



The 5G Future SME Report

October 2020



FOREWORD FROM HUAWEI

Ireland is on the cusp of an exciting 5G future. In the coming years the services, applications and connectivity powered by 5G will have a huge impact on our lives – both at home and at work. For business it will radically change both what we do and how we do it.

Over the past 10 years Huawei has invested more than \$4 billion in 5G research and development, to better understand its potential, its application and the opportunities it will create for businesses and society as a whole. Working with operators globally, we are deploying 5G, helping countries support the growth of their digital infrastructure. In Ireland too, we are focused on working with our partners to bring it to market quickly and seamlessly, so the digital transformation is realised as smoothly as possible.

We are tremendously excited by this research carried out in recent months by Amárach. It shows that Irish businesses, particularly SMEs are not just aware of, but excited by and already planning how 5G can help bring their enterprises to new heights. The insights they shared from right around the country give us a deeper understanding of the challenges they face, and the opportunities they see in adopting new technologies like 5G and AI.

In many ways it will be similar to the electrical revolution of 100 years ago. Electricity became the enabler of the 20th century, with new industries created and others transformed. 5G can do the same. It has been heralded by many as the fourth industrial revolution. Huawei and our partners will help create that power, and business innovation will harness it in ways we can only begin to imagine. What this report shows is that early adoption and roll out of 5G will contribute to economic growth while slower adoption will lead to increased costs and lost opportunities.

Ireland can be a digital leader in Europe. The digital transformation of industries and the enhancing of digital infrastructure throughout the island creates huge potential. SMEs are the backbone of Ireland's economy. They can lead us out of the impending recession and get us to our future fast and sustainably. We are very appreciative of the valuable input from the Small Firms Association in the framing of this paper.

Only deep roots make for green leaves. We will keep working hard to strengthen the foundations of collaboration with capable and willing partners in Irish business. And we very much look forward to growing together with you.

Tony Yangxu
CEO - Huawei Ireland

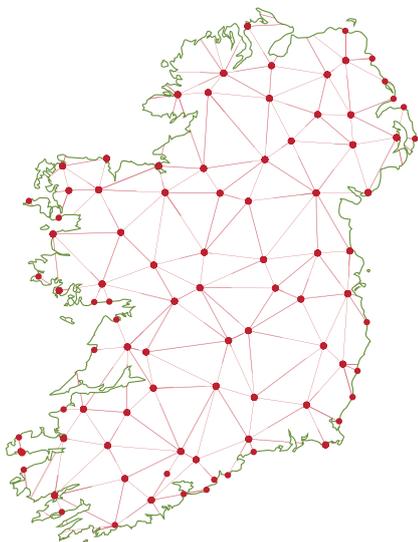


5G



INTRODUCTION

As Ireland recovers from the economic impact of a global pandemic, our thoughts must turn to how we can secure a sustainable recovery that benefits all our citizens. Ireland recovered from the economic shock of the 'Great Recession' in 2008-2010 by embracing the opportunities presented by broadband, smartphones and new digital services and apps.



This report's contention is that Ireland can do the same again, this time by embracing the opportunities afforded by 5G technologies and the impact they will have on how we live, work and do business through the 2020s.

This report examines the role 5G will have in Ireland's future growth prospects as the pandemic passes and we find a viable path to economic recovery. Huawei commissioned Amárach to explore the key drivers of 5G adoption by businesses. Through understanding likely business demand and investment priorities it is possible to see how 5G can help Ireland get to the future faster in terms of growth, job creation, our standard of living and quality of life.

It is important to stress the urgency of the choices and decisions facing Ireland right now. Europe is falling behind globally because of the slow pace of rolling out 5G – indeed, some EU countries haven't yet made 5G available to their citizens¹. The European Commission is calling on Member States to increase the speed of deployment of 5G networks and to reduce the cost of doing so².

5G isn't just 'one technology', rather it is a general purpose combination of technologies that can serve multiple purposes when fully implemented. The chart gives a sense of the rich array of possible benefits 5G can bring to consumers and businesses in Ireland.

¹ ERT Report: <https://ert.eu/documents/5g-assessment/>

² State of the Union: https://ec.europa.eu/commission/presscorner/detail/en/ip_20_1603

Fig 1: Summary of 5G's key benefits to business and consumers

Faster connection speeds

5G, characterised as Enhanced Mobile Broadband (eMBB), is expected to improve mobile internet use with higher speeds and seamless user experience in dense or high-mobility environments. It will support high-bandwidth services such as Augmented Reality (AR) and Virtual Reality (VR) apps.



Greater bandwidth for more devices

5G will enable Massive Machine-type Communications (mMTC). Put simply, it will enable the connection of a very large number of connected devices, which together comprise the internet of Things.



Quicker response times

5G will also provide Ultra-reliable and Low Latency Communications (URLLC). Low latency means the response times for 5G will be much quicker than for previous generations of mobile technology, and that access to 5G will be far more reliable. This will allow the development of "mission critical" applications—for example, in transport (vehicle-to-vehicle communications), healthcare (remote monitoring), and logistics (drone delivery).



Source: Ofcom, Oxford Economics

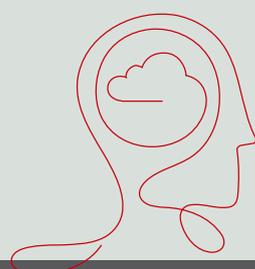
This report examines these benefits – and related challenges – in two parts:

1. Businesses and 5G – we explore how Irish SMEs view 5G in the context of their growth ambitions, investment plans and barriers.
2. The 5G Economy – we examine how Ireland's economic prospects will be tied to the future of 5G adoption and the unique contribution 5G will make to our growth prospects over the next decade.

A separate report on Irish consumers and 5G will be published soon.

Together, our findings point to an exciting 5G future, one that will not only benefit all of us in our daily lives, but will also enable Ireland to grow sustainably in the years ahead.

² State of the Union: https://ec.europa.eu/commission/presscorner/detail/en/ip_20_1603



PART 1 BUSINESSES & 5G.

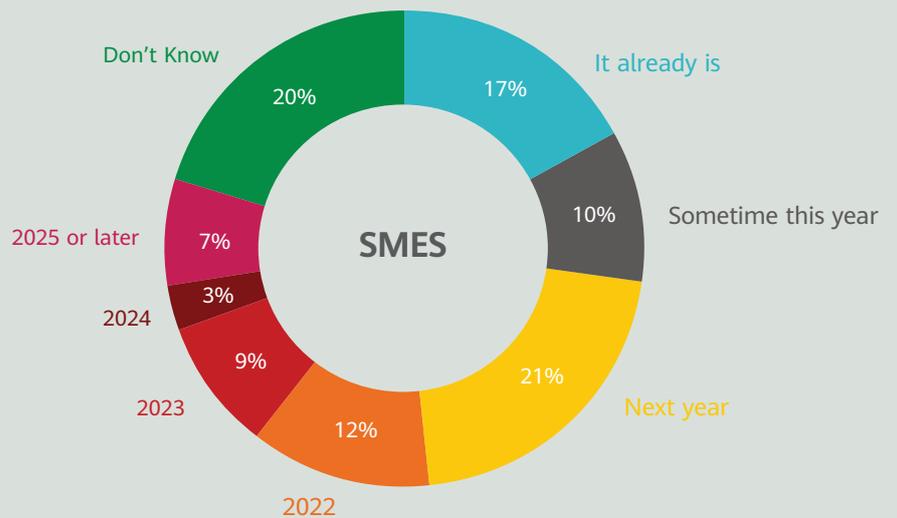
5G Motivations

Who leads the adoption of technology? During the 1990s and 2000s, generally speaking it was businesses who led the adoption of computers, email and the internet. That all changed in the 2010s: it was consumers who led the adoption of smartphones, tablets and even laptops, with IT departments in many businesses playing ‘catch up’ with different technologies.

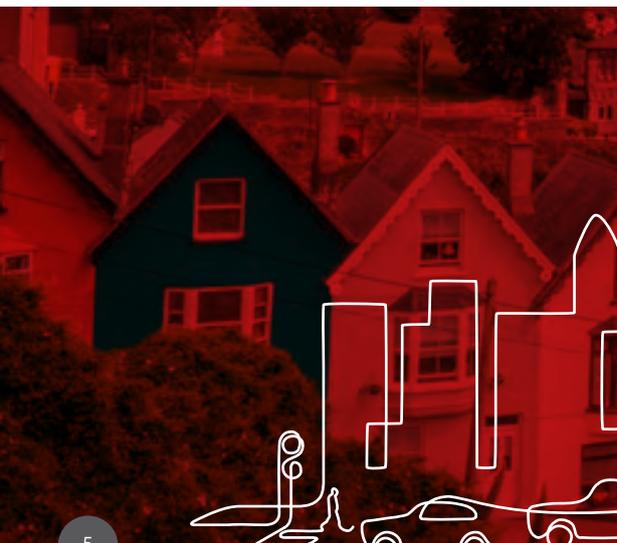
However, the adoption of 5G might be more like the 1990s and 2000s, with businesses rather than consumers reaping the initial benefits, though the latter will follow quite quickly thanks to 5G enabled mobile handsets. We see this in our survey of SME business owners and decision makers in Ireland. They are more likely to be aware of 5G as a technology (87% have heard of it vs 82% of consumers). Also, those who are aware are more likely than their consumer equivalents to be very familiar with 5G.

Irish SMEs are quite optimistic about how soon 5G will be widely available in Ireland:

5G WIDELY AVAILABLE IN IRELAND BY:



Indeed, almost half of SMEs expect some form of 5G to be widely available by the end of 2021, an unlikely scenario at present. Firms based in Dublin are more optimistic about the timeline for ubiquitous 5G, however, medium size firms (employing 50 or more staff) are less optimistic than smaller firms (ten or fewer staff).



Nevertheless, the fact that SMEs are more aware of and familiar with 5G suggests that they are also more alert to the business challenges and opportunities associated with 5G implementation. We asked our SMEs what would motivate them to invest in 5G, and the results suggest a very diverse range of motives:



REASONS FOR INVESTING IN 5G

57%

Improved remote working/operations

44%

Enable new types of services & products

29%

Increased competitiveness

48%

Improved customer experience

40%

Increased productivity of workforce

24%

Improved automation

47%

Efficiency of operations/ cost savings

30%

Greater operational security

23%

Improved data collection and analytics

Medium size firms and those in tech or IT sectors are even more enthusiastic (two thirds and higher) about the potential for 5G to improve remote working practices and remote operations. This is very significant given the incidence of working from home and reinforces the point that both employees and employers want to embrace the full potential for remote and flexible working, facilitated by 5G technologies.

Obviously large minorities of SMEs are attracted to other potential benefits from investing in 5G, including greater security, automation and competitiveness. This tells us that Irish businesses are looking at 5G as much more than just a 'faster internet', but rather see ways in which a 5G-enabled future will help them survive and thrive in the decade ahead.

Casestudy

5G's Value to Industries: Ningbo-Zhoushan Port in Zhejiang, 5G Smart Port

Traditional ports are highly dependent on human operation of container cranes and other machinery, leading to shortcomings in work and cost efficiency. With approximately 90% of global trade carried by the shipping industry, it is becoming difficult for this traditional approach to keep up with the rapid development of global shipping demands.

Ningbo-Zhoushan Port in Zhejiang has held the title of the world's busiest port for 11 consecutive years, managing an annual throughput of over 1.1 billion tonnes. Due to its scale, it faces several immediate challenges:



- Efficiency - shipping volume pressures, slow clearing of customs etc.
- Costs - cargo handling costs are increasing year-on-year
- Safety and Security - personal safety, equipment safety, and information security all need to be improved

China Mobile Ningbo has set about utilising 5G and other digital technologies to upgrade the port into a smart one, to address these challenges.

- It introduced a 5G remote control application for rubber-tired gantry cranes, enabling real-time backhaul of HD videos. Six 5G-powered, remotely controlled gantry cranes have been produced, improving measured efficiency by over 260%.
- It deployed 5G positioning technologies and built an end-to-end integrated network covering container trucks, mobile port equipment, and roads to support autonomous driving of container trucks. Once these trucks are mass deployed, efficiency will be improved by over 40% and labour costs will be reduced by over 50%.
- It has used 5G to backhaul HD videos of quay cranes in real time. This has enabled container numbers and container damage to be automatically identified, improving container identification accuracy to at least 95%.

We also see this reflected in answers to a question about the importance of various features of 5G technology for business and economic growth in Ireland over the next five years. The proportion of SMEs saying each feature will be 'very important' is shown in the chart:

EXTREMELY IMPORTANT 5G FEATURES FOR IRISH SMES

59%

Improved remote working speed and capability

55%

More reliable mobile connection

41%

Higher quality voice & video calls

57%

Wider mobile network coverage in Ireland

53%

Improved network security

34%

Enabling greater number of smart/connected devices

57%

Faster upload & download speeds

42%

Less lag time/delay on mobile devices

30%

Higher quality video streaming

SMEs tend to place even greater emphasis on the importance of these features than consumers (when asked to evaluate the same features and their future impact). This in turn suggests that SMEs are more likely to explore and embrace the full potential of 5G in future ahead of consumers, as noted earlier, though ultimately consumer engagement with 5G will drive widespread usage.



Doing business in 5G

The experience of the coronavirus public health emergency has undoubtedly accelerated the demand for 5G-enabled solutions (though many are not yet available in Ireland). Much of this will come from the combined impact of remote working/working from home and the movement of sales and customer service online.

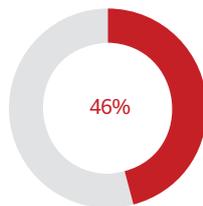
Many Irish SMEs have moved some or all of their services and operations online since the COVID-19 lockdown was introduced earlier in 2020. Some 3 in 10 (29%) of SMEs in our survey have not moved any aspect of their business online in response to COVID-19, simply because their services or operations cannot be delivered digitally. One in four SMEs were already online before the lockdown, with the result that 46% of SMEs have moved some or all of their business operations and services online because of the pandemic.



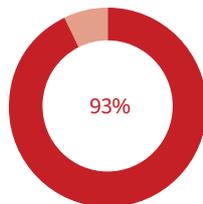


Firms in Dublin and the rest of Leinster tend to have moved online due to COVID-19 more than others, as have the larger firms in our sample. Of course, for some these changes have been a temporary measure, forced on them by the lockdown and various restrictions. However, just 4% of those who were 'forced' to move online expect that they will move all their services and operations back offline when restrictions are full opened. The vast majority of those who only moved online because of the coronavirus expect to keep some or all of their operations and services online even after the pandemic is over.

46% OF SMES MOVED OPERATIONS ONLINE DUE TO LOCKDOWN



93% OF THESE WILL KEEP SOME OR ALL OF THEIR OPERATIONS ONLINE AFTER THE LOCKDOWN



Among those SMEs who are 'very familiar' with 5G, even greater proportions moved their services and operations online because of the lockdown (66%), and will keep most of the same operations online after it is over (100%).

The pandemic and the lessons learned by SMEs mean that we are witnessing an acceleration in business demand for new technologies and digital solutions that will help them respond to change and opportunity. We asked in our survey what capabilities will be key enablers for their organisation's digital transformation in the next five years. Not surprisingly, capabilities in relation to data analysis (53%) dominate SME expectations about future enablers for their organisations when it comes to digital transformation. Followed by systems (49%) and talent (37%).

This isn't surprising when we explore their views on the relative importance of various 5G applications for business and economic growth in Ireland over the next 5 years.

IMPORTANCE OF 5G APPLICATIONS TO FUTURE BUSINESS GROWTH

71%

Replacement of wired internet service to wireless

69%

Smart energy grids

48%

Smart buildings

48%

Telehealth

45%

Business process automation technology

44%

Next-generation Artificial Intelligence (AI)

43%

Real-time translation

42%

Next-generation Internet of Things (IoT)

37%

Multiple connected devices

36%

Virtual reality (VR)

Casestudy

5G's Value to Industries: Georg Fischer Machining Solutions, Switzerland, 5G Smart Manufacturing

Georg Fischer Machining Solutions (GF) is one of the world's leading providers of complete solutions to the tool and mould making industry and to manufacturers of precision components.

The portfolio includes milling, wire-cutting, and die-sinking EDM machines. Moreover, the division offers spindles, laser texturing, laser micromachining, additive manufacturing, tooling and automation, as well as digitalisation solutions.

At its factory in Biel, Switzerland, it has utilised 5G to lay the foundation for the factory of the future.

5G has provided GF with the exact applications that are needed to make the most interruption-free production process possible a reality.

5G gateways were installed and spread out across its entire factory floor. Download speeds and transfer rates of well above 1.1 GBps have been achieved; which is about 10 times more than what this factory floor had seen before.

This means that GF is able to wirelessly and securely connect its machines to their cloud services and infrastructure while benefitting from low latency.

The 5G network has enabled the implementation of predictive maintenance in almost real time. This concept entails the system being able to predict or determine when a machine needs maintenance and intervention.

Unplanned downtime has been reduced and avoided, thus helping to extend machine uptime and reduce costs.

Other 5G applications are considered important too, though by a minority of SMEs depending on the sectors in which they operate. For example, 1 in 3 think that driverless vehicles will be important to future growth, and 3 in 10 think delivery drones and robotic deliveries will be important also. While robots are already in use in certain industries, just over 1 in 4 (28%) of SMEs think next-generation industrial robots will be important, and fewer than 1 in 5 (17%) expect robots for general commercial use will be important.

Investing in growth

It is one thing to admit the importance of 5G and other technologies for future growth, but just how willing are Irish SMEs to invest in such technologies?

Especially coming out of the economic shock induced by the pandemic. The good news is that the majority of SMEs – 55% – say that investment in new technology is a high or essential priority for their organisation over the next 3 years.

The importance of this finding cannot be stressed enough. Those who are especially focused on technology investment also happen to be the biggest employers (the ‘M’ in SME), and not just in tech sectors. Also, investment-focused SMEs are concentrated in Dublin, which in turn is the core of Ireland’s labour market and the largest source of job creation. Furthermore, 7 in 10 of those very familiar with 5G say that investment in technology is key to their future growth plans.

Because SMEs are the key growth engine in terms of job creation, their views on the role of 5G and other technologies in their businesses and the wider economy are a powerful guide to future investment and public policy priorities. Take the issue of remote working – or working from home – and its future evolution. The vast majority – 85% – of Irish SMEs believe that it is important for Ireland to invest in technological infrastructure to ensure people can work remotely if required. There is a clear consensus about this across firms in all of Ireland’s regions, and regardless of size or sector.

Similarly, a large majority – 71% – agree that effective investment in new technological infrastructure could enable Ireland to be a world leader in new industries by 2025. This time it is the larger employers and those in tech-related sectors who are most convinced about the potential for Ireland in this regard.

Turning to the future contribution of investment in 5G, we find a clear consensus among SME decision makers about its role:

FDI

80% of SMEs believe that effective 5G investment will play an important role in ensuring Ireland remains an attractive destination for foreign direct investment.



Growth

nearly 7 in 10 (69%) believe 5G investment will support the growth of indigenous Irish businesses.



Start-Ups

similarly, **67% of SMEs** believe 5G will help develop Irish start-ups and new businesses.

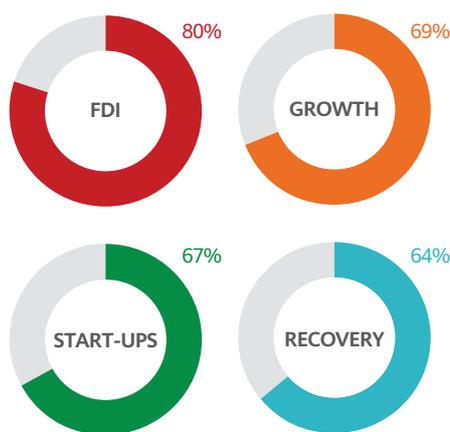


Recovery

finally, **just under two thirds – 64%** - believe that effective 5G investment will be important to Ireland’s economic recovery in the years ahead.



IMPACTFUL 5G



Important as economic recovery and job creation will be to Ireland’s future, the fact is that growth has to be sustainable if it is to help us meet our climate goals. However, there is a similar consensus among Irish SMEs as among Irish consumers that technology can play an important part in achieving our sustainability goals alongside ensuring a higher standard of living and quality of life for all our citizens.

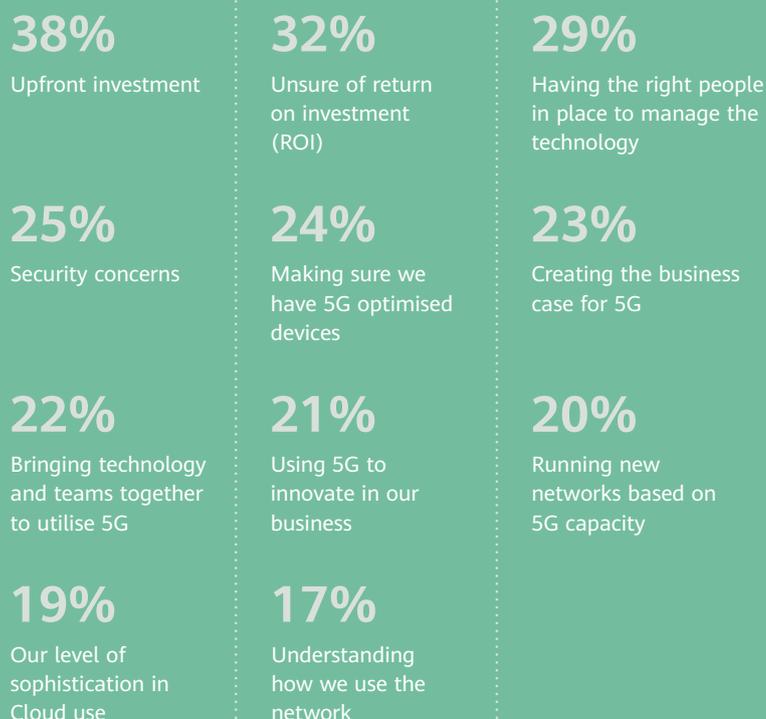
Three in four SME owners and decision makers believe that technology will play an important part in the better management of Ireland’s energy resources. Similarly, just over 7 in 10 (71%) believe that better technology will help Ireland become more energy independent. Crucially, over 7 in 10 (72%) of Irish SMEs believe that technology will also help Ireland reduce carbon emissions and tackle climate change.

5G Barriers

Investment, by definition, requires capital as well as an appraisal of the risks entailed versus expected returns. While we have seen clear support for a 5G-enabled future among business owners and managers, getting to that future requires facing a number of challenges.

In our survey we asked SMEs about the extent to which different factors present a ‘serious challenge’ for their organisation when it comes to adopting 5G in their business. Not surprisingly, the actual upfront investment required is the most serious challenge that they foresee at present:

ADOPTING 5G - TOP BUSINESS CHALLENGES



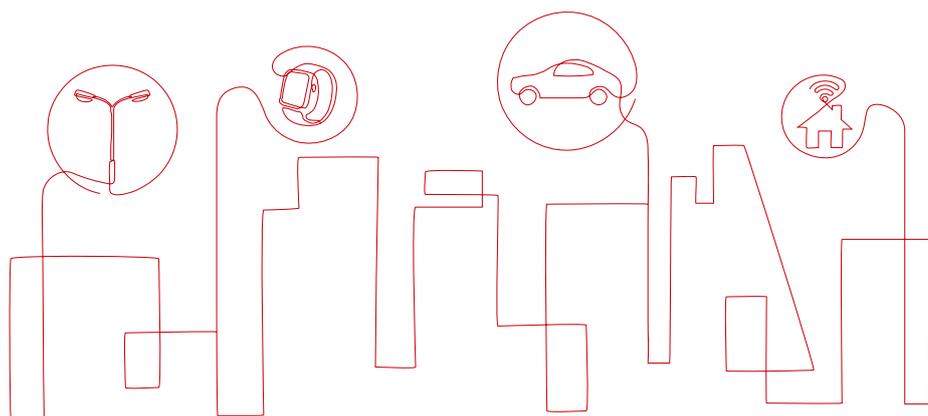


Several challenges amount to the same thing: making a convincing business case for the investment in 5G, i.e.: the return on investment versus the cost of the investment (through borrowings or other sources). But there are other challenges, not least finding and keeping the talent to manage and drive a successful 5G implementation. Regardless of size or location, SMEs tend to see the same challenges in broadly the same order of difficulty.

However, there is a bigger challenge emerging from our research: Irish consumers are enthusiastic about the potential for 5G-enabled products and services (see our forthcoming report), but Irish SMEs are hesitant about the potential commercial return on meeting consumer demand, even though they think it important to embrace 5G.

Ultimately it will be a combination of factors – the rapid rollout of 5G infrastructure, business investment in 5G-enabled services and consumer willingness to buy them – that will drive the wider, economic impact of 5G in Ireland.

In Part 2 we explore just how big that impact will be, and the pathways to getting to the 5G future faster.



PART 2 THE 5G ECONOMY

Driving Growth

Ireland's economy is still in shock from the COVID-19 pandemic. The Central Bank of Ireland forecasts that it will take 2-5 years (under different scenarios) for our economy to get back to the level it reached in 2019. Faced with the prospect of a 'lost half decade' (or worse), then it is vital that Ireland embraces emerging sources of sustainable growth to protect employment and living standards.



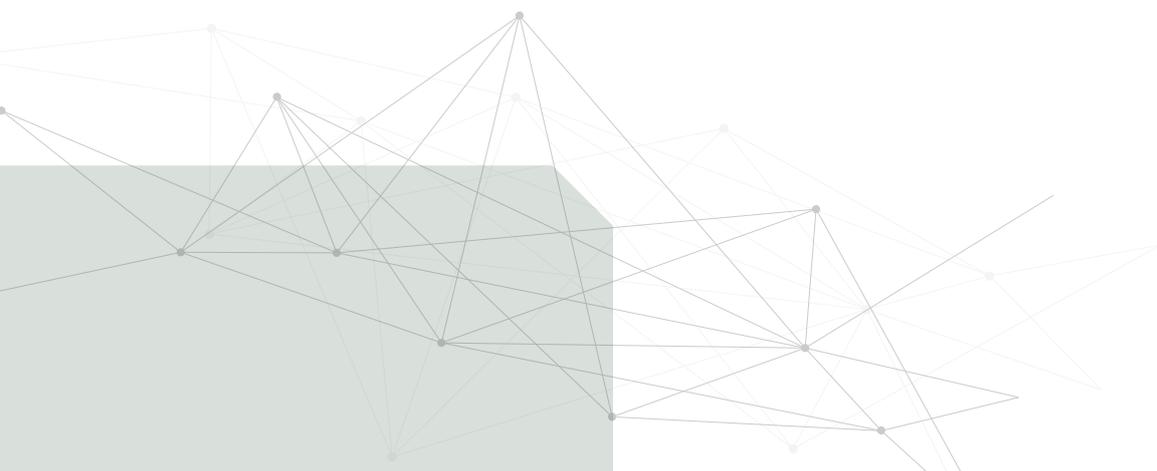
It is often difficult to separate out the contribution of a particular technology or cluster of technologies to the performance of a single business let alone an entire economy. Given that 5G has been described as a General Purpose Technology (GPT) – similar, say to electricity or the internal combustion engine – then it is even more challenging to tease apart the unique role of 5G.

Moreover, researchers recognise that technologies like 5G create direct as well as indirect benefits to economic activity. Investment in 5G networks and jobs that go with it clearly amount to direct benefits. However, just as Huawei, Google or Apple deliver value to customers on the back of existing mobile networks, it follows that new products and services will emerge capable of using the functionality of 5G to end users. These are indirect benefits.

A European Union report on the socio-economic impact of 5G estimates that every €1.00 spent directly on 5G capacity (infrastructure, networks etc.) will generate over €2.50 in 'multiplier effects' (for consumer and

business users) in 2020. Moreover, it is reasonable to presume that, as 5G capabilities become more ubiquitous and accessible, then the multiplier effect may actually increase, at least for a time. Think how the availability of broadband has changed the ways we now relax and work, several years after broadband first became available to the majority of Irish households.

Our surveys of Irish consumers and SMEs shows a high degree of latent demand for innovative new services that are not available yet, but should eventually become available when the right network is in place. Beyond indirect benefits, the same EU report refers to what are called 'second order' benefits from 5G as well. In particular, the improvements to quality of life from reduced requirements for commuting, better healthcare access and a cleaner environment. Nor should we ignore the employment contribution of 5G: the EU expects that 5G will be directly and indirectly responsible for 10,700 jobs in Ireland alone in 2020 (2.4 million jobs throughout the EU). Currently, GSMA estimates that mobile technologies and services generate 4.7% of global GDP and support 30 million jobs directly and indirectly. Both figures are expected to increase significantly in the coming years.



How do these direct and indirect benefits translate into economic growth? The answer, as always, is that 'it depends'. For example, a critical factor in determining the contribution of 5G to future growth is the nature of the 5G infrastructure that will be available over the forecast period. A recent report by Oxford Economics for Huawei explores several different scenarios. In the first scenario, 5G investment doesn't go much beyond providing faster mobile internet services, which adds an extra 0.15% to annual GDP growth in EU countries over the period 2020-2035. At the other extreme, investment in the full potential for 5G as an ultra-reliable source of connectivity (enabling self-driving cars, delivery drones etc) could add 0.3% to annual GDP growth over the same period.

A recent report by IHS Markit for Qualcomm projects an average annual contribution of 0.2% to annual GDP growth globally from 5G investment and its multiplier effects over the next 15 years. So we have a range of potential economic impacts from 0.15% through 0.2% to 0.3% at the top end.

5G and Irish growth

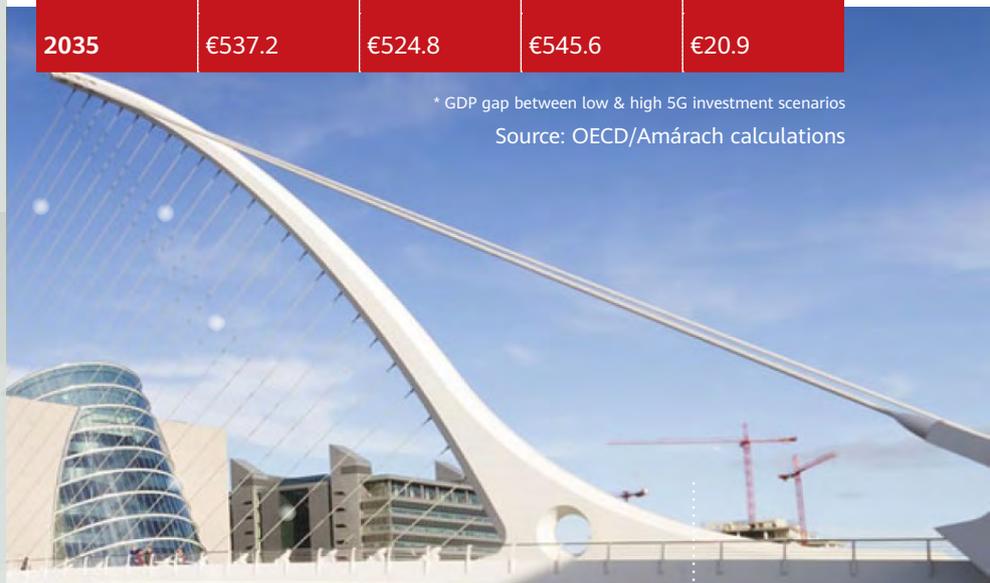
What do these 5G-enabled economic growth scenarios mean for Ireland's prospects? According to the OECD, Ireland's long-run, annual GDP growth rate (between 2020 and 2035) will average 2.6% over the period (smoothing out the temporary decline expected in 2020). This means that, other things being equal, Ireland's GDP will grow from €356 billion in 2019 to €416 billion by 2025, reaching €472 billion by 2030.

If we assume that the OECD's forecast for Ireland's long-term growth already assumes an implicit contribution from technologies such as 5G, then we can use this to calculate the impact of different investment trajectories for 5G in Ireland. Let's assume that the current OECD forecast is aligned with the IHS Markit projection for 5G to contribute 0.2% to average annual GDP growth over the next five years. If we use instead the alternative scenarios from Oxford Economics, i.e.: a lower contribution from 5G (0.15%) and a higher contribution (0.3%), we can then forecast the impact of these two outcomes on Ireland's GDP outlook from a lower growth rate due to lower investment in 5G (2.45% vs 2.6%) and a higher growth rate resulting from a higher investment in 5G (2.7%). The cumulative impact of either scenario is huge:

GDP €BN	CENTRAL FORECAST	GDP: LOW 5G INVESTMENT SCENARIO	GDP: HIGH 5G INVESTMENT SCENARIO	OPPORTUNITY COST OF LOW 5G ADOPTION*
2019	€356.1	€356.1	€356.1	
2025	€415.5	€411.8	€417.9	€6.1
2030	€472.4	€464.9	€477.5	€12.6
2035	€537.2	€524.8	€545.6	€20.9

* GDP gap between low & high 5G investment scenarios

Source: OECD/Amáarach calculations





The 5G Future

The table tells us that the opportunity cost – measured as the gap between Ireland’s GDP in a high 5G investment scenario vs a low investment scenario – will rise sharply over the next 10-15 years. If Ireland follows a low investment approach to 5G over the rest of the decade then the ‘cost’ will be €12.6 billion in national income ‘foregone’ by 2030.

From the viewpoint of 2020 and the recovery challenge that lies ahead for Ireland over the rest of the decade, it is clearer than ever that investing in a world class 5G network will play an even more vital part in our future than anticipated even 12 months ago.

In conclusion, our research points to a unique moment of opportunity for Ireland as we explore new ways of securing our economic future and the sustainability of our economy and society. 5G will play a vital part in getting to the future, and we can get to that future ‘faster’ by embracing the full potential of world class technologies to create businesses, jobs, wealth and sustainable growth for all our citizens.

But time is of the essence, and we cannot wait until the economic wounds from the pandemic have healed. Rather we must work together now to lay the foundations for a better future, one that will enable future generations to reap the benefits of the choices and decisions we make today.

CONCLUSION

5G offers tremendous opportunities for countries that facilitate its widespread provision. Ireland’s economy has an opportunity not to merely recover but to transform in the process. 5G presents the country with the chance to truly become a digital leader. If Ireland wants to stay ahead in its digital transformation, Irish SMEs need support to embrace the digital future and drive our economy.

Huawei has been as a trusted partner in Ireland for 16 years playing a role in the development of Ireland’s digital infrastructure. We believe in the power of innovation and collaboration. We are fully committed to helping Ireland achieve its rightful digital ambitions, enhance resilience, and contribute to the economic prosperity.

About Huawei

Founded in 1987, Huawei is a leading global provider of information and communications technology (ICT) infrastructure and smart devices. We have more than 194,000 employees, and we operate in more than 170 countries and regions, serving more than three billion people around the world.

Our vision and mission is to bring digital to every person, home and organization for a fully connected, intelligent world. To this end, we will drive ubiquitous connectivity and promote equal access to networks; bring cloud and artificial intelligence to all four corners of the earth to provide superior computing power where you need it, when you need it; build digital platforms to help all industries and organizations become more agile, efficient, and dynamic; redefine user experience with AI, making it more personalized for people in all aspects of their life, whether they're at home, in the office, or on the go.

About Amárach

Amárach is an independent research consultancy, measuring the business implications of consumer and business trends in Ireland and abroad.

Methodology

Amárach conducted an online, representative survey of over 1,000 adults aged 18 and over throughout the Republic of Ireland in July 2020, and a survey of 200 SME business owners and decision makers in August 2020.

