I-IoT	Small market, less than 0.1% revenue growth	See Light Reading <sup>2</sup> , August 2019
Services that need slicing such as high-reliability industry	Not needed since mobile networks are already 99% reliable where there is coverage and slicing does not help where there is no coverage.	See LinkedIn <sup>3</sup>
Remote surgery	Will use fibre, and market size vanishingly small	

<sup>1</sup> <http://www.webbsearch.co.uk/wp-content/uploads/2019/08/Does-the-autonomous-car-need-5G.pdf>

<sup>2</sup> <https://www.lightreading.com/iot/industrial-iot/what-might-the-demand-be-for-5g-in-manufacturing/a/d-id/753746>

<sup>3</sup> <https://www.linkedin.com/pulse/how-useful-network-slicing-william-webb/>

IoT (inc healthcare, smart cities)	Revenue growth less than 0.5%	Discussed below
Smart home	Will use WiFi and not 5G	
FWA	Insufficient capacity to grow revenues more than 1%.	Discussed below

As can be seen from the table, none of these applications are likely to generate revenue of any significance. Indeed, I doubt whether they will even add 1% to an operator's revenue. Given that ARPUs for consumer use are likely to continue to fall, operators will not see any growth in revenue to offset the 5G costs.

The reasons for low revenue can be broadly categorised into three areas:

- *Timescales too long.* For example, even if autonomous cars did need 5G, which I doubt, there is unlikely to be material revenue within a ten-year investment period.
- *Market too small.* Most applications fall in this category. For remote surgery the small size of the market should be obvious. For others it is less so and I discuss these below.
- *5G not needed.* For example, smart homes have ample connectivity with Wi-Fi, which is also evolving and improving, and there is no obvious need for 5G.

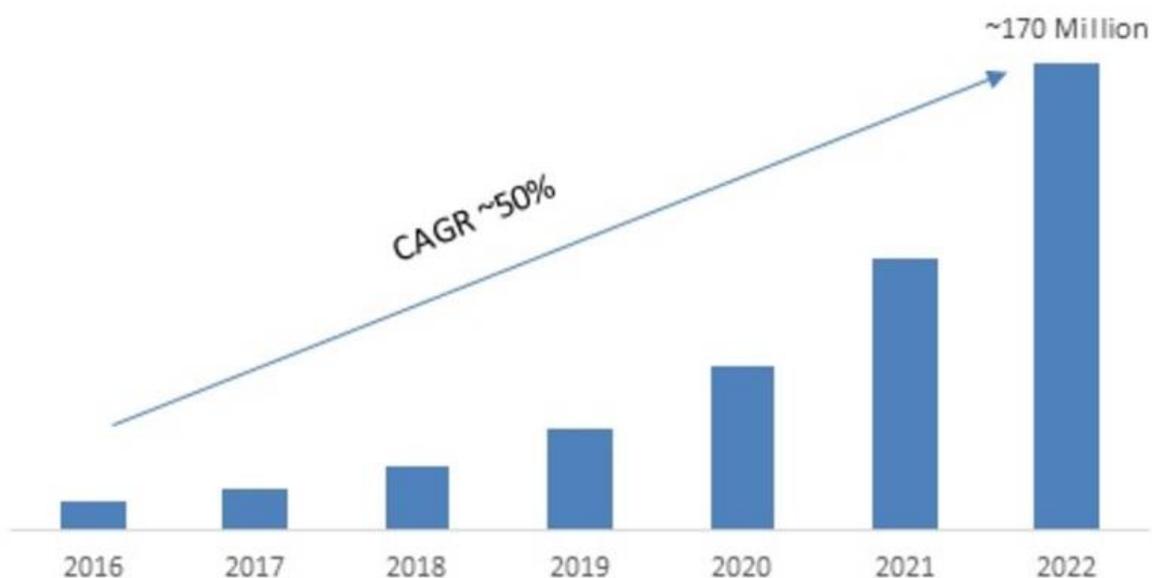
#### *IoT*

Perhaps the area that requires the most explanation is IoT. Within this falls a wide range of applications including healthcare, smart cities, logistics, etc. I am a great believer in IoT, indeed I was CEO of a standards body - the Weightless SIG - dedicated to IoT connectivity. But I do not believe that IoT is a source of significant revenue for mobile operators. I am not alone here, for example, see the figure below from Market Research Future<sup>4</sup>.

---

<sup>4</sup> <https://www.marketresearchfuture.com/reports/narrowband-iot-market-1904>

## NarrowBand IoT Market 2016-2022 (USD Million)



This is the market for IoT services from operators using NB-IoT, the 4G IoT standard, which is anticipated to evolve to the 5G solution. By 2022, with rapid growth, the market is \$170m globally. To put that into perspective, the cellular market globally is around \$1,000bn. So the IoT market is predicted to be less than 0.02% of the cellular market by 2022. Even if it grows ferociously after that it will struggle to reach 1% of cellular revenues within our 10-year period. 5G brings nothing new to this market, because it will be essentially the 4G IoT service. And in any case, 4G IoT provides everything the market currently needs, so even if it were enhanced this would not increase revenues.

So why so small? Firstly, it is because cellular addresses only a small segment of the predicted 50 billion device market. Most devices will be in the home or office using Wi-Fi or other short-range solution. For those outside, many will use self-deployed solutions like Weightless or LoRa. Cellular is only needed for a small percentage of the market, perhaps less than 10%. Secondly, the revenue per device is small. For example, it is possible to buy an NB-IoT SIM card for \$10 which has sufficient lifetime and capacity for most sensor devices for their whole 10-year lifetime. That is an ARPU of \$0.08/month, around 0.5% of cellular ARPUs. If we assume NB-IoT takes 10% of an eventual 50 billion device market that leads to an overall revenue increase of 0.5% for the operators.

### *Fixed Wireless Access*

I have written a few articles about FWA, many looking at mmWave deployment of the sort proposed by Verizon and AT&T in the US. However, this is effectively a separate "5G" deployment with its own business case. Here I will focus on providing FWA using the 5G mobile network as a source of incremental revenue, as proposed, for example, by Three in the UK.

At first sight this appears to be incremental revenue. Consumers can be sold an additional home broadband package consisting of a 5G router for the home. This brings an additional monthly subscription typically about the same APRU as a cellular subscription. Hence, if say 20% as many

home subscriptions as mobile subscriptions could be sold then this could provide a 20% revenue increase which might be sufficient to justify the 5G expenditure.

There are two main problems, which are related. The first is that routers will be located indoors. This means the signal they receive will be weak, especially at the 3.5GHz frequencies used for 5G. This results in relatively poor performance for the user, and worse, in low spectrum efficiency for the network which has to use lower levels of modulation to accommodate. The second problem is then one of network capacity. A 5G mobile user might consume around 5Gbytes/month whereas a broadband home will consume around 250GBytes/month - 50x more. Worse, the home broadband use is much more concentrated into the evening hours than the cellular use which is quite even throughout the day. This means that an operator with a generous 60MHz of 5G spectrum could support a maximum of around 42 FWA users per site (assuming 3 sectors/site). If they did this, there would be no capacity for mobile users.

Let us assume that they can dedicate half their capacity to fixed users making 21 users per site. Operators plan to upgrade around 20% of sites to 5G initially. In the UK that would be around 3,000 sites, leading to around 60,000 FWA subscribers. If this went as far as 50% of sites that would result in 150,000 subscribers. Most UK operators have around 15 million subscribers, so this represents a 1% increase in revenue. Again, not enough.

*So what should operators do?*

Other analysts are starting to come to similar conclusions to me. For example, in August 2019 ABI Research published "The five myths of 5G"<sup>5</sup>. But most analysts, after correctly identifying the issues, assume that all the MNOs need to do is change tactics to reach a happy outcome. ABI suggest:

MSPs and their technology partners need to move their business and operation processes away from just expanding network capacity, with increased performance being the sole value proposition. This is far from enough to attract new audiences, notably the enterprise verticals that are generally more pragmatic. This audience is looking for technologies that could help them effectively optimize their business processes and increase their productivity, efficiency, security, and safety. They are looking to deploy networks agile enough to dynamically fit their current and future requirements, simple enough to integrate with their existing legacy technologies, and reliable enough to enable them to guarantee deterministic and consistent operations.

5G standardization bodies need to deeply integrate industrial verticals as essential contributors to their processes and allow them to influence the roadmap of 5G specifications. If they continue to rely on antiquated notions to protect their current interests and legacy businesses, they will be at serious risk of missing the enterprise digitization wave currently in progress across many verticals and will remain pure connectivity providers with no new business opportunities.

But this is classic consulting strategy advice, good if it could be implemented, but in practice almost impossible to achieve. Enterprise verticals will turn to system integrators to help and, as ABI say, will deploy their own solutions, not those provided by MNOs. Standards bodies are just not set up for

---

<sup>5</sup> Available for free download from <https://go.abiresearch.com/lp-5-myths-of-5g>

integrating others such as verticals into their processes and in any case the 5G standards are now too far advanced for others to influence. Calls for MNOs to simply “up their game” and work better with others are unrealistic.

If none of the currently envisaged applications is going to generate any significant revenue growth that leaves two options. The first option is “hope and pray” that some new, unforeseen application will emerge from which the revenue flow to the operators. That would be a rather risky business case - the discussion above suggests it will, at least, be quite some time before any new application emerges.

The second is to take a different path and deliver what customers actually want. Most would much prefer good, consistent connectivity everywhere rather than blindingly fast 5G. Invest in filling in not-spots, in building roaming agreements with thousands of Wi-Fi owners, in working with handset manufacturers and OS providers for seamless Wi-Fi roaming. This will be much less expensive than 5G, so use the money saved to undercut competitors and draw in more subscribers - each new subscriber brings more revenue with very little cost. What could be more compelling - the network that allows you to always be connected is also the one that is the cheapest?

*Professor William Webb is a consultant and author of “The 5G Myth”. He was President of the IET, has multiple honorary doctorates, has written 16 books and been awarded major industry medals.*