



The 5G Future A Huawei Report

November 2020

FOREWORD FROM HUAWEI



5G represents an exciting range of limitless potential and possibilities for consumers in Ireland. From the way we shop, bank, and socialise, connectivity is now at the centre of how we live. 5G will have the potential to greatly improve everything that depends on a wireless connection, transforming our lives at home and at work.

Huawei is at the centre of this digital revolution. Over the past 10 years we have 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 hugely excited by the research carried out by Amárach, helping us understand consumers' excitement and expectations. In the past, 5G has been considered simply as faster internet and better network coverage. However, this report demonstrates that Irish consumers are moving beyond this superficial understanding of its capabilities.

Each of the modern leaps in wireless network technology has brought distinct change for consumers: 2G allowed for voice transmission, 3G ushered in the app revolution, and 4G brought a speed boost. 5G will open a world of opportunity and it the potential to be a true game changer, helping us to deliver things we can't do yet, such as driverless vehicles, widespread VR, effective telehealth and truly realising the internet of things.

Irish consumers are visualising a brighter, more exciting future and through the insights shared in this research, they recognise how 5G technology will help bring Ireland to the that future faster. The Covid-19 pandemic has forced us to rely on technology more than people were initially prepared to. Homes have become offices, friends and families now stay connected through video, and students access lessons on-line. However, it has also revealed that we have it in us to adapt and unlock our digital potential. Now is not the time to slow down our progress in developing Ireland's digital infrastructure, rather it is the time to get ahead and position Ireland at the forefront of the curve in Europe and globally.

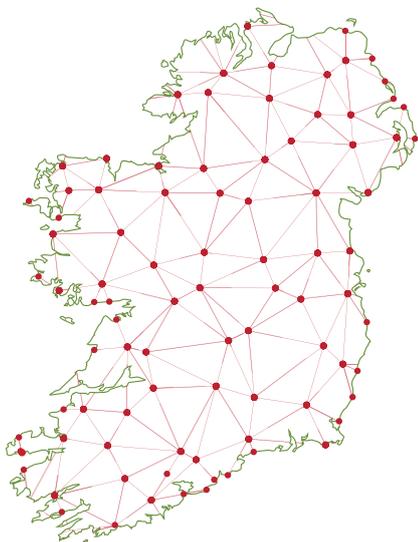
Giorraíonn beirt bóthar – two shortens the road. We will continue to work hard in collaborating with our partners in bringing Ireland on the journey of reaching the 5G future.

Tony Yangxu
CEO - Huawei Ireland



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 consumers as well as by businesses. Through understanding likely consumer demand and business investment priorities it is possible to see how 5G can help Ireland get to the future faster in terms of growth, standard of living and quality of life.

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.



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

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.



CONSUMERS & 5G

Future Soon?

New and emerging technologies feature regularly in Irish news and media. Ireland often performs well in terms of technology adoption compared to other EU countries, and this partly reflects a level of awareness and interest in technology.

When it comes to 5G, 8 in 10 adults (82%) in our survey have heard of the technology, a similar level to awareness of technologies such as virtual reality (VR) and artificial intelligence (AI):

HAVE HEARD OF TECHNOLOGIES

82%

Virtual reality (VR)

82%

5G

74%

Artificial intelligence (AI)

67%

Cloud computing

33%

Internet of things (IoT)

29%

Augmented Reality (AR)

22%

Machine learning

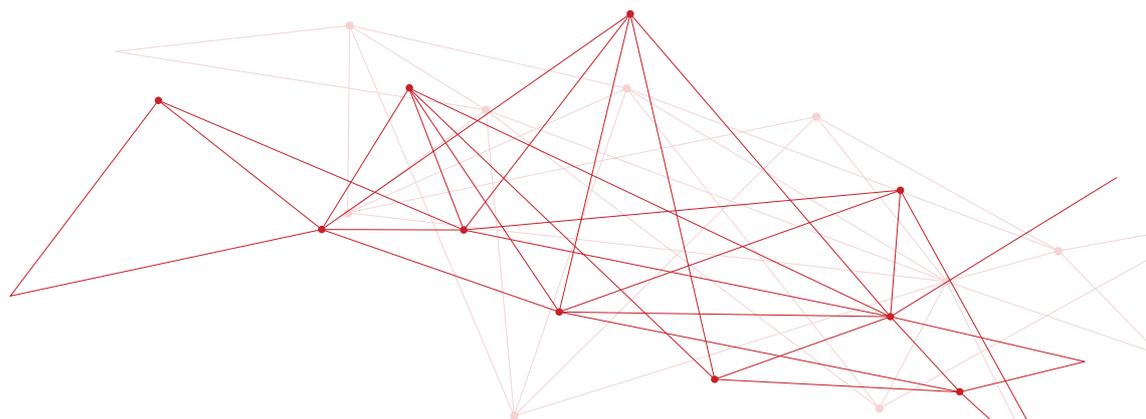
16%

Blockchain

Among those aware of 5G, only 13% claim to be very familiar with the technology, and a further 60% are somewhat familiar with it. Men and those under 25 tend to more familiar than other demographic groups. To facilitate further questions about 5G in the survey, we defined it as follows:

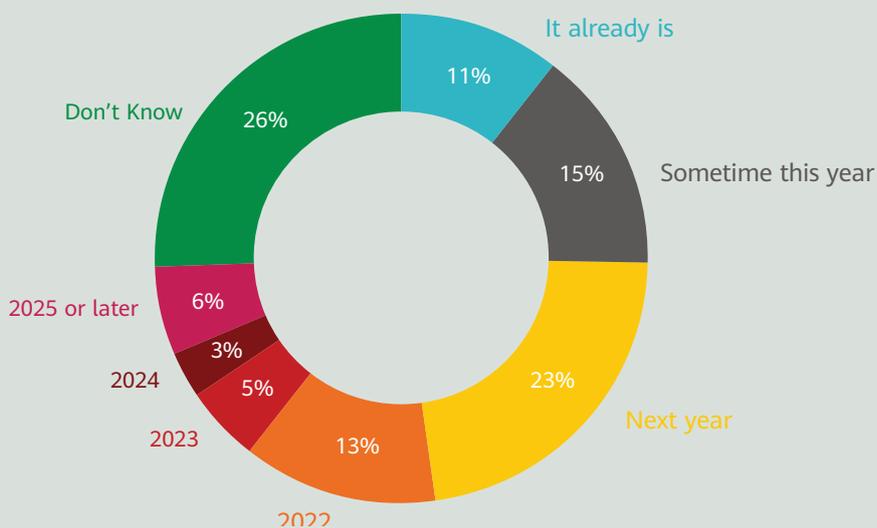
5G is the next generation wireless network technology that's expected to change the way people live and work. It will be faster and able to handle more connected devices than the existing 4G LTE network, improvements that will enable a wave of new kinds.





How quickly might we get to the 5G future? The majority of people expect us to get there in the next few years – if we are not there already:

5G WIDELY AVAILABLE IN IRELAND BY:



Almost half expect 5G to be widely available by the end of 2021. However, in reality that isn't going to happen so soon given the scale of investment required. But our research does reveal a latent expectation by consumers that they will be able to access 5G services and networks sooner rather than later.

Furthermore, people expect 5G to play a transformative role in introducing new products and services to Ireland. The majority (61%) expect that 5G will enable the development of new technologies, as well as improving existing technologies. Only 12% expect it to improve current technologies but not enable new ones, and just 5% expect neither (the balance are not sure).



When it comes to people's expectations about what the 5G future will entail and how important it will be for Irish society over the next five years, there is a very strong consensus that it will be critical in delivering a number of features. For example:

Coverage

80% think it is very or extremely important that there is widespread 5G network coverage over the next 5 years (especially outside of Dublin).

Quality

67% think that higher quality voice and video calls will be important.

Video

59% anticipate that higher video streaming quality will be important (women and parents see this as especially important).

Reliability

79% consider more reliable connectivity to be a key requirement.

Lags

67% expect that less lag time or delays in connections will be important.

Innovation

25% view innovations such as 360-degree video and 3D video as important to 5G's future impact in Ireland.

Speed

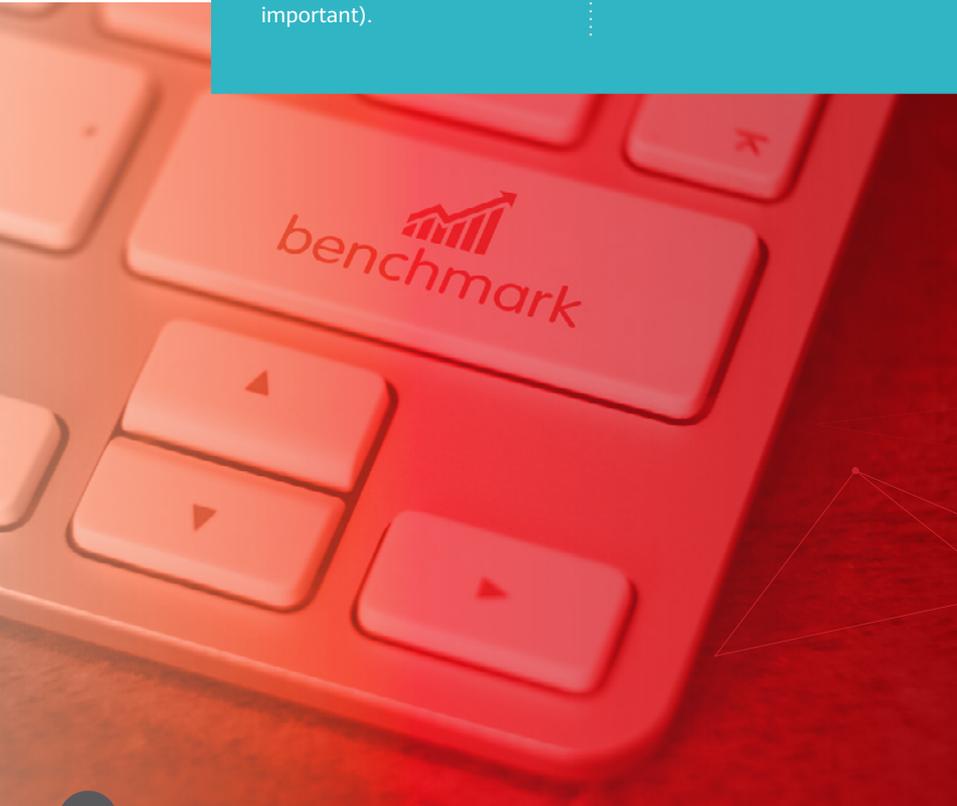
76% see faster upload and download speeds as critical to the future.

Connections

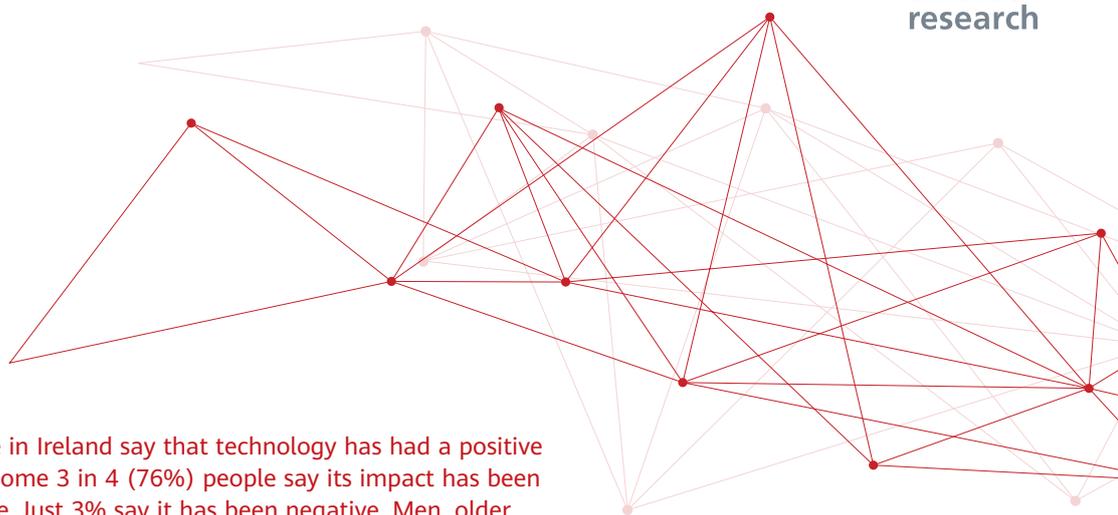
64% see an increased number of smart/connected devices as an important outcome of 5G technology in five years' time.



While all these features would be welcome, they build on much of what is already there. However, our research tells us that people are open to much, much more.



benchmark



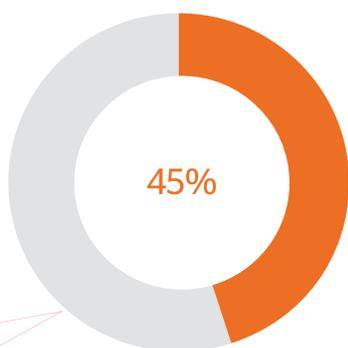
Life in 5G

The majority of people in Ireland say that technology has had a positive impact on their lives. Some 3 in 4 (76%) people say its impact has been positive or very positive. Just 3% say it has been negative. Men, older adults (not younger ones) and people in higher income groups are more likely than average to say technology's impact has been positive.

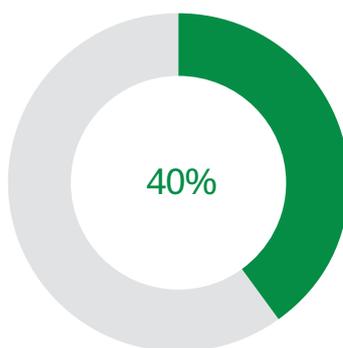
This bodes well for the adoption of 5G enabled technologies and innovative new services in the years ahead. As we saw earlier, people consider a number of 5G's features to be very important to Ireland's future. Likewise, they consider some of 5G's potential applications and uses to also be important. Crucially, Irish people place special emphasis on the 'smart' applications of 5G:

<h4>Smart energy grids</h4> <p>60% consider this application to be important for Irish society over the next 5 years.</p> <h4>Smart cities</h4> <p>some 40% anticipate this being an important application for 5G.</p>	<h4>Smart homes</h4> <p>45% think this will be very important to the future.</p> <h4>Smart household appliances</h4> <p>39% expect this will also be important to the future.</p>	<h4>Smart battery storage</h4> <p>62% expect it to be critical to Irish society</p>
--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------

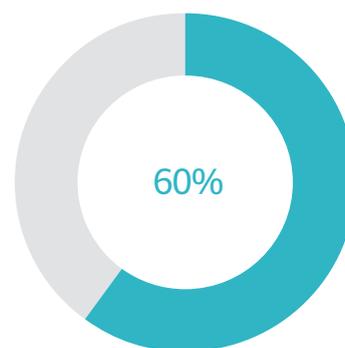
SMART HOMES



SMART CITIES



SMART ENERGY



People also consider 5G to be an important technology for replacing or upgrading existing technologies. For example:

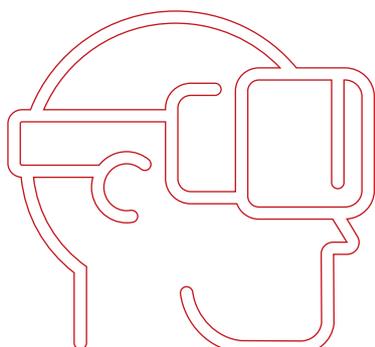
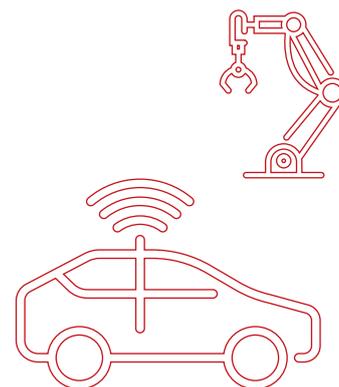
<p>Replacing landlines/cable</p> <p>55% expect this will be an important feature of 5G.</p>	<p>Replacing cable/satellite tv</p> <p>similarly 54% expect this will be important.</p>	<p>Connecting multiple devices</p> <p>also important to the future for 37% of adults.</p>
-----------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------

Furthermore, 5G is expected to provide much better experiences for a number of services that are still in early stages of adoption, including:

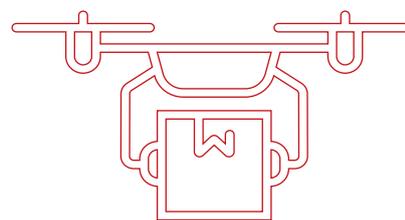
<p>Telehealth</p> <p>58% of adults think this will be an important feature over the next 5 years.</p>	<p>Real-time translations</p> <p>Over half (53%) cite this as important to Irish society.</p>	<p>Next-generation personal assistants on smart devices</p> <p>for example siri or alexa, considered an important 5G feature by 29% of adults.</p>
---------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------

Of course, much of the promise for 5G is about the things it will enable that we can't really do yet. Here again we see people attributing high importance to some of these features:

<p>Driverless vehicles</p> <p>26% of adults see this as important over next five years.</p> <p>Virtual reality: an important feature for 26% of Irish people.</p>	<p>Delivery drones and robots</p> <p>considered important by 27% of adults.</p> <p>Augmented reality: seen as important for 24% of adults over next 5 years.</p>
---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------



There is a certain amount of impatience on the part of Irish people when it comes to the pace of 5G adoption and its application to existing and new product and service categories. Among those who consider different applications to be important to Irish society over the next five years (such as those listed above), the majority actually expect each application to be widely available in Ireland in 4-6 years' time. In some cases even sooner.



Even if only a minority consider some 5G applications to be important (such as delivery drones and robots), a large number are open to actually using such services. In the case of delivery drones (described in the survey as autonomous vehicles or robots, used to transport packages, food or other goods), nearly a third (32%) of adults would use such a service if it was available. Younger adults and people living in Dublin are especially interested in such a service.

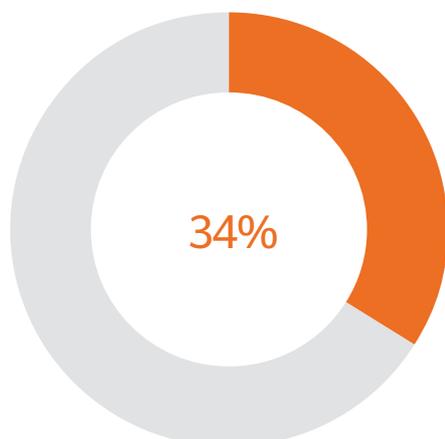
People are also intrigued by the potential for 5G to make workplaces safer as well. For example, 41% of adults think that autonomous vehicles and machines (enabled by 5G) will play an important part in improving workplace safety for certain dangerous tasks.

There is a similar level of interest in another 5G application, namely autonomous stores – described in the survey as a store where no checkout is required and customers simply enter the store while logged into an app on their smartphone. Nearly 2 in 5 (39%) adults would be likely to use such a service if it was available. Again, younger adults and those in higher income groups are more attracted to such a proposition.

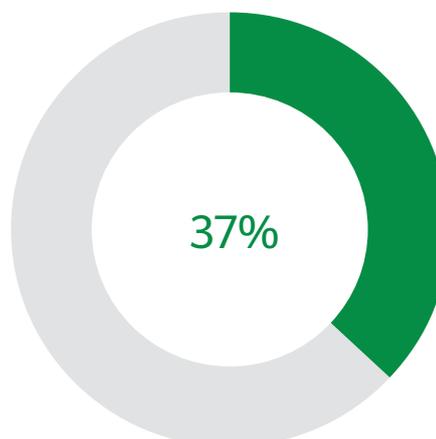
Furthermore, most people expect that 5G-enabled services will not only benefit themselves but will also benefit Ireland’s economy. Take the example of delivery drones: 34% of adults think it would be positive for them personally if Irish businesses were able to offer online purchases combined with delivery drone or robotic deliveries. But an even higher proportion – 37% - think this would have a positive impact on the Irish economy. People living in Dublin are more positive about such prospects than the country as a whole.

DELIVERY DRONES

POSITIVE FOR CONSUMERS



POSITIVE FOR ECONOMY

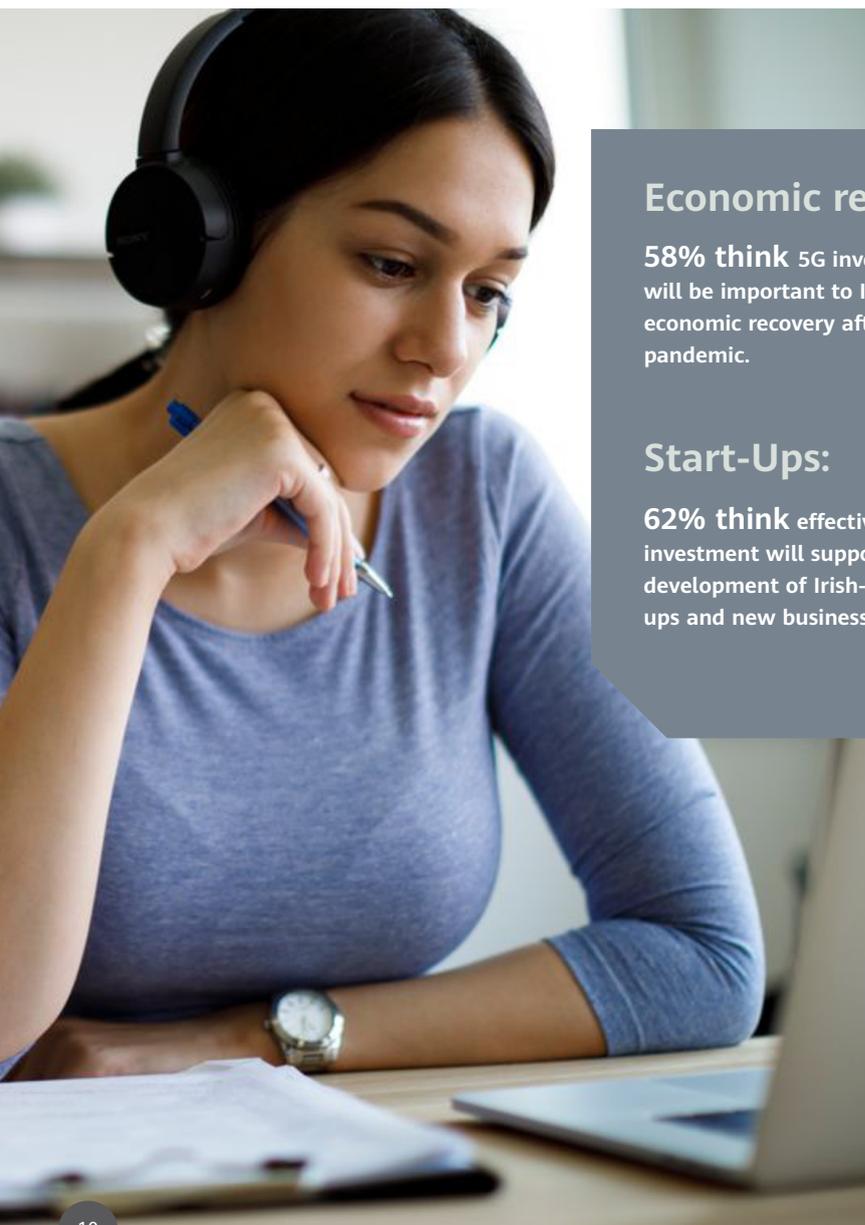


This time is different

A large minority – 40% - of adults in our survey have used their home internet to work from home during the public health emergency. The experience of working from home for the first time for many people has meant that have reconsidered the potential to do the same in future after the pandemic is over.

Not surprisingly, nearly 3 in 4 adults (74%) think it is very or extremely important for Ireland's economy that the technological infrastructure is in place so people can effectively work remotely if required. Moreover, 73% believe that remote working will be widespread in Ireland by 2025.

The experience of the working from home 'revolution' has woken people up to the revolutionary potential of communications and related technologies to play an even bigger part in our economic future than heretofore. Over 6 in 10 adults (61%) agree that effective investment in new technological infrastructure could enable Ireland to be a world leader in new industries by 2025.



Thinking about the benefits of effective 5G investment, Irish people are very bullish about the future economic and business impact:

Economic recovery

58% think 5G investment will be important to Ireland's economic recovery after the pandemic.

Start-Ups:

62% think effective 5G investment will support the development of Irish-start-ups and new businesses.

FDI

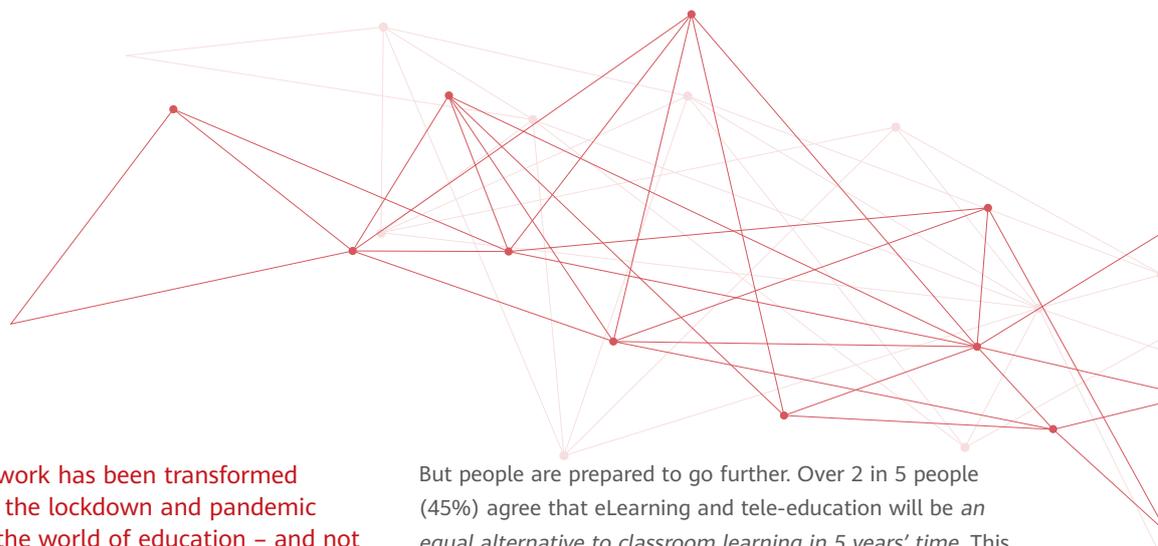
68% of adults think that 5G will be very or extremely important to ensuring Ireland remains an attractive location for foreign investment.

Growth

finally, **66% of adults** believe that 5G will be important to growing domestic Irish businesses, a key source of employment in the economy.

Of course, such 'macro' observations about the economic impact of 5G need to be backed up by 'micro' insights into the needs and preferences of Irish citizens when it comes to the life-changing potential of 5G.

To that end, we explored in our survey the potential impact of 5G on three key aspects of people's daily lives, namely: education, healthcare and energy.



5G Education

Just as the world of work has been transformed by our experience of the lockdown and pandemic policies, so also has the world of education – and not just for children.

On the issue of eLearning and tele-education, the majority – 55% – of Irish people are convinced that these technology-enabled innovations *will play an important part in improving Ireland's education and training sector*. People over 45 are *more likely* to agree with this suggestion than those under 45, as are people outside of Dublin.

But people are prepared to go further. Over 2 in 5 people (45%) agree that eLearning and tele-education will be *an equal alternative to classroom learning in 5 years' time*. This time under 45s are more in agreement with this scenario, as are women compared to men.

Crucially, as we face high levels of unemployment for the foreseeable future and a pressing need to re-train those made redundant, we find that over half (52%) of adults would be *more likely to undertake upskilling or further education if eLearning or tele-education were more widely available*. Women, those aged 35-44 and parents of children are much more likely to agree to this proposition than other demographic groups.

5G Healthcare

Before the COVID-19 public health emergency, Ireland's health services were the subject of considerable debate and dissatisfaction. The success of the HSE and Department of Health in responding to the pandemic, and the measures put in place for non-coronavirus patients to access certain services remotely, has left the vast majority of Irish people open to new ways of running our health services.

As a result we find considerable level of support for potential innovations related to 5G-enabled telehealth by 2025:

Health costs

over two thirds (67%) of adults agree that telehealth has the potential to help better manage Ireland's healthcare cost.

Rural access

76% of adults believe that telehealth has the potential to improve medical access to people in rural areas and underserved regions in Ireland.

Waiting times

70% of adults believe telehealth could reduce waiting times for medical consultations and treatments.

Elder care

Over 6 in 10 (63%) believe that telehealth could improve elderly or less mobile people's overall quality of life by 2025.

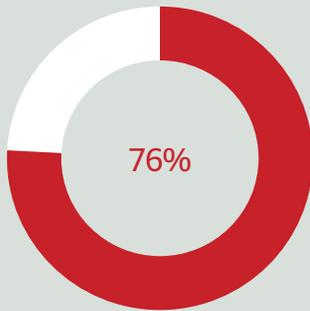
Patient care

60% believe that telehealth initiatives by 2025 could improve overall patient experience.

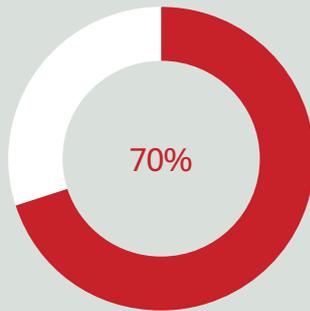


TELEHEALTH

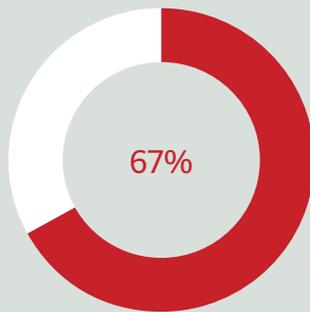
RURAL ACCESS



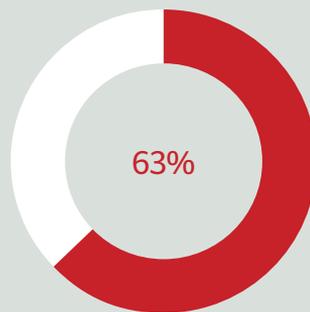
WAITING TIMES



HEALTH COSTS



ELDER CARE



But what is telehealth? What could comprise such services by 2025? We set out a number of potential applications for tele-medicine services to gauge their level of appeal in the future, as follows:

APPEAL OF POTENTIAL TELE-MEDICINE SERVICES

45%

Wearable technology

37%

Live consultation

32%

Home monitoring

31%

Expert Consultation

28%

Remote visits

28%

Tele-emergency

28%

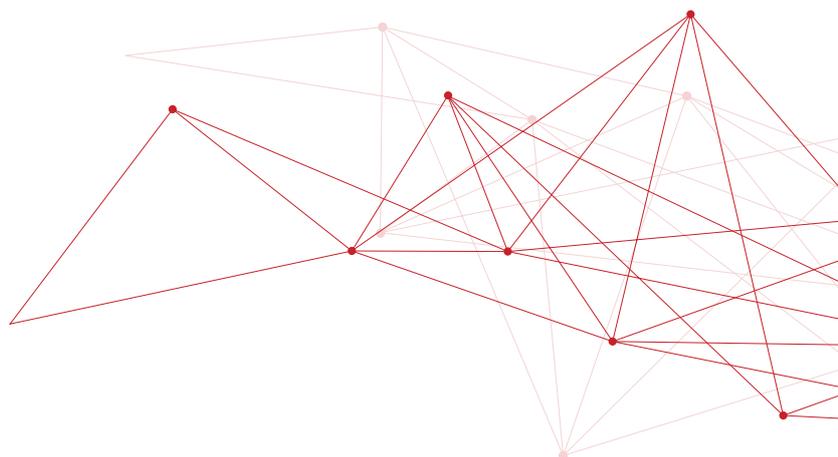
Telemonitoring

21%

Robotic surgery

The important point is that only 7% of adults didn't find any of these tele-medicine concepts appealing. Most people found several of interest: from those that are more familiar (wearable devices such as fitbit) to those that are less familiar (robotic surgery).

A clear message from our survey is that 5G-enabled telehealth services will play an increasingly important part in meeting Ireland's healthcare needs in the decade ahead.



5G Energy

The final sector we focused on in our consumer research relates to energy. There is a growing understanding that energy needs to get 'smart' if Ireland is to meet its climate policy ambitions and targets. The good news is that Irish people see a clear connection between energy consumption, sustainability and the role of technology.

We see this in the following findings:

Emissions

71% of adults believe that technology will play an important part in helping Ireland reduce carbon emissions and tackle climate change.

Moreover, the environmental impact of technology is an important consideration for over half (53%) of Irish adults. This is especially true for men, younger people and those living in Dublin.

Of course there are some technologies available to enable consumers to access 'smart energy' services already. One in five Irish adults (19%) say they have a smart connected energy device (e.g.: smart meter, Nest) in their home. Those aged 35-44 and people living in Dublin are more likely to have such devices installed already.

Resources

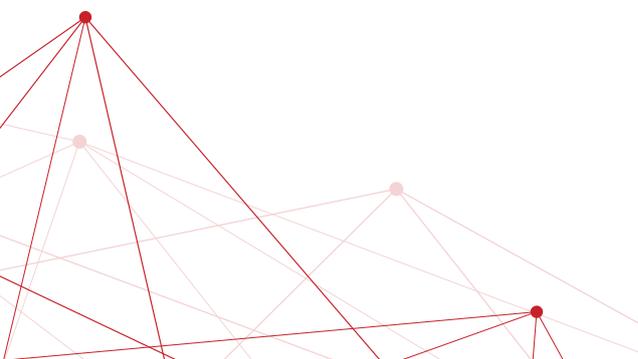
7 in 10 Irish people believe that technology will help Ireland to better manage energy resources in future.

The majority do not – but will they in future? In fact, 2 in 5 (37%) of those who do not have a smart connected energy device would definitely consider getting one in the future. Only 1 in 10 would rule it out entirely, the rest are undecided. Men and people over 45 are among the most enthusiastic for potential smart energy connections if they don't already have one.

Independence

Nearly 7 in 10 (68%) also believe that technology will help Ireland to become a more energy independent country.

As Ireland juggles the dual demands of growing our economy after a sharp recession as well as achieving our sustainability goals then a clear message from our survey is that Irish people will support a smart energy strategy that benefits both consumers and the nation over the next ten years.



5G Barriers

It is easy to speculate about the potential benefits of technologies such as 5G that are not yet available to any significant degree. But the reality is that we start with an installed base of existing technologies – including broadband and mobile internet services – which influences people’s most pressing needs for better solutions.

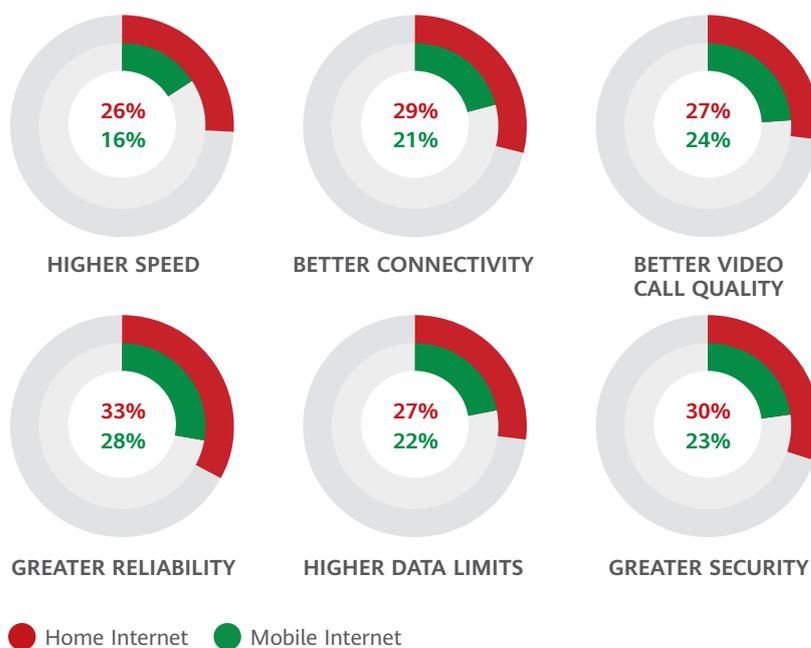
The main issues people encounter with fixed line broadband at home (‘home internet’) relate to reliability of connections and speed online. Just over 1 in 5 home internet users are dissatisfied with these features of their service. Among those with mobile broadband connections at home or when on the move (‘mobile internet’) network coverage is their main issue, followed by connectivity and speed in joint second place. Similar shares of mobile internet customers are dissatisfied with existing service providers when it comes to these same issues.

There is no doubt that 5G will address these and other issues for broadband users in Ireland. However, it is likely – going on experiences with 5G networks in other markets – that consumers may be asked to pay more for a better service that addresses their issues with their existing services.

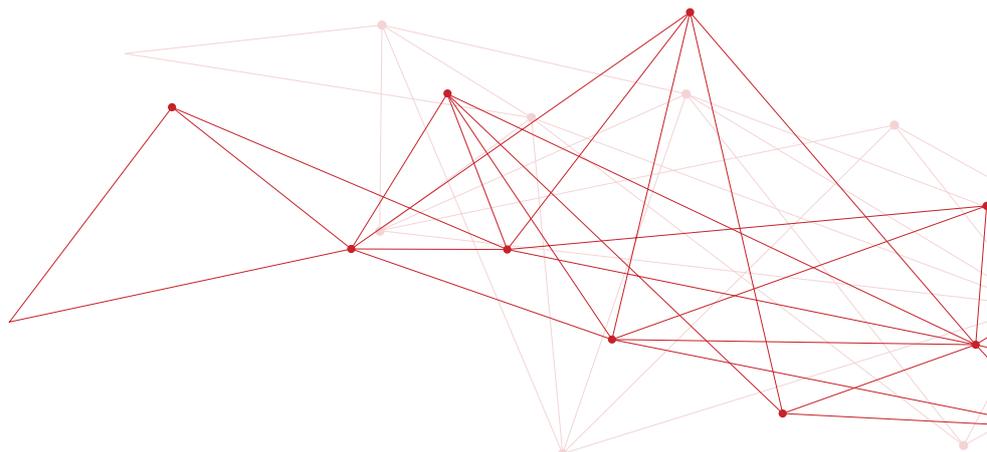
Interestingly, when we ask Irish consumers who are dissatisfied with their current home internet or mobile internet services whether they would be willing to pay more for a significantly improved service when it comes to the various aspects of their customer experience we find that large minorities would definitely consider paying more for better:

DISSATISFIED INTERNET USERS

% ‘DEFINITELY CONSIDER’ PAYING MORE FOR EACH IMPROVEMENT



Digital security and privacy will become bigger issues for all of us in the coming years. Over 7 in 10 (71%) Irish people believe that data privacy for mobile phone users will become a great concern in future. Women and older people are particularly concerned with this issue. As our lives become even more dependent on communications services – affecting how we shop, work, live and look after ourselves and loved ones – then future network improvements will have to do even more to protect the privacy of users and their security and that of their families.



The 5G Consumer Future

Our research finds Irish consumers at a critical point in their use of communications technologies. The experience of the pandemic and its impact on how we work, care and learn will have profound implications for our economy and for the future of our nation.

Irish people have been enthusiastic adopters of technology in the past – though not always at the forefront of the European adoption curve. That can change with 5G. Ireland has an opportunity to embrace the revolutionary potential of 5G to transform many different aspects of our daily lives – including the world of work.



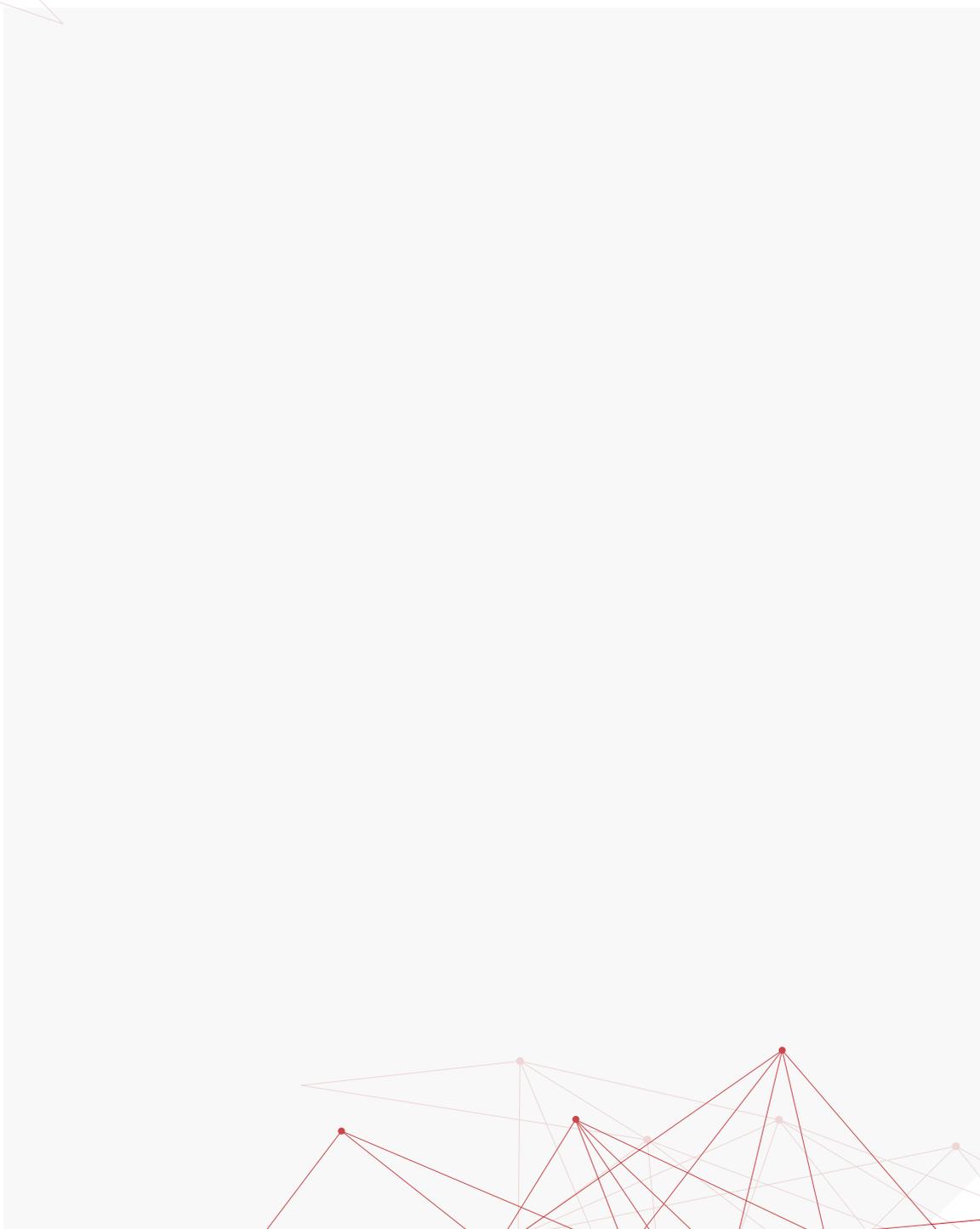
THE 5G FUTURE

It is clear from the research that consumers expect 5G to play a major transformative role in both introducing new products and services to Ireland, and improving existing offerings. Irish consumers believe technology has had a positive impact on the quality of their lives and the consensus is 5G will bring much better experiences and enable us to do what hasn't yet been achieved.

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 realise its 5G future.



NOTES



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.

