

# National Broadband Plan

## Benefits of high-speed broadband

EY report for the Department of the  
Environment, Climate and  
Communications



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# Executive summary

The pandemic has confirmed the fundamental importance of broadband to the economy and to our daily lives.

The purpose of this report is to investigate the current and future benefits of the National Broadband Plan to the Irish economy and society. These benefits are identified across several categories, namely: economic, enterprise, societal, and individual benefits. Identified benefits are of both a qualitative and quantitative nature, and draw on domestic and international research. Given the changing structure of the Irish economy post-Covid and the increasing importance of broadband, it is anticipated that this will become an iterative process as the rollout of high-speed broadband continues in the coming years. The key findings from this research are as follows:

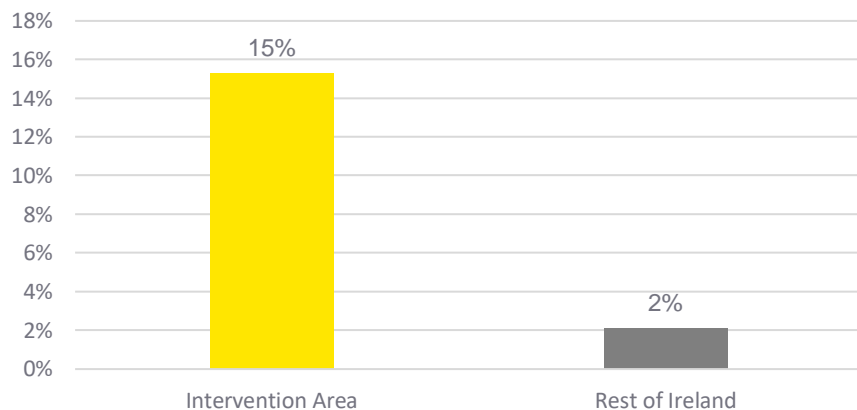
<b>Broadband is increasingly essential to our daily lives</b>	The increasing importance of broadband to the way we live, work, socialise, shop and access public services has been placed under a spotlight by the COVID-19 pandemic. Throughout the pandemic, broadband proved to be a critical infrastructure, keeping businesses and the economy going, supporting education, and allowing us to stay connected with friends and family. Usage of broadband went up significantly following the first lockdown, but the “digital divide” - the difference between those with access to high-speed broadband and those without - was exacerbated by inequality between those who could work remotely and access services online and those who couldn’t because of the quality of their broadband connection.
<b>Broadband is a vital part of economic and social development</b>	High-speed broadband access is a key pillar of the European Commission (EC) strategy for economic and social development. It has set an ambitious target for 2030 that all European households are to be covered by a “Gigabit” capable broadband network, meaning one that can deliver download speeds of at least 1 Gbit/s (equivalent to 1,000 Mbit/s). Reflecting this, the new Digital Ireland Framework sets a target of having all Irish households and businesses covered by Gigabit network no later than 2028.
<b>Despite the benefits of ubiquitous broadband coverage, the private sector will not deliver it alone</b>	There are significant economic and social benefits that can be realised from ubiquitous coverage of Gigabit-capable networks. However, the high cost of the infrastructure build required means that it is not commercially viable for the private sector to build networks in rural areas. The market failure arises as the full range of benefits that come from ubiquitous high-speed broadband, such as enabling digitisation of health and other public services, would not be realised by private sector companies building the network, who would only get the benefits of the revenues received for providing services.
<b>The characteristics of Ireland make network rollout to rural areas challenging for the private sector</b>	The unique characteristics of Ireland - its low population density, high proportion of rural households and its high proportion of the population living in houses rather than apartments - are aligned with the factors that significantly increase the cost per premise of rolling out high-speed broadband. The market has pushed coverage of Gigabit-capable broadband to its commercial limits. However, there are currently almost 560,000 premises where the cost of rolling out the network is too high for the private sector, referred to as the Intervention Area. These premises tend to be in rural areas, resulting in a digital divide. These and future new households will have access to high-speed, reliable broadband through the investment in the Intervention Area.
<b>State intervention is crucial to ensure that all citizens can equally benefit from high-speed broadband</b>	The market failure resulting from the discrepancy between the full range of benefits arising from ubiquitous, high-speed broadband and the benefits that accrue directly to telecoms operators was recognised in a 2019 decision by the EC, which noted the under-provision of high-speed broadband to rural Ireland. Without intervention from the State, these premises are highly unlikely to be able to access high-speed, reliable broadband and risk being left behind - both economically and socially.

## Executive summary

# Ubiquitous fibre broadband is associated with a wide range of economic, enterprise, societal and individual benefits

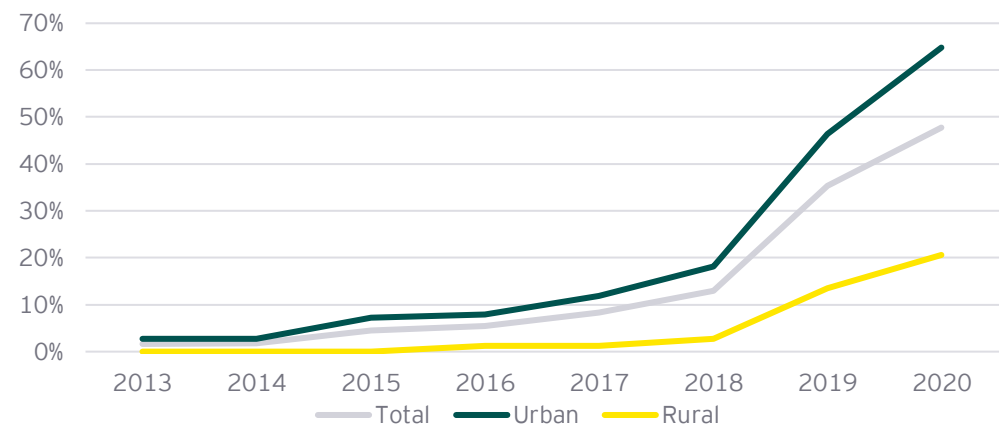
<p><b>The National Broadband Plan is providing high-speed and reliable broadband to all premises in Ireland, ahead of EU 2030 targets</b></p>	<p>In 2019, the EC approved an initial plan to deliver a network capable of providing speeds of at least 150 Mbit/s. The network capabilities have subsequently evolved, and today the commercial sector, together with the State's intervention under the National Broadband Plan NBP will ensure all premises in Ireland will have access to download speeds of 1 Gigabit and more, in line with the 2028 target in The Digital Ireland Framework. The NBP is being delivered through investment by commercial enterprises coupled with intervention by the State in parts of the country where private companies have no plans to invest. It will bring access to high-speed broadband to 100% of the population by 2026, with almost 95% of households having access to high-speed broadband by 2025. In doing so, the NBP will help meet the EC 2030 target well ahead of schedule, improving Ireland's international competitiveness. National Broadband Ireland (NBI) is the company designing, building and operating the broadband network to deliver the NBP in the intervention area.</p>
<p><b>The NBP will contribute to economic resilience</b></p>	<p>Lockdowns across the world in response to the pandemic caused severe economic shocks as many economic sectors were forced to close. However, evidence suggests that online platforms played a role in mitigating economic shock during the lockdowns by supporting remote working and the use of online marketplaces. The NBP will support a more flexible economy, strengthening Ireland's resilience to any future economic shocks, and supporting the transition to a net zero society.</p>
<p><b>The NBP will address the digital divide between urban and rural areas</b></p>	<p>There is a clear counterfactual that if the State didn't invest in the NBP, there would be significant economic and societal opportunity costs, including a persisting digital divide, reducing economic opportunities for citizens living in the Intervention Area. It would also lead to an inability to fully implement digital transformation across the State, reducing the ability to increase efficiency and improve the quality of public services. Without the delivery of the NBP, the State would not be able to meet several policy goals, including Project Ireland 2040 and the Climate Action Plan. This would have negative consequences, holding back Ireland's economic growth and reducing Ireland's competitiveness compared to other countries with more ubiquitous coverage of high-quality digital infrastructure.</p>

### Proportion of respondents saying the main reason they selected their current broadband provider is because it is the only provider available in their area



Source: ComReg Broadband Connectivity Survey, fieldwork September to December 2020. National Broadband Plan | Benefits of high-speed broadband

### FTTP broadband coverage in Ireland, 2013-2020 (% of households passed)



Source: EU Commission



# The National Broadband Plan is unlocking economic value and extending high-speed, reliable broadband across all of Ireland

<b>Ireland is a leader in high-speed broadband rollout compared to EU peers</b>	Ireland ranks tenth among EU Member States in terms of access to Gigabit speed broadband. According to the EC, in June 2020, 58% of Irish households could access broadband speed of 1 Gigabit or more, seven percentage points ahead of the EU 27 average of 51%. This achievement - despite the geographic challenges of rollout in Ireland - is highly notable. The State's mission-focus of providing high-speed, reliable broadband to all households, businesses, and community facilities has likely "crowded in" private investment, contributing to a greater focus by private sector providers on the economics of network rollout and how best to deliver more widespread coverage in Ireland.
<b>NBP rollout in Intervention Area is already realising benefits</b>	Significant preparatory work is required to roll out a high-speed, reliable broadband network efficiently. NBI has been physically surveying the Intervention Area since January 2020 and is now connecting businesses, schools and homes in the Intervention Area. While these premises can benefit from high-speed broadband today, many of the most significant benefits of the NBP - such as economic opportunity, resilience and social equality - are longer-term benefits to be realised once coverage is ubiquitous.
<b>The State is investing to ensure that benefits are unlocked through the adoption of high-speed broadband</b>	State policy and intervention aim to ensure premises are connected to a Gigabit-capable network, and not just 'passed' with fibre. The NBP contract includes initiatives to stimulate demand among households passed with the network and also ensures a typical connection charge for households of €100, preventing NBI from charging customers for civil works associated with a connection. This is in contrast to many other countries, where government intervention only relates to the subsidy to 'pass' premises with the network resulting in potential high costs for some consumers to cover the final connection. In Ireland, over €600m of the overall NBP subsidy is allocated to covering the cost of connections, reducing barriers to high speed connection for the vast majority of households.
<b>The NBP is already unlocking economic value through NBI's capital investment programme, supported by state subsidy</b>	As of April 2022, NBI employs over 290 persons directly and over 1,100 jobs through its subcontractors. This number is expected to double over the course of 2022. It also indirectly supports economic activity through its supply chain, partly through its extensive capital investment programme (supported by the state subsidy) and partly as the wages generated by employees have a knock-on impact on the economy through spending on goods and services by employees. In 2021, EY estimated that the infrastructure activities enabled by the state subsidy and NBI investment will generate c.€500m in output in the Irish economy and a GDP contribution to the Irish economy of €150m. This annual economic impact will grow as the rollout activities expand across the country in the coming years.
<b>The NBP could yield significant environmental benefits</b>	Increased prevalence of remote working, made possible in the Intervention Area by high-speed broadband, reduces the need for people to commute and delivers environmental benefits by reducing carbon emissions. Analysis by EY shows an increase in remote working in the Intervention Area could reduce transport emissions by up to a tonne of carbon per worker each year. Additionally, a transition from legacy copper telecoms networks to a next-generation fibre broadband network saves significantly on energy usage, bringing wider environmental benefits.

# Economic benefits of the National Broadband Plan likely to be significantly higher in a post-Covid world

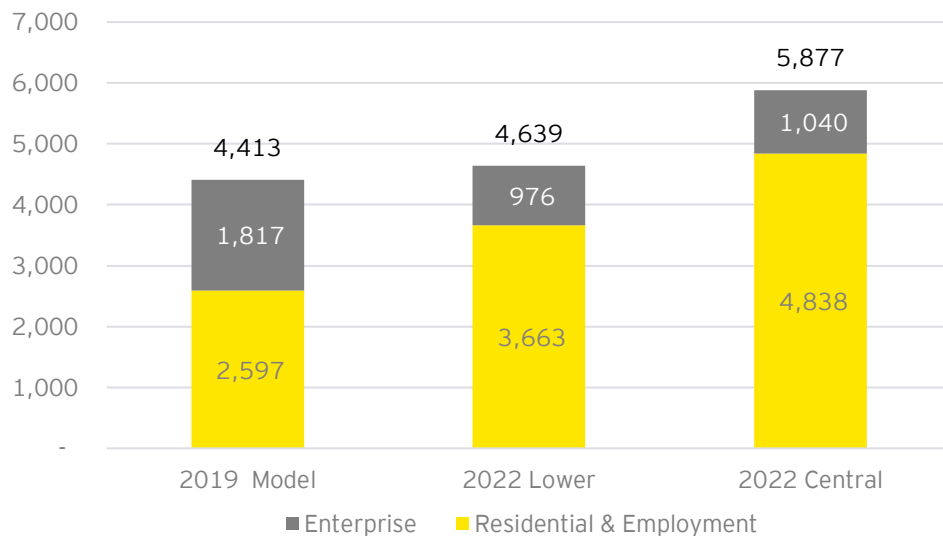
An increase in remote working could mean that the benefits associated with the NBP could be much higher than initially anticipated

In 2019, the State commissioned a cost-benefit analysis to assess whether the NBP would yield a positive return to Irish society. The cost-benefit analysis was positive for all scenarios considered, meaning that the benefits of the programme were deemed to be greater than the costs. Since 2019, the assumed costs associated with the NBP have not materially changed. However, there have been some significant economic developments that imply that the benefits associated with the NBP could be higher than initially anticipated. For example, the COVID-19 pandemic has fundamentally changed attitudes to remote working. EY re-examined several of the 2019 benefit assumptions in light of the increase in remote working. The central assumption in the 2019 analysis was that 20% of employees worked remotely. Based on new evidence, a revised central assumption that 50% of employees will work remotely was modelled, generating significantly higher benefits for households largely through time and cost savings from less commuting. In broad terms, the shift to remote working in the Intervention Area can enable an improvement in quality of life, and generate economic benefits.

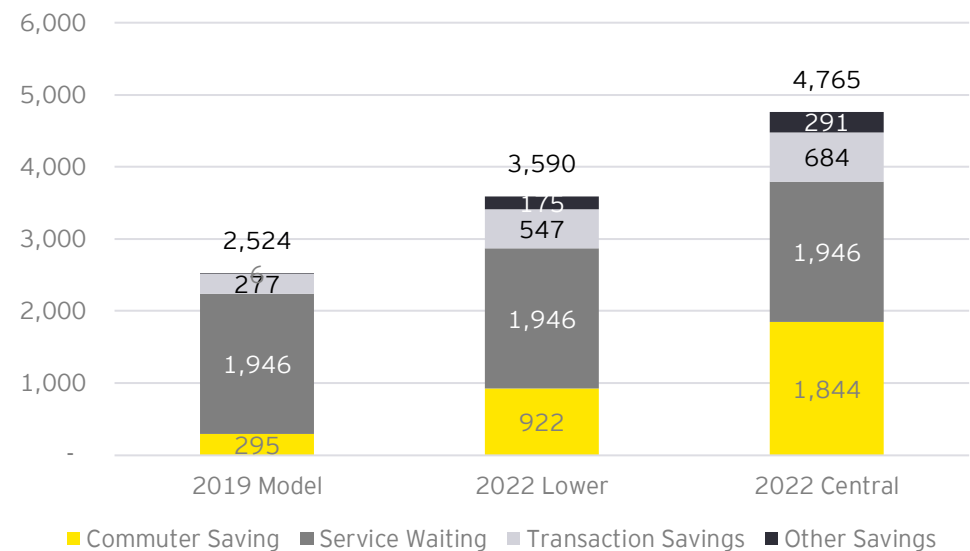
Updating assumptions results in significantly higher economic benefits for the NBP of over €1.5bn

EY also reassessed other structural changes, such as increased online shopping and access to eHealth services, generating material incremental benefits over and above those estimated in 2019. The remainder of the assumptions were unchanged to provide a like-for-like comparison with the 2019 analysis. The results show significant incremental benefits for the NBP over the 25-year appraisal period with an increase in total benefits of up to €5.9bn compared to the 2019 estimate of €4.4bn. This increase is primarily generated by the structural shift to remote working in Ireland and the benefits that will accrue, in particular, to workers living in the Intervention Area with relatively long commutes to their workplace.

Revised total estimated benefits for NBP Plan (€m)



Revised residential benefits for NBP Plan (€m)

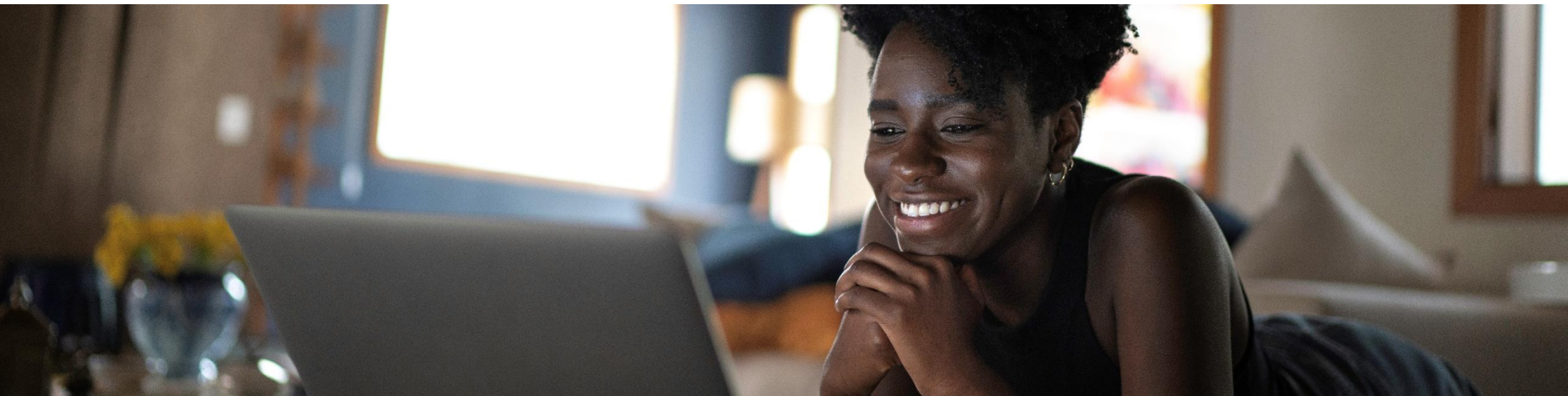


## Executive summary

# Ubiquitous fibre broadband is associated with a wide range of economic, enterprise, societal and individual benefits

Connectivity supports business productivity and innovation	Better connectivity enables benefits for enterprises based in the Intervention Area, helping them innovate, expand their businesses and reduce their operating costs. Businesses in the Intervention Area connected under the NBP are able to access a wider market across Ireland and internationally. High-speed broadband boosts productivity by reducing downtime and fuelling greater technological innovation, providing the digital infrastructure to support new technology adoption.
The NBP can drive balanced regional development	Improving broadband connectivity can bring new businesses and jobs to the Intervention Area and improve the productivity of businesses already located in these regions, reducing outages and enabling access to new technologies. It can also have multiplier effects across the local and wider economy, supporting businesses throughout the supply chain and creating more jobs. A shift to remote working in the Intervention Area could also attract more people to live there and equalise economic opportunity across Ireland. Improved connectivity in Ireland can also attract more investment from abroad, including to rural areas.
The NBP supports Ireland's competitiveness on the world stage	Ubiquitous coverage of Gigabit-capable broadband would position Ireland as a leader in Europe in terms of digital transformation and integration of digital technology, increasing its competitiveness on the world stage and attracting international investment.
The NBP contributes to a fairer society	The NBP provides people living in the Intervention Area with access to the same services as people across the rest of Ireland. Connectivity can also have a positive impact on social isolation, allowing people to connect with friends, family and communities online.

The remainder of this report sets out the full range of economic, enterprise, societal and individual benefits associated with the NBP investment in the Intervention Area.





01

Introduction





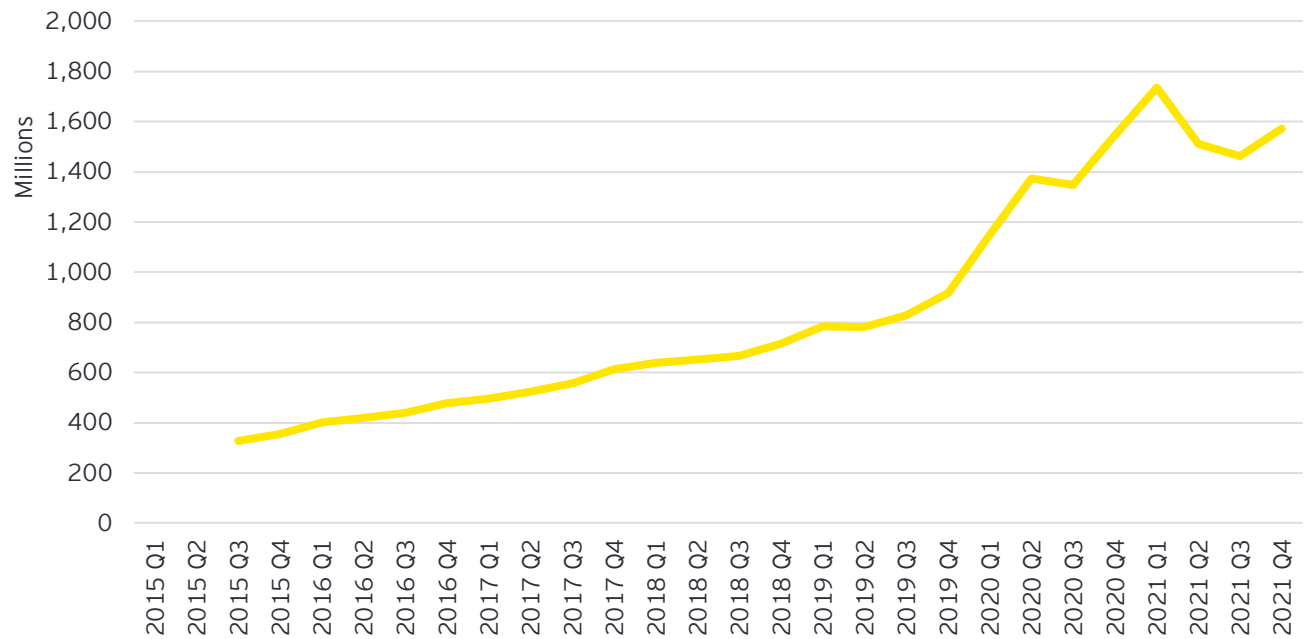
## Introduction

The importance of high-speed, reliable broadband to the way we live, work, socialise, shop and access public services has never been clearer.

The availability of ubiquitous, high-speed, reliable broadband access plays a fundamental role in allowing citizens and businesses to fully participate in so many aspects of today's society and economy. High-speed broadband access is a key pillar of the European Commission (EC) strategy for economic and social development and hence is a key strategic priority for governments across the EU. The EC has a vision for a single market across the EU where digital technologies can enrich the lives of all citizens and where businesses can compete and engage with the economy on fair and equal terms. Ensuring fair and equal access to high-quality digital connectivity has been a long-standing priority of the EC, feeding into EU-wide targets for the availability of fixed broadband access.

The transformative effects of the outbreak of COVID-19, and the subsequent lockdowns, have placed a spotlight on how increasingly essential broadband is to our daily lives. Throughout the pandemic, we have seen how broadband has proved to be critical infrastructure, keeping businesses and the economy going, supporting education, and allowing us to stay connected with friends and family. Many people found themselves doing more daily tasks online or trying online services for the first time; for example, shopping for groceries, working remotely or video calling. Almost overnight, many people across the State were reliant on their fixed broadband connection

Irish residential fixed broadband traffic (Gigabytes per quarter)



Source: Comreg, Quarterly Key Data Report Q4 2021

to continue with their jobs and to support the education of their children. Data from ComReg, the communications regulator, highlights the profound impact which COVID-19 has had on fixed broadband traffic in the State from the start of 2020.

However, this acceleration of digital behaviours was not uniform across the State, with those people and businesses without access to high-speed broadband connections being at a material disadvantage during lockdown. This has led to inequality in how people have been able to deal with the pandemic. Those without access to high-speed connectivity have been unable to access services to stay as socially connected with their friends and family as others in the State (e.g. through

video calling), to access online educational resources and to continue their jobs effectively from home.

The increased demand for bandwidth and the digital behaviours adopted during lockdown are likely to endure across the State. Once people adopt services like video calling and online content streaming, they are unlikely to give them up. There has also been a fundamental shift across the economy towards remote and hybrid working. Without ubiquitous access to high-speed fixed broadband, there is a risk of a growing divide between those who can access digital services and those who can't, which will be detrimental to the economy and to society as a whole.

## Introduction

# Ireland performs well among EU countries for coverage of Gigabit-capable broadband, despite having a lower-density population.

The Government has set out an ambitious target for 2028 of having all Irish households and businesses covered by a Gigabit network.<sup>1</sup> Gigabit-capable speeds can be delivered via fibre-to-the-premise (FTTP) or by cable networks that have been upgraded to use the latest DOCSIS 3.1 standard. Upgrading cable networks to Gigabit-capable speeds is akin to a software upgrade as it utilises the existing cable infrastructure connecting into peoples' homes. FTTP is akin to a hardware upgrade as the network infrastructure connecting homes (historically based on copper wires) needs to be replaced with a fibre optic cable. Therefore, FTTP has a higher cost per household than upgrading cable networks.

According to the EC, in June 2020, 58% of Irish households could access broadband of 1 Gigabit or more, seven percentage points ahead of the EU 27 average of 51%, albeit with no indicator of network reliability<sup>2</sup>.

Ireland ranks tenth among EU Member States in terms of access to broadband speed of 1 Gigabit or more. However, country-specific factors influence the coverage of some of the top-ranked countries in the EU. For example:

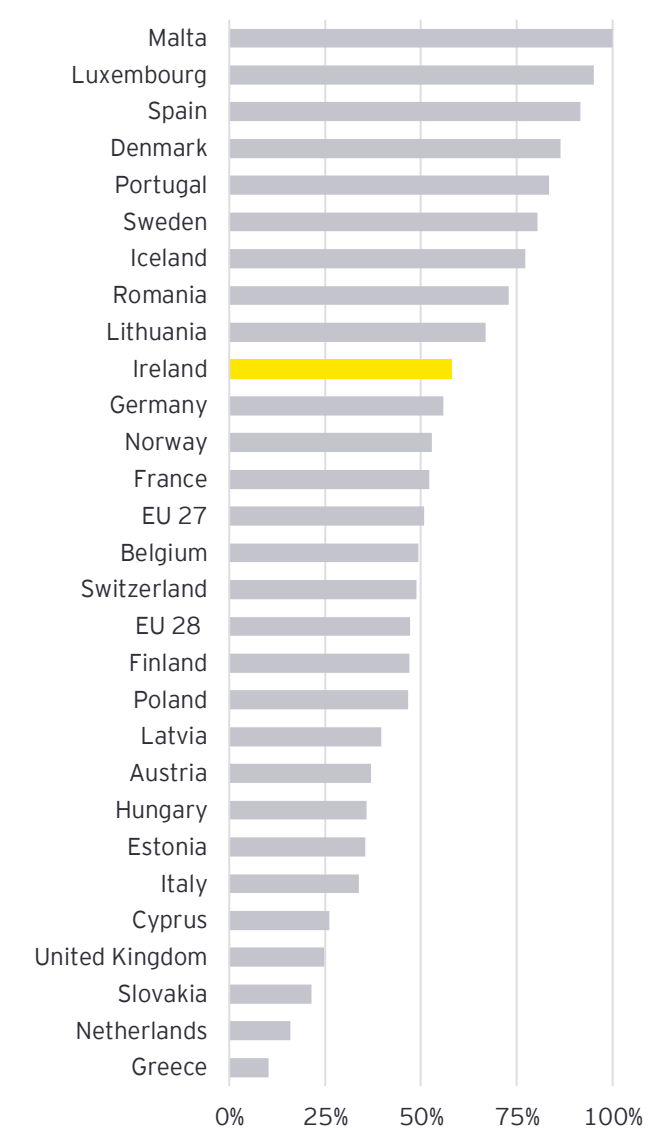
- ▶ Malta and Luxembourg are small countries with 100% and 89% coverage of Gigabit-capable DOCSIS 3.1 cable networks respectively. Denmark has 68% DOCSIS 3.1 coverage.

- ▶ Among EU Member States, Spain has one of the highest proportions of the population living in apartments rather than houses (65%, compared to an EU average of 53%). Rolling out fixed networks to apartments is less costly than rolling out to individual households as multiple households can be connected via a single connection into the building (connecting individual units through in-building wiring).
- ▶ Latest data from Comreg show 2.4 million premises have now been passed by FTTP or cable connection, suggesting Ireland has moved higher in relative to EU peers since 2020.

Ireland has the most rural population among EU Member States, with 39% of Irish households classed as rural, compared to an EU average of 16%.<sup>3</sup> Ireland also has the highest share of the population living in houses across the EU, at 92%.<sup>4</sup> Cable networks cover 50% of Irish households, and the majority of these were upgraded to DOCSIS 3.1 by June 2020 (with the upgrade process starting in late 2019).

The characteristics of Ireland - its low population density, high proportion of rural households and its high proportion of the population living in houses rather than apartments - are aligned with the factors that significantly increase the cost per premises of rolling out high-speed broadband. Ireland's current coverage of Gigabit-capable networks, well in excess of the EU average, is therefore highly notable.

Coverage of >1 Gigabit broadband (% of households)



Source: EU Commission, Connectivity Studies 2021

Note: The Netherlands has very high coverage of gigabit-capable networks but ranks near the bottom of the EU for access to Gigabit speed broadband. This is due to Gigabit-capable networks being able to be constrained to sub-Gigabit speed

# The NBP will address the challenges of rural network rollout to give full coverage across Ireland.

While fixed broadband access in the State is widespread, this is due to the historic universal provision of fixed voice services and the copper network being able to be reused for the provision of broadband services. The copper broadband network has evolved over time with upgrades to broadband speed and quality occurring first at local exchanges (of which there are ~1,200) and later by providing fibre to the street cabinets. These upgrades have largely been implemented where feasible to do so, with 93% of households in the State able to access 'fibre-to-the-cabinet' (FTTC) broadband.<sup>2</sup>

However, FTTC is reliant on the copper connection between the street cabinet and the home, with speed and reliability degrading significantly with distance due to the physical properties of copper. The latest FTTC technology (with 'vectoring', which covers 63% of households in Ireland and 25% of rural households)<sup>2</sup> can deliver speeds of over 150 Mbit/s to those living within ~300m of a street cabinet but this drops to around 40 Mbit/s at distances of ~1km.<sup>5</sup> The average distance between homes and the nearest street cabinet tends to be greater in rural areas and hence the existing infrastructure cannot deliver as high-quality a service in rural areas as to those in more densely populated areas.

The market has, with the upgrades to the existing copper broadband network, done a lot to improve the quality and speed of broadband across the State. The only remaining option to improve the fixed broadband in such areas that cannot get a reliable, high-speed

fixed broadband connection is with FTTP, which can provide significantly higher speeds than copper-based broadband, regardless of distance.

FTTP deployment is, however, challenging in rural areas. The factors highlighted on the previous page (population density, rurality, housing stock composition), along with local conditions such as labour costs and the availability of reusable infrastructure, all contribute to the costs of deploying FTTP networks (on a per household basis) varying significantly across countries. Within each country, there is also significant variability of the rollout cost per household. Unsurprisingly, dense urban environments typically have the lowest cost of network rollout due to the high concentration of homes limiting civil works costs. Connecting the most rural households can cost orders of magnitude more than urban homes.

The relative high cost of FTTP deployment in rural areas can lead to market failure. Significant economic and social benefits can be realised from ubiquitous coverage of Gigabit-capable networks, as we highlight in this report. However, the high cost of the infrastructure build required means that it may not be commercially viable for the private sector to build networks in these areas. The market failure arises as the full range of benefits that come from ubiquitous high-speed broadband, such as enabling digitisation of health and other public services, would not be realised by private sector companies building the network, who would only get the benefits of the revenues providing services. The market failure in respect of under-provision of high-speed, reliable broadband to rural Ireland was recognised in a 2019 decision by the EC.

The challenging economics of rolling out high-speed, reliable broadband in rural areas are unlikely to materially change in the short to medium term due to a large proportion of the costs of rollout being civil

infrastructure costs and the labour required to install the network, which are unlikely to significantly reduce in the future. This challenge is common across countries. Without state intervention, there is a significant risk of a growing divide between urban and rural areas across countries.

Recognising the wider economic and societal benefits that can be realised from universal access to high-speed broadband, the Irish Government is investing in the National Broadband Plan (NBP) to provide high-speed, high-quality and reliable broadband services to all premises in the State. The NBP will provide download speeds ranging from 500Mbit/s up to 1Gbit/s and more.

The NBP will be delivered through investment by commercial enterprises coupled with intervention by the State in parts of the country where private companies have no plans to invest. It is intended to bring access to high-speed broadband to 100% of the population by 2028. This represents the largest infrastructure project in rural Ireland since rural electrification and will have a similar transformational impact for driving social and economic equality between urban and rural areas. National Broadband Ireland (NBI) is the company designing, building and operating the rural state-funded broadband network.



## Introduction

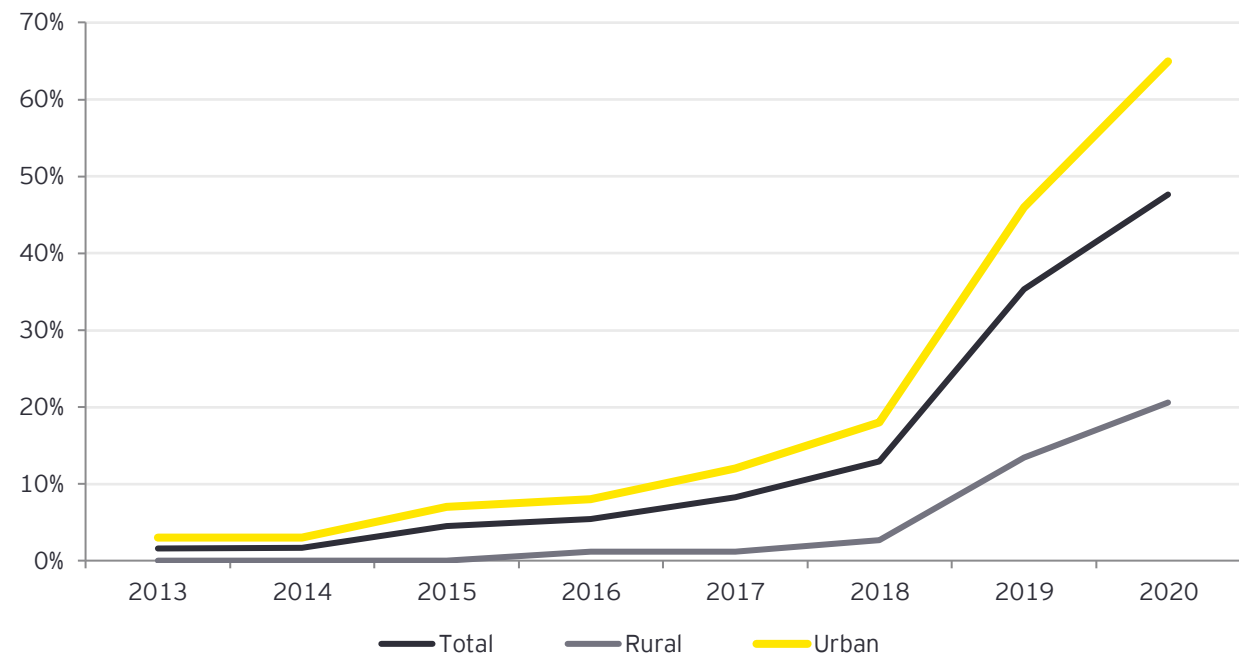
The NBP has helped focus the market on the economics of rollout, resulting in a rapid increase in high-speed broadband coverage.

The original NBP, published in 2012, envisaged that state intervention would be required to connect over 900,000 households and businesses across the State. At that time, it seemed unlikely that the private sector would deploy to these premises. Just under 700,000 households in Ireland are classed by the EC as being rural, highlighting that the original NBP was seeking to cover not only rural areas but also sub-urban areas where the cost challenges of deploying FTTP networks suggested that the private sector would not deploy in these areas.

As shown earlier in this section, the private sector has now covered up to 58% of households in the State with Gigabit-capable networks. The NBP process since its inception has contributed to a greater focus by private sector providers on the economics of network rollout and how best to deliver more widespread coverage in Ireland, helping to drive innovation and to support new business models. The State's mission-focus of providing high-speed broadband to all households has likely "crowded in" private investment. The increase in the market focus on fibre broadband rollout since the initial announcement of the NBP has reduced the size of the Intervention Area to almost 560,000 premises where there is true market failure.

For example, in 2017, Eir committed to rolling out FTTP broadband to an additional 300,000 rural homes that were initially judged to be part of the NBP Intervention Area and delivered an additional 40,000

FTTP broadband coverage in Ireland, 2013-2020 (% of households)



Source: EU Commission, Connectivity Studies 2021

premises. This commitment reduced the size of the Intervention Area and meant that more rural homes could benefit from high-speed broadband earlier and without the need for state intervention. Additionally, SIRO, a joint venture between Vodafone and the Electricity Supply Board (ESB), launched in 2015, making use of ESB's energy infrastructure to deliver FTTP to more households on a commercial basis. These developments have led to an acceleration in the deployment of FTTP from 2017 onwards.

As can be seen from the chart, the acceleration of FTTP has benefited urban areas more than rural areas. The upgrade of the cable network has also primarily benefitted people living in urban areas - of the 860,000 households in Ireland covered by DOCSIS 3.1

networks in 2020, less than 3% are in the areas defined as rural by the EC.

EC data shows that 27% of FTTP-covered households overlap with those which can access DOCSIS 3.1 cable, highlighting that FTTP deployment is largely complementary. However, this also highlights that some have a choice of competing Gigabit-capable networks, but those in areas where it is not economic to deploy networks are reliant on lower quality broadband which may not provide a high-speed and reliable connection. Therefore, these people are at risk of being left behind in terms of access to reliable services.

## Introduction

# The State intervention in the NBP will mean that Ireland will meet its Digital Framework target for ubiquitous access by 2028.

Despite the critical importance of broadband connectivity, many countries have struggled to meet the targets set by the EC. In 2010, the EC set a target to provide all Europeans with access to broadband with speeds in excess of 30 Mbit/s by 2020. An audit of this initiative conducted in 2020 found that only 52% of households had a connection with speeds of at least 30 Mbit/s, while speeds in excess of this were unevenly distributed, with a clear divide between well-connected urban centres and remote rural areas.<sup>6</sup>

EU-wide performance against this target illustrates the challenges felt by a wide range of countries of providing universal high-speed broadband. Given the economic unviability of private sector provision in such areas, many countries have adopted a similar strategy to that of the NBP where governments have stepped in to support funding of broadband infrastructure in areas of market failure.

For example, in 2013, the French government launched a national broadband programme, 'Très Haut Débit'. This plan sets out a commitment by the State to invest in the provision of high-speed broadband in rural markets that would not be commercially viable for commercial operators, representing 45% of all premises. The aim of the plan is to provide all households with a minimum broadband coverage of 30 Mbit/s by 2022 and subsequently upgrade to fibre throughout the country by 2025.<sup>7</sup> In order to achieve this, it is expected that up to €20 billion of public and private investment will be required.<sup>8</sup>



As noted, the targets set by the EU for 2030 are even more ambitious than those set in 2010 - for every citizen to have access to a Gigabit-capable network. Many countries across the EU will require state intervention to meet these targets, and some may be at risk of missing the targets.

Through the development of the NBP, the State is well-positioned to achieve this target ahead of schedule as outlined in the new Digital Ireland Framework, with all households having access to a future-proof, Gigabit-capable network by 2028, two years in advance of the EC target. As highlighted in this section, the economics of broadband deployment would mean that this target would not be met in the absence of an intervention by the State.

The intervention in the NBP will therefore enable:

- ▶ All citizens having equal access to digital services which can enrich their lives, reducing digital inequality
- ▶ All businesses to be able to access the digital economy and compete on fair and equal terms
- ▶ Meeting Digital Ireland Framework targets and highlighting the strength of digital progress in the State
- ▶ Greater economic resilience to deal with future economic shocks such as COVID-19
- ▶ Providing the foundation to support a broad range of policy goals, as set out on the next page

## Introduction

The NBP will play a key role in facilitating the success of a number of the Irish Government's policy goals.

The NBP underpins the Irish Government's strategy across a number of key sectors including climate, agriculture, education, transport, tourism, sustainable growth, jobs and health.

The connectivity delivered by the NBP will support a number of key policy frameworks:

### Project Ireland 2040 and the National Development Plan

Project Ireland 2040 is the Government's long term overarching strategy to enhance regional connectivity and competitiveness, improve environmental sustainability and build a fairer, more equal Ireland. It is supported by the National Development Plan 2021-2030, which details approved Government investment to support progress towards the outcomes envisaged under Project Ireland 2040.

The NBP is a key enabler for Project Ireland 2040, supporting balanced regional development. The National Development Plan states that: *"The NBP will play a major role in promoting balanced regional development as part of a sustainable and equitable post-pandemic recovery. Citizens and businesses in remote areas will enjoy the same opportunities to benefit from a connected and digital economy as those in urban areas"*.<sup>8</sup>

Ireland has embraced the digital economy: it was ranked number five among EU Member States countries by the European Commission in its Digital Economy and Society Index\* (DESI).<sup>9</sup> However, poor rural connectivity is holding Ireland back and this means that communities across Ireland are not benefitting from new digital opportunities in the same way.

### Climate Action Plan

The NBP will support the Irish Government's target of cutting greenhouse gas emissions by 51% by 2030 and reaching net-zero by 2050 by enabling remote working and creating new local employment opportunities, reducing commuter transport energy use and emissions. Better connectivity will also reduce the need for business travel and the associated carbon emissions, and can reduce the need for physical goods (e.g. newspapers, DVDs).

### Remote Working Strategy

Ireland's national remote working strategy aims to ensure that remote working is a permanent feature in the Irish workplace in a way that maximises economic, social and environmental benefits.

The NBP is an essential component to the success of the strategy, providing the high-quality digital infrastructure to support remote working across all of Ireland, regardless of where people live.

### Rural Development Policy

The NBP is a key enabler for Ireland's Rural Development Policy 2021-2025, which aims to address the challenges facing rural areas and support rural development.

The Rural Development Policy considers that high-quality digital connectivity is essential to support remote working in rural Ireland, to have a transformative effect for rural businesses, farms, schools and communities, and to support social cohesion and equality.

\*Note: The DESI summarises indicators on Europe's digital performance and tracks the progress of EU countries.



02

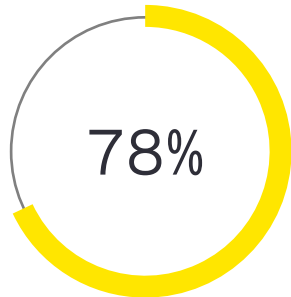
Overview of  
the National  
Broadband  
Plan



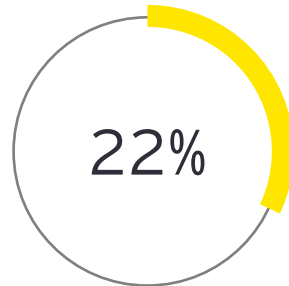
## Overview of the NBP

### The Intervention Area covers the length and breadth of the country.

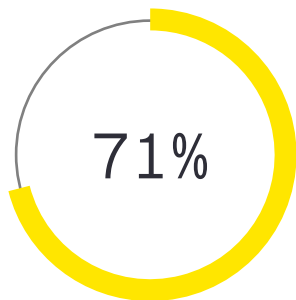
As part of the NBP, the State will fund the roll out of high-speed broadband to households and businesses in market failure areas, where private companies have no plans to invest due to the relatively high cost of roll out. The NBP Intervention Area comprises 96% of Ireland's land mass and will ensure all premises have access to high-speed, reliable broadband.



residential premises

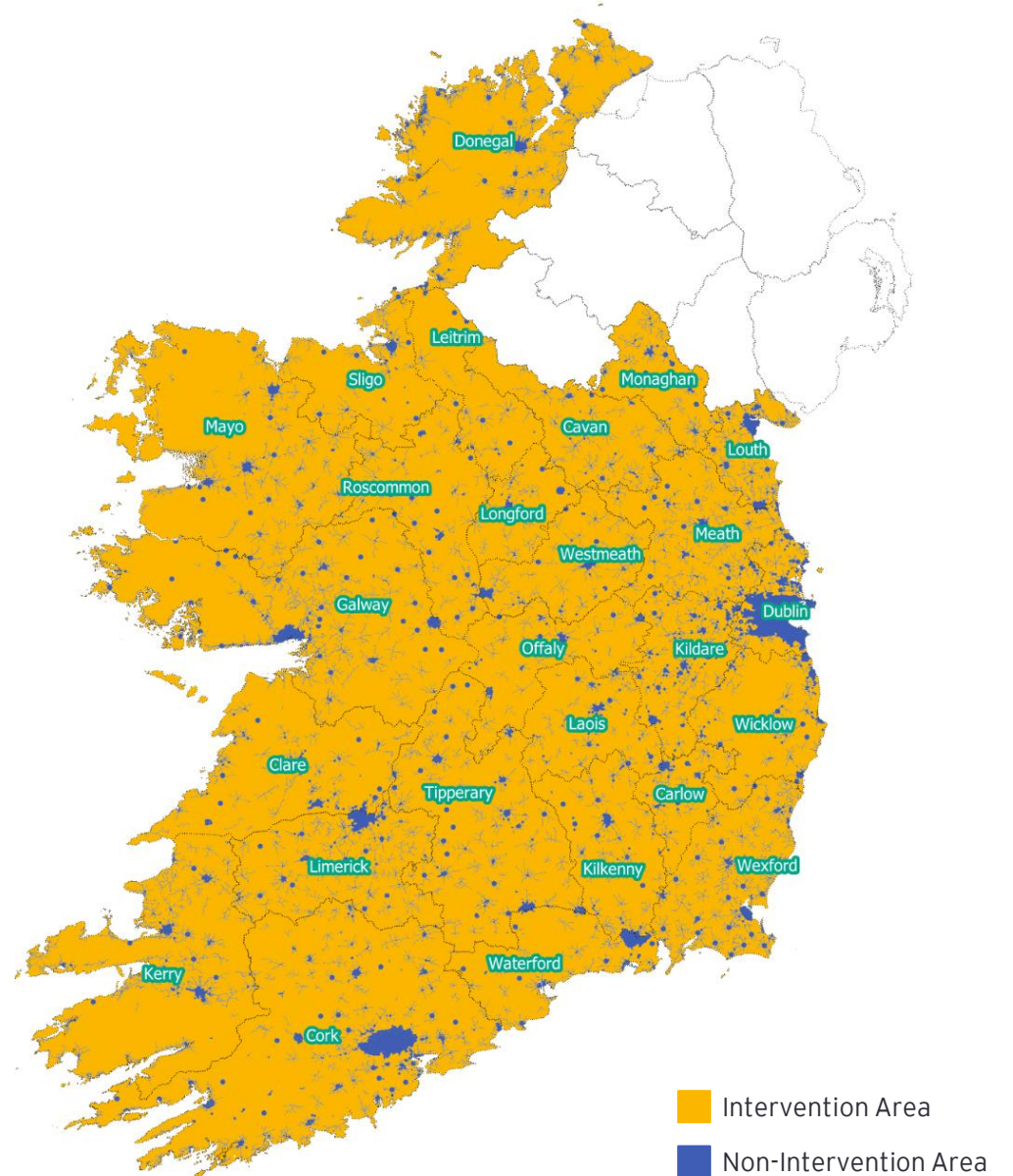


commercial premises



of enterprises in the Intervention Area are in Agricultural sector

### Map of the Intervention Area

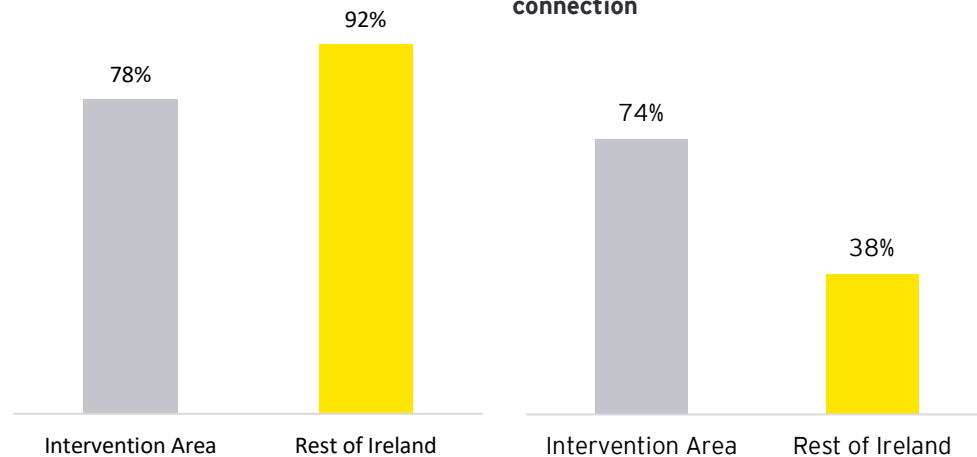


## Overview of the NBP

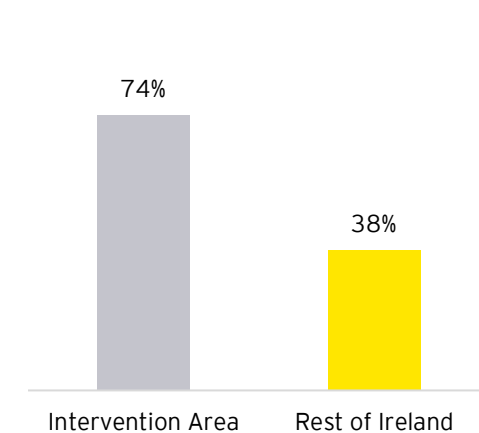
There is pent up demand for better broadband in the Intervention Area, which will be met by state intervention.

Average broadband speeds outside the Intervention Area are higher due to the availability of fibre, cable and better quality copper broadband, allowing people to access a range of services online. Despite extensive commercial investment across the rest of Ireland, connectivity is much more limited in the Intervention Area. Households in the Intervention Area are less likely to have access to fixed broadband at home compared to households in the rest of Ireland, and are more likely to say they would benefit from faster broadband. This disparity in access to broadband demonstrates the enduring challenge of improving connectivity in the Intervention Area in the absence of state intervention.

**Proportion of households with access to fixed broadband**



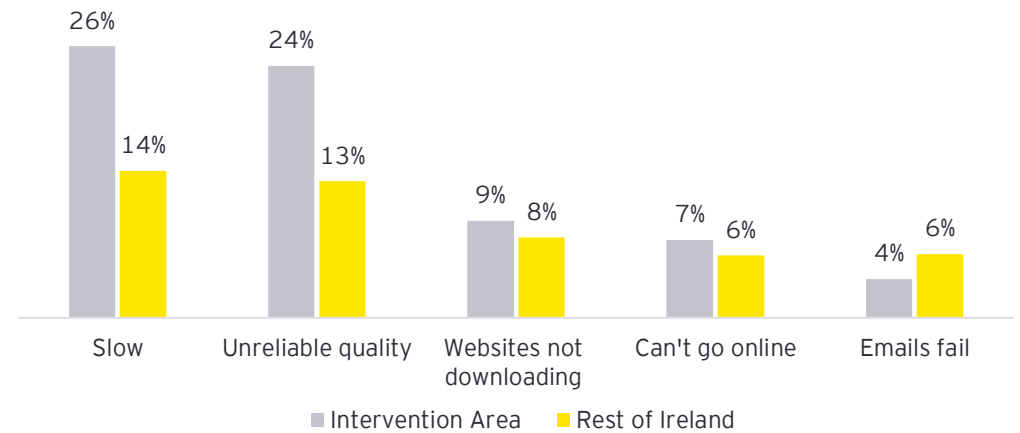
**Proportion stating their household would benefit from a faster broadband connection**



Due to the widespread availability of high-quality, high-speed networks, households in the Intervention Area are more likely to have broadband connections that are frequently slow or of unreliable quality than households outside the Intervention Area, demonstrating the benefits of next-generation broadband.

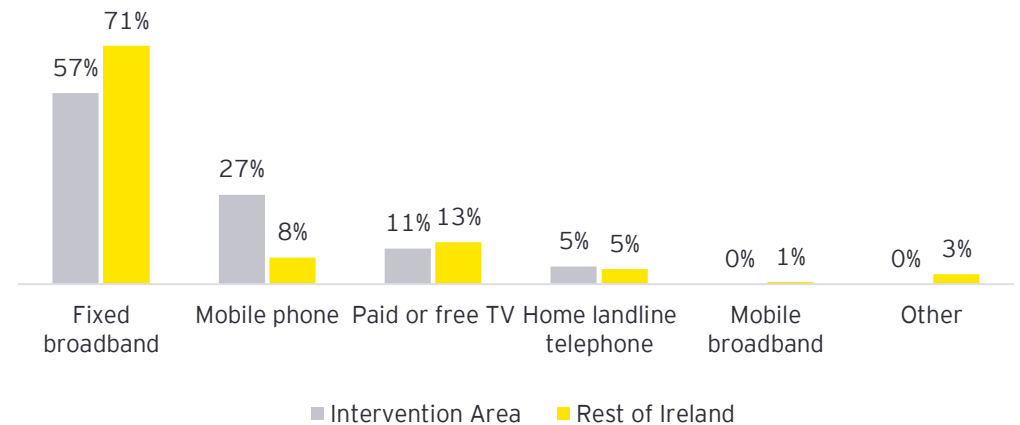
Data for all charts sourced from ComReg Broadband Connectivity Survey, fieldwork September to December 2020.

**Frequency of experiencing problems with broadband very often or often**



While fixed broadband is the most important element of the communication bundle across Ireland, mobile phones are more important for those in the Intervention Area compared to those in the rest of Ireland. While mobile connections give households some of the benefits of broadband, the network providers face similar challenges to fixed connection providers. Mobile broadband connectivity in rural areas is often poorer than in urban areas due to similar challenges to fixed networks in the economics of network rollout.

**Most important element of bundle**





## NBI has been carrying out a detailed planning exercise and is connecting homes in the Intervention Area to its network.

Significant preparatory work is required to roll out a high-speed, reliable broadband network efficiently. NBI, the company building the State-funded broadband network in the Intervention Area on behalf of the Government, has been physically surveying the Intervention Area since January 2020 and is now connecting businesses, schools and homes in the Intervention Area.

### 01

#### Surveying

Physical surveys of townlands is required to examine the existing pole and duct network for inclusion in the design

### 02

#### Design

NBI carries out a detailed design process. The NBP Unit in DECC reviews and approves NBI designs.

### 03

#### Build

After the designs have been approved, works start on the ground to build the infrastructure.

### 04

#### Build complete

NBI 'pass' the premises with fibre. Consumer orders can be submitted to retail service providers

### 05

#### Consumer orders received

Retail service providers will receive orders from customers

### 06

#### Consumers connected

Consumers are connected to high-speed fibre broadband by retail service providers

To accelerate the benefits of the State-funded network in the Intervention Area, NBI has delivered high-speed broadband to specified Broadband Connection Points (BCPs) across Ireland. The BCPs in public places will leverage the connection through a range of initiatives, including free public Wi-Fi and digital hub business centres where digital training, business information events and other SME supports are organised. As of April 2022, there are at nearly 600 BCPs installed.

As discuss further in Section 5 of this report, connectivity has proved vital for education during the pandemic and subsequent lockdowns as schools across the world closed. By 30 April 2022, NBI had installed 298 BCPs in primary school schools in the Intervention Area, with 101 now connected and plans to connect almost 680 in total by mid 2023.

The progress has been made despite the challenges posed by COVID-19, which slowed down infrastructure projects across the world as issues in the supply chain made it more difficult to source materials and for engineers and other staff to travel.

### Progress to date

40 retail service providers actively selling services and 54 signed up

574 publicly available BCPs connected

175,330 premises with build underway

47,123 premises available for order

Source: NBI

## Overview of the NBP

State investment will also ensure adoption of high-speed broadband to unlock the benefits of the NBP.

In many countries, state intervention to support rural broadband networks is focused on providing a subsidy to 'pass' premises with the network. Customers may have to pay an additional cost to cover the final connection. For some of the most rural households, these final connection costs could potentially disincentivise adoption of the new network. For example, the UK's broadband universal service obligation requires BT to provide a 'decent' broadband connection - with a download speed of at least 10 Mbit/s and an upload speed of at least 1 Mbit/s - to eligible households. However, households may need to pay to receive the connection depending on the cost of upgrading the local network. If the total cost is £3,400 (c.€4,000) or less per premises, the customer will not have to pay for the work. However, if the build cost is more than £3,400, customers need to pay the excess costs to obtain the connection.

In contrast, the State intervention in Ireland aims to ensure premises are connected to a Gigabit-capable network, and not just 'passed' with fibre. The NBP contract includes initiatives to stimulate demand among households; for example NBI must develop, specify, maintain and implement a Demand Stimulation Project Plan, detailing Demand Stimulation initiatives. The NBP contract also ensures a typical connection charge of €100 for households, providing an affordable connection to premises passed by the new network.



03

Economic  
benefits







State intervention is expected to drive significant economic benefits, bring new opportunities to rural parts of Ireland and attract investment.

In this section, we highlight some of the economic benefits that State intervention is expected to bring to the Intervention Area and wider society. While many benefits can be identified and monetised, the infrastructure rollout will likely yield other benefits (e.g. emerging technologies) in the long run which can not yet be anticipated.

### Structural changes triggered by COVID-19 could mean the benefits of the NBP are higher than initially anticipated

In 2019, following the submission of the Final Tender for a supplier to rollout to the Intervention Area, the Irish Government commissioned a cost-benefit analysis of the NBP.<sup>10</sup> The objective of this cost-benefit analysis was: “to assess the extent to which a State intervention to support the attainment of the primary NBP objective of universal NGA (Next Generation Access i.e. high-speed broadband) will yield a positive return to Irish society”.

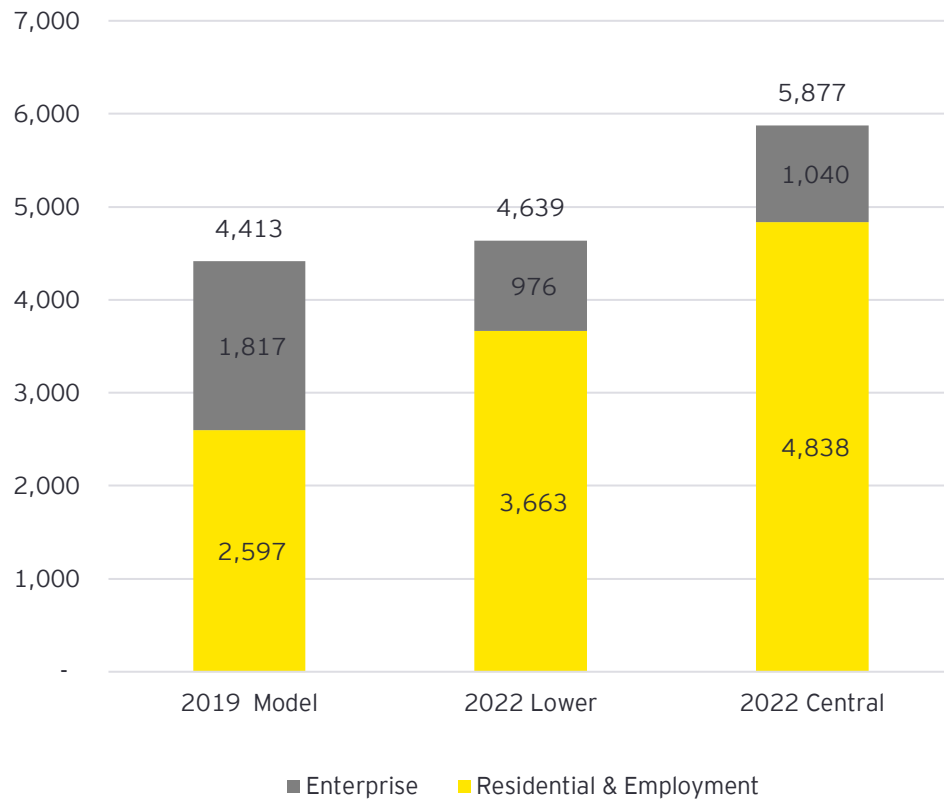
The cost-benefit analysis considered a range of benefits, including benefits to residential premises, farm enterprise, non-farm enterprise in the Intervention Area, enterprise outside the Intervention Area and benefits to employment. It weighed these benefits against the costs of the NBP to the State and to the operator. The cost-benefit analysis was positive for all scenarios considered, meaning that the benefits of the programme were deemed to be greater than the costs. Under the central scenario, the ratio of benefits to costs was 1.43, i.e. every €1 spent delivers €1.43 in benefits.

Since the final cost-benefit analysis was carried out in November 2019, the assumed costs associated with the NBP have not materially changed. However, there have been some significant economic developments since 2019 that could mean that the benefits associated with the NBP could be much higher than initially anticipated. Primarily, one of the key residential benefits considered in the initial cost-benefit analysis was increased remote working. The COVID-19 pandemic has fundamentally changed attitudes to remote working and significantly increased its prevalence in many sectors of the economy, increasing the benefits beyond those considered in the initial cost-benefit analysis.

## Economic benefits

EY has re-examined some of the initial benefits captured in the 2019 analysis in light of the impact of COVID-19 on the economy, appraising two new scenarios of a Central and Lower Case\*. The remainder of the assumptions for farming and commercial enterprise benefits were unchanged to provide a like-for-like comparison with the 2019 analysis. The results show a significant increase in total monetised benefits to €4.6bn-€5.9bn versus the 2019 analysis estimate of €4.4bn. This implies the benefits of the NBP could be over €1.5bn higher over the 25-year appraisal period than initially estimated in 2019.

### Revised estimated benefits for NBP Plan (€b)



Source: DECC, PWC, EY

\*Note: The Lower Case is a more conservative scenario compared to the core assumptions in The Central Case.

## Remote working the key driver of increased NBP benefits

The central assumption in the 2019 cost-benefit analysis was that just 20% of white collar workers remotely for 20% of the time. However, COVID-19 is now expected to lead to a permanent increase in the prevalence of remote working in Ireland, according to recent industry and employee surveys. A national survey in November 2021 of Irish employees across a wide range of sectors found that 65% of respondents continued to work remotely, despite just 23% never working remotely before COVID-19.<sup>11</sup> The shift to remote working is unlikely to reverse even when the pandemic is over: the survey found that the majority of respondents (88%) would like to work remotely after the pandemic, either part- or full-time. A business survey by IBEC, found almost three-quarters of companies (74%) planned to introduce hybrid working in their organisations over the next 2-3 years.<sup>12</sup> Given these significant structural changes, EY modelled the impact on the benefits of the NBP through a number of channels. These are:

- ▶ Benefits to households in the Intervention Area through time and travel cost savings
- ▶ Benefits to non-Intervention Area enterprises through reduced absenteeism from Intervention Area workers
- ▶ Benefits to society through lower carbon emissions from reduced commuter trips; and greater access online services such as GP visits, and retail outlets

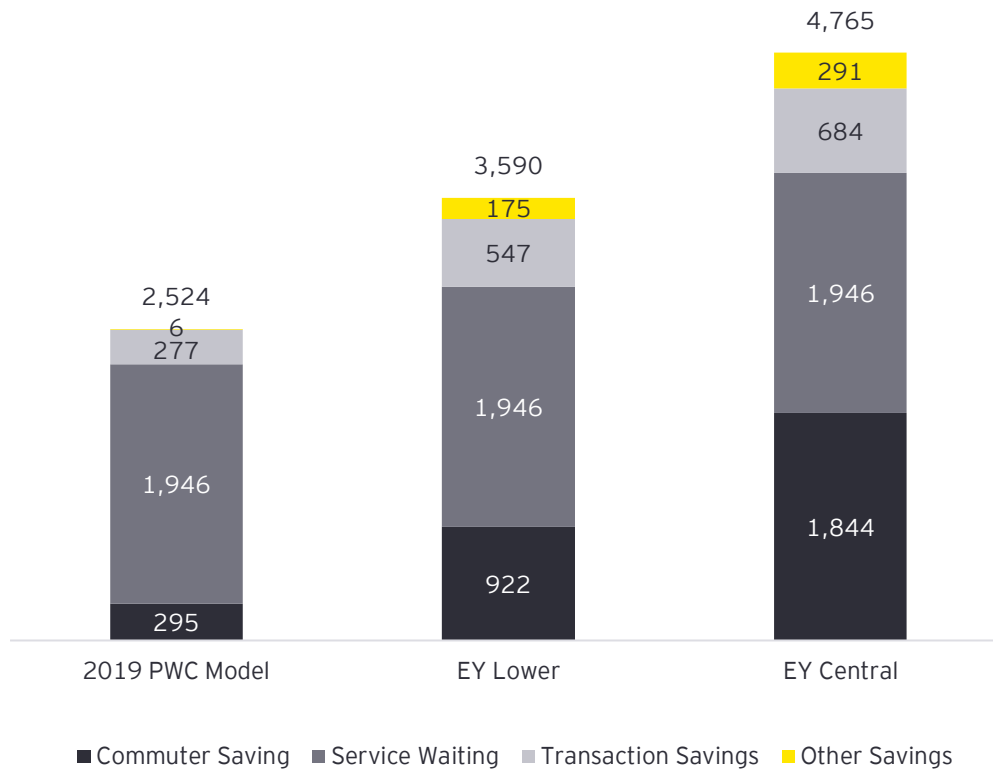
EY's Lower Case made a conservative assumption that 50% of white collar workers work remotely for 25% of the time, and a Central Case assumption that 50% of white collar workers will work remotely for 50% of the time. Compared to the initial cost-benefit analysis in 2019, updating these assumptions results in significant incremental benefits of between around €261 to €522 per household each year in the Intervention Area, largely due to travel time and fuel cost savings.

EY also estimated the impact of reduced greenhouse gas emissions from fewer commuter trips. This analysis was based on the number of car kilometres saved by an average white collar worker at an annual carbon price in line public spending code guidance. However, increased home energy usage reduces this net carbon reduction. Assuming additional energy use for remote workers over a 6-month autumn and winter period creates a disbenefit from increased carbon emissions, but overall, a net carbon benefit of €10-20 per household is still generated by remote working. The monetary cost of energy is assumed to be offset from businesses to households, therefore generating no additional economic impact.

## Economic benefits

These assumption changes generate significantly higher benefits for the NBP over the 25 year appraisal period. Total residential benefits increase from the €2.6bn estimated in the 2019 analysis to €3.6bn and €4.8bn in the Lower and Central Cases. This is largely generated by commuter savings from the increase in remote working in the intervention area, with more modest contributions from carbon savings, eHealth access, and increased internet shopping (transaction savings).

### Revised residential benefits for NBP Plan (€b)



Source: DECC, PWC, EY

Alongside remote working, consumer behaviours have also shifted significantly in access to public services such as health and the prevalence of online shopping. The proportion of spending that is online has increased significantly, and while equivalent data does not exist for Ireland, data for the UK suggests that the proportion of retail sales that was online rose from 9.3% in 2012 to 19.2% in 2019.<sup>13</sup> The outbreak of COVID-19 has accelerated this trend, with data for the UK suggesting that spending online increased to 29.1% in 2021. Assuming a similar progression of online spending in Ireland, EY modelled the impact of higher online spending, increasing the 2019 cost-benefit analysis assumption of 10% of household spending online to 15% and 20% in the Lower and Central Cases, respectively. This results in increased benefits of between around €77 to €115 per household each year compared to the 2019 analysis.

Health benefits were not captured in the final 2019 cost-benefit analysis. However, the impact of the pandemic has shifted some consultations online. While there is a lack of evidence in Ireland for eHealth services, the international evidence is explored in further detail in the Societal Benefits chapter of this report. In analysis, EY modelled the impact of shifting GP consultations online based on an average of 4.3 visits per annum per person.<sup>14</sup> This results in an annual benefit of €19 to €24 per household. Combined, these assumption changes for online shopping and health generate a relatively modest €615m to €770m in the Lower and Central Cases.

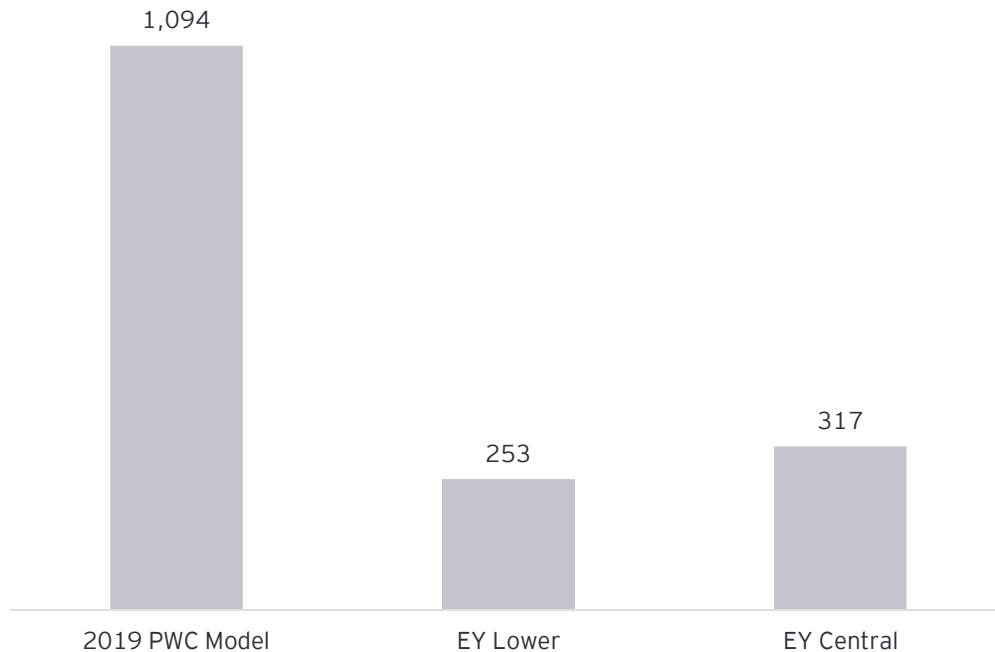
### Remote working generates benefits for non-Intervention Area enterprises

The 2019 cost-benefit analysis also considered the productivity benefits to businesses outside the Intervention Area driven by remote workers living in the Intervention Area. The analysis assumed a 35% increase in productivity for people employed by businesses outside the Intervention Area who would be able to work from home due to the NBI network rollout. However, since the initial cost-benefit analysis was carried out, there has been significantly more data and analysis on the productivity benefits of remote working. The evidence is currently inconclusive, with some studies suggesting that productivity for remote working is lower and some studies suggesting productivity is significantly higher.<sup>15</sup> Rather, the benefits of remote working to households are likely to accrue in better work-life balance and quality of life, through reductions in long distance commuting and greater leisure time.

## Economic benefits

EY reviewed the analysis in light of the new evidence and concluded that a long-term productivity gain could not be attributed to those who remote work. Therefore, benefits are driven only by the assumption that remote workers had reduced rates of absenteeism rather than any productivity boost. The results show a reduction compared to the 2019 analysis, which found a benefit of 0.95% of gross value added (GVA) per worker\*. EY's Lower Case scenario results in a lower - but still positive - benefit of 0.22% of GVA. The Central Case assumption for the productivity results in a higher benefit of 0.28% of GVA due to the higher volume of remote workers. These assumption changes generate lower benefits for the NBP over the 25 year appraisal period than initially estimated in 2019. Total non-Intervention Area enterprise benefits fall from the €1.1bn estimate in the 2019 analysis to between €0.25bn and €0.3bn in the Lower and Central Cases, respectively.

### Revised Non Intervention Area enterprise benefits for NBP Plan (€b)



Source: DECC, PWC, EY

\*Note: Gross Value Added (GVA) is a measure of economic activity which can be viewed as the incremental contribution to Gross Domestic Product (GDP).

## Remote working can support a larger, more flexible workforce

While the cost-benefit analysis monetised the impact of increased remote working for white collar workers in the Intervention Area, the realised benefits could ultimately be greater. The ability to work remotely is particularly beneficial for disabled people, parents and carers, and older people, who may currently like to work but struggle to do so due to their commitments at home. Remote working will also be formalised in legislation, with the Right to Request Remote Work Bill 2021 currently before the House of the Oireachtas, which will give both employers and employees certainty on the rights and obligations of remote working in Ireland.

By supporting remote working in this way, the NBP could expand the workforce and unlock broader economic benefits. Research commissioned by Openreach found that nationwide full fibre deployment in the UK, coupled with the cultural change in remote working brought about by COVID-19, could bring nearly 1 million more people into the workforce by 2025 by allowing them to work from home, including over 300,000 working-age carers, nearly 250,000 older workers and 400,000 parents of dependent children. The study estimated that this increase in participation would contribute £25 billion to UK GVA.<sup>16</sup>

In the longer term, a combination of the private sector and state investment in universal high-speed broadband coverage could unlock similar benefits for Ireland, bringing more people into the workforce. The research commissioned by Openreach estimated a 1.3% increase in GVA driven by the increase in participation in the workforce enabled by nationwide fibre broadband coverage. Applying the same percentage to Ireland, and assuming equivalent benefits are delivered, suggests that universal coverage of fibre broadband across Ireland could contribute an indicative €4 billion to Ireland's GVA.<sup>17</sup>



### State investment in the Intervention Area to date has supported employment and economic growth across the economy

While the benefits of broadband will largely be realised upon completion of the rollout to all parts of Ireland, the establishment of the NBI entity to implement the rollout is already having a significant impact on the Irish economy. Every time there is an injection of new demand into the economy, there is a multiplier effect. This is because an injection of extra income leads to more spending, which creates more output by firms, which continues throughout the supply chain. An economic multiplier shows the total additional activity generated across all sectors of the economy associated with a €1 increase in output by NBI. Key multipliers include output, GDP and employment.

As of 30 April 2021, NBI employs over 290 persons directly, up from 175 in the end of 2020. NBI also supports over 1,100 jobs through its subcontractors. In addition to this, it also indirectly supports through its supply chain across the country. The wages generated by these jobs also have a knock-on impact on the Irish economy through spending on goods and services by employees.

Crucially the main economic impact of NBIs activities are through its capital investment programme, supported by the state subsidy. In 2021, the infrastructure activities enabled by the state subsidy and NBI investment will generate c.€500m in output in the Irish economy, with an economic multiplier of 1.85x associated with this type of construction activity. The gross value-added (GVA), or GDP contribution, to the Irish economy is estimated at €150m in 2021. This annual economic impact will grow as the rollout activities expand across the country in the coming years.

### Broadband can drive balanced regional development

The NBP is a key enabler for the objectives of Project Ireland 2040 and the most recent National Development Plan to support balanced, sustainable economic growth across the State, making opportunities available to both urban and rural communities. Improving broadband connectivity can: bring new businesses and jobs to the Intervention Area; improve productivity for businesses located there by reducing outages and enabling new technology; and have multiplier effects across the local economy, supporting businesses throughout the supply chain and creating more jobs in the Intervention Area.

Limited analysis has been carried out to assess the economic impact of rolling out high-speed broadband for Ireland. However, the UK has invested in state-funded broadband since 2010/11 through the 'superfast broadband' rollout programme - capable of providing download speeds of at least 30Mbit/s, generally delivered through a mix of copper and fibre networks. Despite having a larger population than Ireland, the UK is facing many of the same issues as Ireland in rolling out high-speed broadband to rural premises. Given the proximity and similarities between the UK and Irish economies and the lack of analysis specific to the Irish market, we have reviewed the economic impact of the UK's superfast broadband rollout programme to understand the potential benefits for Ireland. The UK programme of state-funded broadband has demonstrated significant value for money. For example:

- ▶ In 2021, the UK Government commissioned an evaluation of the superfast broadband rollout programme.<sup>18</sup> The report compared the cost of the programme in terms of net public spending with the economic and social benefits, which included local employment impacts, turnover, impact on firms, wages, unemployment and house prices. The report found that the estimated benefit to cost ratio was £2.70 to £3.80 per £1 of net public sector spending based on its impacts between 2012 and 2019. Allowing for future economic benefits to 2030, the BCR was estimated to rise to £3.6 to £5.1 per £1 of net public sector spending.
- ▶ Previous analysis of the UK superfast broadband programme from 2018 found that postcodes benefitting from subsidised coverage saw employment rise by 0.8% and turnover grow by 1.2%.<sup>19</sup> The research suggested that the economic impacts of broadband increase substantially with faster speeds.

## Economic benefits

We expect similar benefits will be realised in Ireland as a result of state intervention but these benefits may be more transformational for the Intervention Area than those seen in the UK study due to NBI's deployment of a broadband network capable of providing higher speeds. The UK's superfast broadband scheme focused on rolling out FTTC, which typically delivers speeds of 38Mbit/s or higher, compared to the network rolled out by NBI, which will offer a minimum download speed for its standard products of 500Mbit/s, with the option of purchasing a 1Gbit/s product once the network is live.

Research carried out by Openreach for the UK indicates significant economic benefits of rolling out full-fibre broadband. It published analysis suggesting that nationwide rollout of full fibre in the UK could result in a £59 billion boost to UK productivity by 2025.<sup>20</sup>

### Large investment programmes will contribute to economic growth and can support recovery following COVID-19

Governments across the world are recognising that large investment programmes can stimulate economic growth and can support economic recovery following the pandemic and subsequent lockdowns. The EU is providing funding to support economic recovery and resilience through its €750 billion Recovery and Resilience Facility. Connectivity is one of the key pillars of the plan, with the Commission stating that it *"encourages Member States to include in their recovery and resilience plans investments and reforms aimed... at the fast rollout of very high capacity networks"*.<sup>21</sup> Accordingly, 20% of the €750 billion fund will go towards high-speed networks.

The EC has endorsed Ireland's recovery and resilience plan, stating that *"it will enable Ireland to emerge stronger from the COVID-19 pandemic"*.<sup>22</sup> The Commission's positive assessment was linked to the effectiveness of the Irish Government's plan to support digital transition, finding that the State planned to devote 32% of its funding allocation to measures supporting digital transition, including enhancing connectivity. But for full digital transformation, and to maximise the economic benefits, all of Ireland will need to be connected, with no one left behind. This is the role of state intervention.

### Migration of workers from urban areas to the Intervention Area can boost the local economy and improve problems associated with living in cities

A national survey in October 2020 of Irish employees found that 23% of respondents would consider relocating to another location in Ireland due to their experience of remote working since COVID-19. The proportion of respondents saying they would consider relocating in Ireland was higher in Dublin than in any other region, at 29%.<sup>23</sup>

Migration of workers from urban areas to the Intervention Area, made possible by digital infrastructure to support remote working, would drive local economic benefits. New workers moving to the area would spend their salaries with local businesses, creating more employment opportunities for local people and boosting demand for local services. Increased demand would lead to increases in property prices.

More remote working could deliver other benefits by allowing people to live further away from the places where they work. This could help to address higher property costs and congested transport networks in areas like Dublin, as well as addressing a lack of jobs and opportunities in the Intervention Area.

### Broadband can develop a local digital ecosystem, unlocking significant economic value

The state-funded rural broadband network can diversify the types of industries located in the Intervention Area, supporting a local digital ecosystem. For example, the network could support businesses currently located in the Intervention Area to expand into new services or to manage their businesses online. Additionally, state intervention could attract new businesses to the Intervention Area, fostering start-up growth, driving an innovative culture and increasing business diversification by providing the foundation for new service offerings. While the current connectivity in the Intervention Area inhibits the growth of e-businesses, access to FTTP broadband could support e-commerce businesses, cloud computing and other online-based industries.

Small and medium sized enterprises (SMEs) in Ireland are leaders in digital: the EC ranked Ireland first out of 28 countries for integration of digital technology, with SMEs excelling in e-commerce.<sup>24</sup> The NBI network will bring these opportunities

## Economic benefits

to the Intervention Area, balancing the economy across Ireland, fostering innovation and entrepreneurship, which in turn would have local social and economic benefits.

### High-speed digital infrastructure contributes to economic resilience

The pandemic caused economic shock across the world, with lockdowns to manage the virus requiring shops and businesses to close. However, evidence suggests that online platforms played a role in mitigating economic shock during the lockdowns:

- ▶ Analysis by the Organisation for Economic Co-operation and Development (OECD, an intergovernmental economic organisation) found that online platform use increased markedly during the first half of 2020, when many countries imposed lockdowns. The study found that countries with higher levels of economic and technological development, easier access to infrastructure and connectivity, better digital skills, and wider Internet use tended to experience a larger increase in the use of online marketplaces, possibly mitigating the negative effects on output and jobs of the COVID-19 shock.<sup>25</sup>
- ▶ Analysis by the International Telecoms Union (ITU, a United Nations agency) found that, while research on the contribution of digitisation to mitigate the impact of pandemics is limited, initial analysis suggests that in the medium term countries with top connectivity infrastructure could mitigate up to half of the negative economic impact. The research suggested that the digital divide was the primary limitation to the role of digital infrastructure in mitigating some of the economic and social impacts of the pandemic.<sup>26</sup>

The NBP will support a more flexible economy, strengthening Ireland's resilience to any future shocks.

### The NBP could help drive cost benefits through the retirement of the copper broadband network

As next-generation high-speed, high-quality networks are rolled out, operators across Europe are increasingly looking to retire their legacy copper networks. There are significant cost and environmental benefits to switching off and removing the copper network. Analysis has found that copper switch off saves 40-60% on energy costs and fibre saves 40-60% on maintenance costs.<sup>27</sup>

### Improved connectivity can attract more investment from abroad

High-quality infrastructure is an important factor attracting foreign direct investment (FDI), including transport infrastructure as well as connectivity. Research suggests that broadband access is one factor positively associated with the attractiveness of a given location for FDI.<sup>28</sup> Partly due to this factor, FDI generally clusters around cities and large towns, with few investments in rural areas.

By improving connectivity across Ireland, the NBP could support more FDI. While investors are still likely to focus on regional towns rather than fully rural areas, more hybrid and remote working following COVID-19 could mean that people work in regional towns but live in the nearby country and villages, with increased FDI across Ireland supporting these opportunities. Improved connectivity could attract different types of FDI to the Intervention Area, including more digital businesses and services-type investment.

“We have a strategy of pursuing regionalisation where possible. We always give investors the option of a location other than Dublin. But for FDI to grow out of Dublin, we need to improve capital infrastructure across Ireland in the broadest sense. Digital infrastructure needs to be available across Ireland at a quality that can support enterprises of all types, so that companies don't feel like they're at a disadvantage compared to being in the big cities.”

- IDA Ireland



## Economic benefits

Nationwide high-speed broadband could unlock digital dividends

Currently, free-to-air television is transmitted via airwaves, referred to as the radio spectrum. Radio spectrum can be hugely valuable, particularly for mobile use. For example, in 2012, mobile network operators in Ireland paid €854.6m for spectrum to enable the rollout of 4G mobile services, of which €450m was paid to the Exchequer in the first year following the spectrum auction.

In the long term, nationwide high-speed broadband coverage could provide the speeds and reliability required to deliver television services to households using the broadband network. This could enable further clearance of the radio spectrum for mobile use, improving the coverage and capacity of mobile services and resulting in valuable licence fee payments to the Government.

### The counterfactual

Failure to address the digital divide would risk enhancing economic inequality between urban and rural areas, denying economic opportunities to people and businesses based in the Intervention Area, and reducing the scope for rebalancing the economy.

This would have negative consequences across the whole of Ireland, holding back Ireland's economic growth and reducing Ireland's competitiveness and FDI compared to other countries with more ubiquitous coverage of high-quality digital infrastructure.

As broadband has been linked to economic resilience, failure to invest in broadband connectivity across the full economy could mean that the State is relatively more exposed to future economic shocks compared to countries with full coverage. The State could therefore suffer more economic consequences (e.g. deeper or longer recessions) as a result.

### Conclusion: Economic benefits

The NBP is a key enabler for Project Ireland 2040, driving balanced regional growth and supporting economic opportunity across the whole of Ireland. Accelerating the economic growth in rural areas will contribute to a more connected and equitable Ireland.







04

## Enterprise benefits

“29% of the total turnover generated by Irish SMEs comes from online sales, almost three times the EU average of 11%. On the other hand, Irish SMEs are just near or below the EU average when it comes to adopting other ‘e-business’ technology (e.g. supply chain management, enterprise resource planning, customer relationship management, radio frequency identification, etc.).”

- Ibec, Reboot and Reimagine Campaign, May 2020

## Enterprise benefits

Better connectivity will benefit enterprises based in the Intervention Area, helping them innovate, expand their businesses and reduce their operating costs.

In this section, we outline the range of benefits the NBP is bringing to enterprises connected under the plan. We outline the specific benefits to the agriculture and tourism sectors in two 'deep dive' case studies.

### High-speed, reliable broadband can allow businesses to offer new services to new markets, both within Ireland and to the rest of the world

Digitisation allows businesses to improve and diversify their products and services and to expand the markets they operate in, opening up new opportunities. The skills and appetite to support business digitisation are already present in Ireland: the EC's Digital Economy and Society Index (DESI) 2021 found Ireland ranks seventh among EU Members States for integration of digital technology by businesses, which refers to the digitalisation of businesses and e-commerce.<sup>29</sup>

Ireland outperforms the EU average on a number of metrics for the integration of digital technologies by businesses, particularly in e-commerce. Strength in e-commerce has numerous benefits for enterprises, allowing them to reach a wider market by trading across Ireland and across borders with the rest of the world. By broadening their markets, e-commerce businesses can benefit from economies of scale, reducing costs and improving productivity.

However, the current lack of access to high-speed broadband is holding back businesses in the Intervention Area and preventing them from realising the full benefits of digitisation. The NBP will ensure these opportunities are available to businesses across Ireland, cementing its place as an EU market leader.

### DESI 2021: Ireland country report, integration of digital technology

Indicator	Ireland	EU average
SMEs with at least a basic level of digital intensity <i>% SMEs</i>	66%	60%
Electronic information sharing <i>% enterprises</i>	28%	36%
Social media <i>% enterprises</i>	44%	23%
Big data <i>% enterprises</i>	23%	14%
Cloud computing <i>% enterprises</i>	41%	26%
Artificial intelligence <i>% enterprises</i>	14%	25%
ICT for environmental sustainability <i>% enterprises having medium/high intensity of green action through ICT</i>	67%	66%
e-invoices <i>% enterprises</i>	19%	32%
SMEs selling online <i>% SMEs</i>	32%	17%
e-commerce turnover <i>% SME turnover</i>	27%	12%
Selling online cross-border <i>% SMEs</i>	18%	8%

Source: EU Commission

## Enterprise benefits

### Reliable connectivity can improve productivity through reduced downtime and innovation

The full-fibre broadband rolled out by NBI is significantly more reliable than copper broadband, with far fewer faults and outages. Reducing outages can improve productivity by reducing downtime waiting for files to download and upload and by reducing employee frustration with unreliable connections.

Additionally, high-speed broadband can improve productivity by fuelling greater technological innovation for businesses in the Intervention Area by providing the digital infrastructure to support new technology adoption.

For example, high-speed broadband could allow businesses to take advantage of 'Internet of Things' (IoT) technologies, where a range of Internet-connected devices, such as sensors, computing devices, machines and objects, work together to drive significant productivity improvements for businesses by streamlining operations and automating processes. IoT connections are forecast to reach 24 billion globally by 2025, with enterprise forecast to be the main user of IoT connections.<sup>30</sup>

We discuss how new technologies like IoT could benefit businesses in the Intervention Area in more detail in our case study analysis.

### High-speed broadband can reduce operating costs

Adoption of new technologies, as discussed above, can reduce operating costs by making systems and processes more efficient and by providing access to scalable, cloud-based solutions. For example, connected sensors can detect potential issues before they occur, enabling predictive maintenance targeting signs of trouble and therefore reducing maintenance costs. Predictive maintenance can also reduce the downtime of equipment, again resulting in operational cost savings.

Businesses in the Intervention Area will also be able to reduce staff travel costs, as improved connectivity will make high-quality video conferencing possible. This will also support businesses and workers in the Intervention Area who wish to collaborate globally with colleagues and clients.

### Increased prevalence of remote working across Ireland could widen the talent pool for businesses based in the Intervention Area

Businesses that make remote working an option for their employees could open up the potential talent pool beyond the Intervention Area, attracting talent from across Ireland. This could ensure that businesses in the Intervention Area benefit from the best staff for all roles.

In Section 3, we set out the economic benefits of remote working in connectivity supporting a larger, more flexible workforce. Expansion of the workforce can also benefit enterprises, broadening the talent pool and allowing enterprises to benefit from the skills of people who may otherwise find it challenging to work due to caregiving responsibilities or disability.

We set out the individual benefits of remote working in Section 6 of this report.

In the remainder of this section, we consider how the NBP could benefit enterprises in the agriculture and hospitality sectors. As noted in the introduction, these sectors are most relevant to the majority of enterprises based in the Intervention Area.



## Focus On: Agriculture

Around 66,000 enterprises in the Intervention Area are in the crop and animal production, hunting and related services sector, representing 71% of all enterprises and 14% of all premises in the Intervention Area. On this page, we demonstrate some of the cutting edge technologies, enabled by high-quality fixed connectivity, that are used by leading enterprises in the agricultural sector.

On the following pages, we consider the benefits of high-speed broadband for enterprises in the agricultural sector and how these benefits could be realised in future.



Technology in farming can help farmers to maximise production, increase efficiency and realise cost savings. These technologies can include:

- ▶ **Connected sensors** to monitor crops and livestock in real-time and to inform assessments of productivity.
- ▶ **Advanced analytics** of processes and output.
- ▶ **Robotics and autonomous vehicles** to automate planting.
- ▶ **Buying and selling online**, expanding the potential market for the farm's output.

Reliable, fast fixed and mobile connectivity is a crucial enabler for many of these technologies. State funding therefore plays an important role to give farms in the Intervention Area the same opportunity as their peers and competitors across the world.

Irish Farmer's Association reported **average cost savings of €5,600**, and **average greenhouse gas emission reductions of 9%** through adoption of smart farming techniques in 2020.<sup>31</sup>

Successful implementation of connectivity in agriculture could add **\$500 billion in additional value to global GDP by 2030**, representing a **7 to 9% improvement** from its expected total.<sup>32</sup>

Nearly **12 million agricultural sensors** are predicted to be installed globally by 2023.<sup>33</sup>

Smart farming techniques can allow farmers to reduce **chemical application by up to 80%**, **water use by 20-50%** and **fuel burned by 40%**. Full adoption of precision farming could **increase yields by 60-70%** for corn, for example.<sup>34</sup>

The Hands Free Hectare, a project in England, is the first in the world to grow, tend and harvest a crop **without operators in driving seats or agronomists on the ground**. The project has completed two successful cropping cycles.<sup>35</sup>

Using remote-sensing technology to identify unproductive land could save US corn and soybean farmers an **estimated \$500 million in fertiliser costs** and **save 6.8 million metric tons of carbon dioxide equivalent** from unused nitrogen fertiliser.<sup>36</sup>



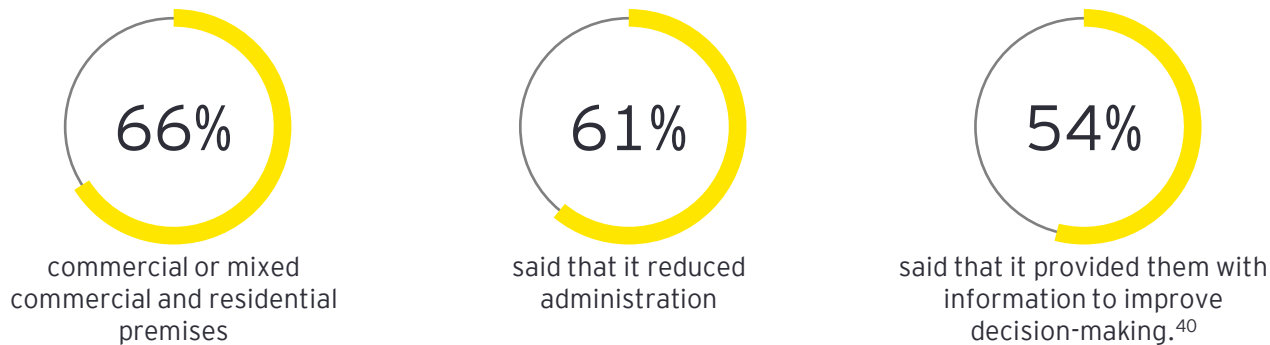
## Enterprise benefits

### Reliable connectivity can improve productivity through reduced downtime and innovation

Technology is already embedded into many parts of the agricultural sector in Ireland, with farmers across the country embracing digital transformation:

- ▶ 86% of Irish farmers say that broadband is essential and/or critical.<sup>37</sup>
- ▶ Farmers across Ireland have a positive attitude to farming technologies, with 46% of farmers reporting that they already use technology on their farm and a further 40% reporting that they plan to embrace technology in the future.<sup>38</sup>
- ▶ One in two Irish farmers use herd and breeding software, making it the most used farm technology.<sup>39</sup>
- ▶ Throughout the COVID-19 pandemic, virtual mart auctions allowed farmers to trade livestock online. More than 70% of Irish farmers want online mart selling to continue after COVID-19.<sup>38</sup>

Farmers using technology have realised benefits:



However, broadband availability is a barrier:

- ▶ During COVID-19, 40% of animal marts did not have access to good-quality broadband.<sup>41</sup>
- ▶ A survey of farmers found that availability or quality of internet connection was the foremost barrier to further adoption of technology on their farm, cited by 55% of respondents.<sup>42</sup>
- ▶ State intervention will help to meet the demands and ambitions of farmers in the Intervention Area for digital transformation.

“The biggest benefit of broadband for farmers in Ireland is the marts going online to trade cattle. That’s a huge thing for a farmer – to be able to keep in touch, keep up to date and be able to trade.

Online marts bring transparency and there is equilibrium between bidders. It also extends the reach of the local mart – it’s nationwide now, and that’s revolutionary for rural Ireland.

But there was significant disparity among our members in terms of their ability to log on and access the mart on high-quality broadband. A lot of farmers couldn’t do this, and they had to drive somewhere to log on to a hotspot to access the mart.”

- Irish Farmer’s Association

## Case study: Farm business in County Cavan

In April 2021, NBI successfully connected the first farm to its new high-speed fibre network, achieving minimum speeds of 500 Mbit/s.

Tom Canning, President of the Agricultural Consultants Association (ACA) and Managing Director of Canning Consultants, a Farm Consultancy business, says:

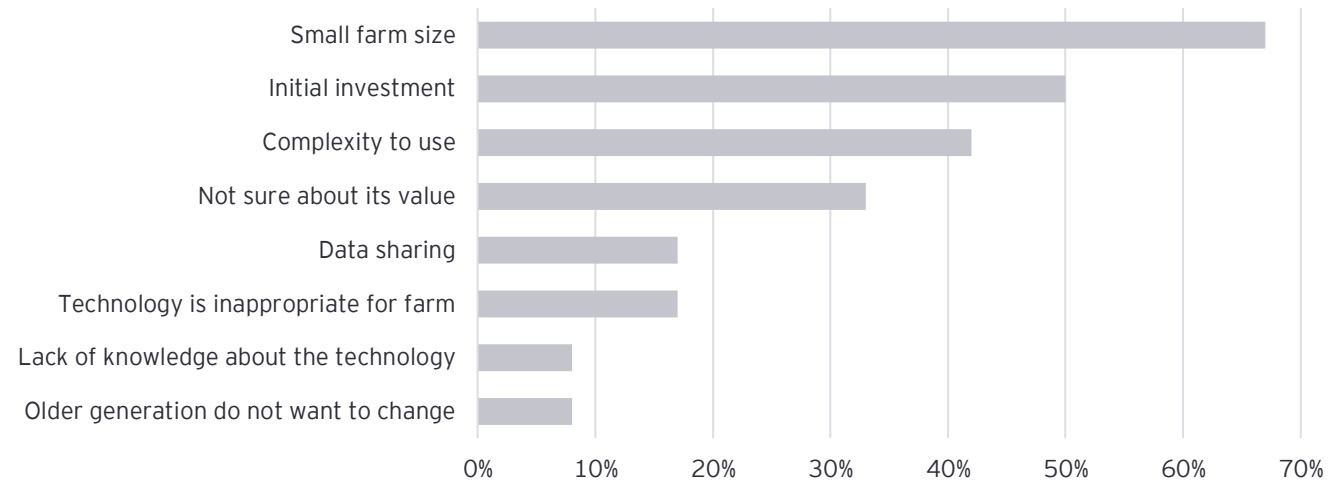
“We are delighted to be the first farm business to be connected under the National Broadband Plan. The need for the farming community to be connected to a high-speed network is vital as administration and the day-to-day running of a farm has moved online. For the purpose of my farm consultancy business, I also need a reliable network connection so I can effectively operate business from a rural base and I am already seeing the benefits from this connection. From speaking with others in the farming community, the NBP will benefit them hugely”.

Source: NBI

## The benefits of connectivity will be realised over time as adoption of new technologies increases and skills improve

The benefits of connectivity to agricultural enterprises cannot be realised overnight. There are barriers, beyond connectivity, to take-up of new technologies in the agricultural sector.

### Major adoption barriers among Irish farmers not adopting any technology



Additionally, a study into digital agricultural technology adoption and attitudes among Irish farmers found that technology awareness is currently limited, with only 10 individual systems and pieces of equipment registering awareness among one third or more of all farmers.<sup>43</sup>

Education, skills development and proper articulation of the benefits of agri-tech against the costs are all required before the benefits of technology for the Intervention Area can be fully realised. The State-funded network is therefore the first step in a journey for agricultural enterprises in the Intervention Area, giving these farms the same opportunities as farms across the rest of Ireland.

“Technology brings benefits to farmers by helping them know more, use sensors to track their farm, automate processes and to have that information system on a computer for analysis. There are time savings and the benefit of having access to data.

Awareness and understanding have been inhibitors to take-up of smart farming and this has probably led to a slower take-up for some farms. Technology can be expensive, so while there is a benefit in smart farming technologies, there is a lot of work to be done by manufacturers and industry to show what the benefits of broadband are.”

- Irish Farmer's Association

## Focus On: Tourism & Hospitality

After agriculture, the tourism and hospitality sector is one of the largest enterprise sectors, representing around 5,000 premises in the Intervention Area, and supporting activity across other sectors such as retail and transport. Tourism and hospitality supports 260,000 jobs across Ireland, with many of these located in the rural areas.

On the following pages, we consider the benefits of the NBP for enterprises in tourism and hospitality sector and how these benefits could be realised in future.



Access to high-speed broadband can allow hospitality enterprises based in the Intervention Area to attract new customers from businesses, including both business travellers and conferences and business events.

Beyond business travellers, good connectivity is also important for leisure travellers, who expect to be able to stream video, access travel information and post on social media while travelling.

Good connectivity can deliver efficiencies for hospitality establishments, for example remote check-in for hotels or allowing customers to order and pay for food and drinks via an app.

Research by Fáilte Ireland shows less than 10% of Irish tourist attractions and experiences are digitally enabled, with reliable broadband access an impediment to expanding into new marketplaces.

With the rise of remote working, Wi-Fi can also help cafés and restaurants attract new types of customers who might bring a laptop to work in these types of premises for the day.

Research shows that hotels believe that free Wi-Fi increases bookings, with 73% agreeing compared to 17% disagreeing.<sup>45</sup>

Having access to Wi-Fi is more important to business travellers than room rate, with 84% of business travellers stating that Wi-Fi access is important in influencing them to choose a particular hotel compared to 81% stating that room rate is important.<sup>44</sup>

Over the next 3-5 years, Fáilte Ireland will partner with 1,350 visitor experiences, 2,000 accommodation providers, and 2,500 free attractions to provide practical, technical and financial support to enable them to secure direct bookings through their own websites, distribute products via third party channels and drive operational efficiencies through new technologies.





## Enterprise benefits

### High-speed, reliable broadband expands markets and delivers better customer experiences in the tourism and hospitality sector.

#### High-speed broadband can give businesses access to new customers

Broadening provision of high-speed broadband to tourism businesses in the Intervention Area has the potential to yield significant economic benefits by unlocking access to new markets, increased revenue generation, and new job creation. These benefits include:

- ▶ Creation of direct digital platforms and access to third-party platforms to market and sell to new markets and an increasingly digital native consumer base
- ▶ Ability to build up profiles of potential customers and to create tailored marketing campaigns
- ▶ Expanding customer offerings and business creations from increased market activity and visitor numbers

#### High-speed broadband can improve customer experience

High-speed broadband will also enhance customer experience and drive business efficiencies, including:

- ▶ Digitalisation of point-of-sale platforms integrated with marketing and booking platforms
- ▶ Reliable connectivity can deliver efficiencies for hospitality establishments, for example remote check-in for hotels or allowing customers to order and pay for food and drinks via an app
- ▶ Broadening customer service and experiences through new technologies such as the Internet of Things

### “Digital that Delivers” - Fáilte Ireland’s digitalisation programme

Recognising the underutilisation of digital platforms by Irish providers, Fáilte Ireland published a medium-term strategy to expand digitalisation. Over the next three to five years, Fáilte Ireland will partner with 1,350 visitor experiences, 2,000 accommodation providers, and 2,500 free attractions to provide practical, technical and financial support to enable them to:

- ▶ Secure direct bookings through their own websites.
- ▶ Distribute products via third party channels such as online travel agents, aggregators and tour operators.
- ▶ Drive operational efficiencies through new technologies.
- ▶ Target the consumer at key stages on their path to purchase.
- ▶ Enhance their own websites and digital marketing content.
- ▶ Evaluate and optimise their digital channel performance.

Consultations with Fáilte Ireland indicate that currently under 10% of activity and attraction providers use digital platforms compared to an EU average of 30%. The target is that this will rise to 60% over the next four to five years. Grants to businesses will range €3,000 to €150,000 to migrate tourist products and experiences to digital platforms. However, this growth trajectory is predicated on businesses having access to fast and reliable broadband. Broadband access will enable attraction providers to create platforms and integrate into digital marketplaces, already commonplace amongst accommodation businesses.

“Currently less than 10% of activity and attraction providers use digital platforms. The hope is that this will rise to 60% in 4-5 years through our digitalisation programme”

- Fáilte Ireland

## Enterprise benefits

### The counterfactual

A counterfactual scenario where the State did not invest in improving connectivity in the Intervention Area could risk leaving businesses in the Intervention Area behind, meaning they would not be able to access digital opportunities.

This could disincentivise further investment in the Intervention Area, with negative economic consequences, and could mean that these businesses would find it more difficult to compete with national and international peers that benefit from high-quality connectivity.

Innovation and entrepreneurship in the Intervention Area could be at risk without state intervention in high-quality connectivity.

### Conclusion: Enterprise benefits

State intervention will allow business in the Intervention Area to take advantage of the significant benefits of being online and adopting new cutting edge technologies, providing these businesses with the same opportunities as those across the rest of Ireland. Expanded markets, improved productivity, reduced operating costs and a widened talent pool will support the growth of enterprises within the Intervention Area, with associated benefits to the rural economy.

It will allow the rural economy to form better linkages with the wider economy in Ireland and with customers and suppliers around the world.





05

Societal  
benefits





# Universal high-speed, reliable broadband has many benefits for society more widely, beyond simply the individual benefits for people living in the Intervention Area.

In this section, we outline the benefits to society of rolling out high-speed broadband to the Intervention Area.

## Increasing the number of people online increases the value of online services for everyone

Broadband exhibits what are referred to as 'positive network effects', where the value of the network to its users increases as more users join the network. For example, connecting more people in rural areas to the broadband network will mean that, in the long term, more services can be offered exclusively online, making services more efficient. This will particularly benefit public services where the costs of offering dual online and paper-based systems can be cut, saving public money. As such, the incremental benefits of connecting the rural population in Ireland will not just accrue to individuals in the Intervention Area, as improvements to services will benefit users across Ireland in the longer term.

These are considered 'external benefits' as they will not be realised by private sector companies building the network and are therefore not considered by the private sector when commercial decisions on network build are made. These external benefits, and the associated market failure, demonstrate the need for State intervention to ensure the full range of benefits can be realised.

## Connecting the rural population will improve people's access to government services and reduce the cost of delivering these services

E-government services include any government service that is access online, for example, submitting government forms online, paying taxes online, applying for student grants online, accessing online health services and accessing information about local public services online.

Digital transformation is becoming increasingly important to governments across the world. By moving services online, governments can:

- ▶ Understand their citizens better and achieve better outcomes
- ▶ Provide services more effectively and efficiently
- ▶ Find new solutions to policy challenges
- ▶ Engage with external partners to develop new delivery models
- ▶ Commercialise some public services and develop fresh sources of revenue.<sup>48</sup>

E-government services can be more personalised for people and more convenient for people to access. Advanced data analytics can help governments understand the needs of citizens and to respond to those needs efficiently, driving significant savings. Estonia estimates that at least 2% of its own GDP has been saved by enabling every Estonian resident to provide a digital signature for safe identification and use of e-services.<sup>49</sup> This shows the potential scope of benefits that some economies can realise from e-government.

## Universal connectivity can support improved health outcomes

Online public services are particularly valuable in healthcare:

- ▶ Digitising health services can make them more accessible to people who might otherwise struggle to access services, for example older people living in rural areas who might otherwise need to travel to appointments, or parents of small children.
- ▶ More integrated digital health services can unlock the value of healthcare data, which could improve research and medical procedures and deliver operational savings.
- ▶ Improve monitoring of vulnerable patients at home, e.g. through 'wearable' technology can identify issues earlier, making them easier to treat, reducing the length of hospital stays and the complexity of treatment required, and lowering the cost of social care.
- ▶ Improving the health of citizens across Ireland would deliver benefits across the wider economy as well as reducing the cost of healthcare provision.



## Societal benefits

E-Health technology is already being used in Ireland. For example, during the pandemic, a portal was developed to allow GPs in Ireland to conduct consultations with patients virtually, for example, via video calls.<sup>50</sup> Using this portal would mean that patients with suspected COVID-19 could be triaged remotely without risking travelling to the GP surgery. Additionally, the Heartbeat Trust has developed a virtual consultation service that allows heart specialists and GPs to virtually discuss cases in real-time. GPs can log in to the heart failure virtual clinics remotely to access expert advice and education.<sup>51</sup>

These case studies demonstrate the growing role of eHealth technologies in Ireland's healthcare system. However, the benefits of digital transformation for healthcare cannot be fully realised without universal connectivity or some citizens will be left behind. Poor connectivity in some parts of Ireland limits the advances the whole of the Irish healthcare system can make in eHealth.

Therefore, the NBP is a key factor enabling digital transformation for healthcare in Ireland. State intervention in the Intervention Area ensures that the whole of Ireland can benefit from these innovations and also supports more healthcare services moving online, increasing the efficiency of delivering the best healthcare.

### High-speed, reliable broadband will support education in the Intervention Area, delivering wider social and economic benefits across Ireland

Following the closure of schools across the world, the pandemic exposed a deep digital divide between children who can access digital learning facilities and children who do not have such access. This was the case in Ireland, with many households in the Intervention Area lacking the connectivity to access high-quality remote learning. In areas with poor broadband, children may not be able to participate in virtual classroom scenarios via video, and accessing remote learning can be particularly challenging where more than one child in the household needs to be online at the same time. This can increase inequality between urban and rural areas.

One study on the impact of the COVID-19 pandemic on second-level education in Ireland found that almost half of schools surveyed reported issues with a lack of access to high-speed broadband and/or a lack of access to appropriate digital devices. The study also found that, in schools located in areas of lower quality broadband coverage, 62% reported delivering all or most classes live online, compared to 90% of schools located in areas with good broadband coverage.<sup>52</sup>

This could indicate that low quality broadband coverage is acting as a barrier for some schools.

Another study considered the influence of high-speed broadband availability on second-level student engagement with distance learning during the COVID-19 lockdown in Ireland and found a reduction in student engagement was almost three times more likely among schools in areas with lower coverage of high-speed broadband. The study found that students were more engaged with distance teaching that was interactive and collaborative, and that this type of learning was best facilitated in areas with good high-speed broadband availability.<sup>53</sup>

These studies demonstrate the risks the pandemic posed to education in the Intervention Area. Although lockdowns have since been lifted, managing COVID-19 continues to require people to isolate following exposure to the virus. Continued quarantine requirements for school children exposed to the virus mean that effective remote learning remains critical to children's success.

Partly in response to the increased importance of remote learning for children, in December 2020 DECC and NBI announced an acceleration of the NBP where almost 680 primary schools would be connected to broadband by mid 2023. Under the originally planned rollout, some schools would have had to wait up to seven years for connection under the NBP rollout, but as a result of the acceleration of the plan, all primary schools in the Intervention Area will be connected within two years of the announcement.

State intervention is therefore allowing schools and children living in the Intervention Area to access online educational resources, including high-quality interactive and collaborative distance teaching techniques like video calling. As the rollout continues, all schools in Ireland will have equal access to these educational opportunities.

The rollout of high-speed broadband is also bringing education opportunities to adults living in the Intervention Area. 49% of adults living in the Intervention Area said they would definitely or probably use online educational and training services more as a result of having a faster broadband connection.<sup>54</sup>

### Connectivity can decrease loneliness and support social inclusion

Connectivity can have a positive impact on loneliness, allowing people to connect with friends, family and communities online. People often develop new social connections online, meeting new people through social media or online community groups.

## Societal benefits

For example:

- ▶ One study found a number of positive associations within deprived communities between internet access and social integration and wellbeing outcomes.<sup>55</sup> The study found that internet users were less likely to report feeling lonely and had higher mental wellbeing scores.
- ▶ Additionally, older people, who are often at most risk of loneliness, can benefit significantly from virtual social interactions. Seventy-two per cent of Irish adults aged 50+ who have access to the internet in their homes send and receive emails, while 43% use the internet for audio or video calls and 40% use it to access social media.<sup>56</sup>
- ▶ The outbreak of COVID-19 has highlighted the role that connectivity can play in addressing social isolation. Sixty-four per cent of people said that they were video calling friends and family more often in April 2020 compared to before the pandemic (57% in September 2020), while more than half of people said they were using social media more often.<sup>57</sup>
- ▶ Facebook carried out a survey of its community groups in October 2020 and found that 91% had given some form of support to others through a group or community during the pandemic, while 86% have said they received some form of support from others.<sup>58</sup>

## Case study: Obair social enterprise

Obair is a small regional social enterprise that seeks to combat social exclusion and develop social enterprise. It provides community services including meals on wheels, community creches and after school clubs, and works with early school leavers and young mothers. Obair had an ambition to grow but did not have access to high-quality connectivity until it was connected to the NBI network via a BCP.

Siobhán O'Driscoll, Obair community development officer, says:

“The BCP not only has a positive impact on all of us working here in Obair as well, but it has a positive impact on our communities...We want to rollout our new food for you app. It's basically JustEat or Deliveroo for elderly rural people...not only will the app help the elderly people where they can communicate and order what they want – giving them choice, keeping them independent, letting them stay at home in rural Ireland – it will also help us gather all the information on their dietary requirements, what they need. We're very excited, we're not insular anymore...we now know that we have the expertise that we can share with the rest of Ireland“.

Source: NBI

## Societal benefits

### Ubiquitous fibre broadband coverage can reduce CO2 emissions through reduced need for travel and lower emissions

Increased prevalence of home working, made possible in the Intervention Area by high-speed broadband, reduces the need for people to commute, reducing carbon emissions. Better online collaboration tools and reliable video-conferencing facilities also reduce the need for business travel, again delivering environmental benefits, while better access to online goods and services can reduce leisure travel time:

- ▶ A study for Openreach in the UK estimated that the environmental impact of an additional 1.9 million workers mainly working at home due to nationwide full-fibre broadband rollout in the UK would equate to an annual saving of over 700,000 tonnes of CO2 emitted from car commuting trips.<sup>59</sup>
- ▶ Similarly, a report for CityFibre assessing the economic impact of rolling out full-fibre broadband to 100 UK towns and cities estimated that the rollout would save 2.3m tonnes of carbon over 15 years.<sup>60</sup>
- ▶ Additional environmental benefits are unlocked as fibre networks are more energy-efficient than legacy copper telecoms networks, reducing greenhouse gas emissions. Analysis has found there is an 88% reduction of greenhouse gas emissions per Mbit in Europe by fibre compared to a combination of copper and coaxial cable.<sup>61</sup>

#### The counterfactual

Without state intervention, there is a risk that children living in the Intervention Area would not be able to access the same educational opportunities as their peers across the rest of Ireland. Over time, as schools increasingly benefit from the range of online resources, the educational experience for children in the Intervention Area could be undermined, with negative implications for the Irish economy and society as a whole. Additionally, without high-speed broadband connectivity, children in the Intervention Area may not be able to develop the skills to access opportunities in digital industries in future. In this counterfactual scenario, ease of access to public services and healthcare would also depend on where people lived, risking a more divided, unequal society.

#### Conclusion: Societal benefits

The NBP delivers positive network effects, improving education, healthcare and government services by supporting digital learning opportunities and allowing more services to be delivered online, saving costs and time. Other societal benefits include environmental benefits and improved social inclusion. In this way, the NBP will deliver benefits both for people living and working in the Intervention Area, as well as delivering indirect benefits for people living across the whole of Ireland.

This highlights the broad extent of the benefits that will accrue from rural broadband investment. These benefits are not factored into private sector investment decisions as the firms delivering the network would not be the recipients of the benefits. This highlights the important role of state investment to ensure these benefits are realised. These benefits will contribute to the value for money of the state investment.

### Case study: Brockagh Resource Centre

A BCP was installed at Brockagh Resource Centre, a community centre in County Wicklow, and is delivering benefits for the local community. Frank Curran, Chief Executive Wicklow County Council says:

“It’s hugely important for people living in County Wicklow in terms of working from home, e-learning, e-health, farms in terms of stock management, and also in terms of community groups and businesses right throughout the county”.

Pat Casey, founder of Brockagh Resource Centre says:

“To have high-speed broadband is fantastic. We had literally no broadband of any speed that we could relate to before that, so that opportunity of providing an enterprise hub for people or for the school children...was vital during the pandemic because they didn't have it at home”.

Source: NBI

06

Individual  
benefits





## Individual benefits

State intervention will transform the way people in the Intervention Area work, shop, interact with friends, and consume information and entertainment, with benefits extending across the whole of Ireland.

In this section, we highlight some of the benefits that the NBP is expected to bring to the individuals and households connected to the network.

### Connectivity brings access to new products and services

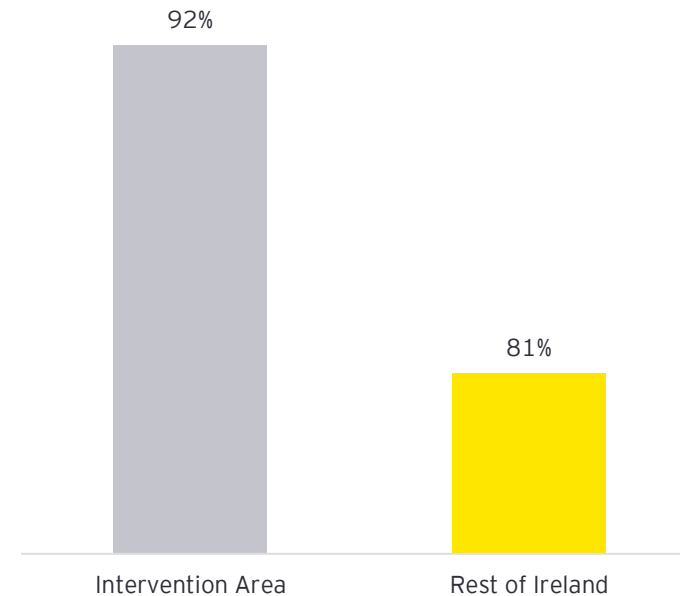
The Intervention Area is made up of a mix of households that either has poor broadband access, with broadband speeds that are too low and unreliable to take advantage of the full range of online services, or households that don't have access to broadband at all due to living too far from a telephone exchange.

For those households that currently don't have access to broadband, the NBI's rollout will provide access to online products and services for the first time. For households that currently have access to broadband that delivers download speeds of less than 30Mbps, NBI will upgrade their connections, providing significantly higher download speeds and reliability, making it possible for households to use new online services that are not supported by their current broadband connections. For example:

- ▶ Fibre broadband, the solution chosen by the NBI to connect premises in the Intervention Area, delivers the high speeds and low latency required for online gaming, with research suggesting that fibre is 70-80% more reliable than copper.<sup>62</sup>
- ▶ High-speed broadband will enable seamless access to online streaming services, gaming platforms, and catch up services, where currently households in the Intervention Area may experience poor quality, buffering and delays when trying to access online content.

- ▶ Consumer research carried out by the Irish communications regulator, ComReg, indicates that there is pent-up demand for online services in the Intervention Area, which will be addressed by state intervention. The proportion of respondents saying they are likely to take up faster broadband if it were available is higher in the Intervention Area compared to the rest of Ireland, where availability of networks is higher and adoption of high-speed broadband has already begun.

### Proportion of respondents saying they are very likely or fairly likely to take up fast broadband if it was available in their area



Source: ComReg Broadband Connectivity Survey, fieldwork September to December 2020.

**“The National Broadband Plan in Ireland is expected to address the significant digital divide between urban and rural areas in Ireland, enabling Irish consumers and businesses to benefit from the full potential of digital growth. This will help households and businesses in areas of Ireland where private investment is insufficient.”- EC Commissioner Margrethe Vestager**

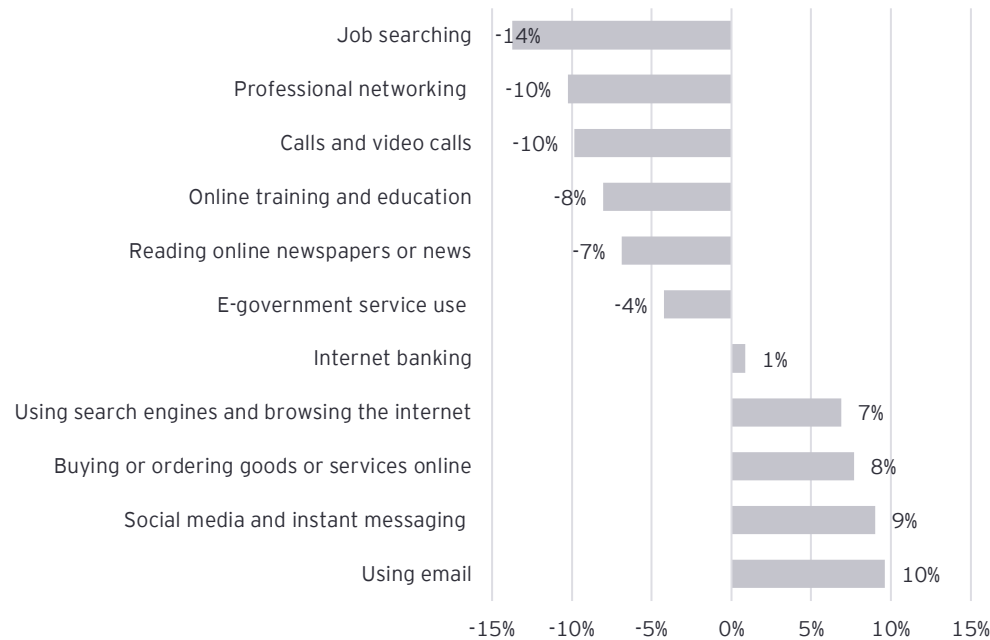
## Individual benefits

### The NBP can help to close the gap in use of services between urban and rural communities

Research suggests that there is a significant gap between urban and rural communities in Ireland in terms of their use of online services. People living in the Intervention Area are significantly less likely to use online services like calling and video calling than people living in the rest of Ireland, likely in part because their broadband connection cannot provide the speeds and reliability necessary to support online video calling.

Similarly, there is a significant gap between the Intervention Area and the rest of Ireland in use of important online services, including online training and education, professional networking, online job searching and use of e-Government services.

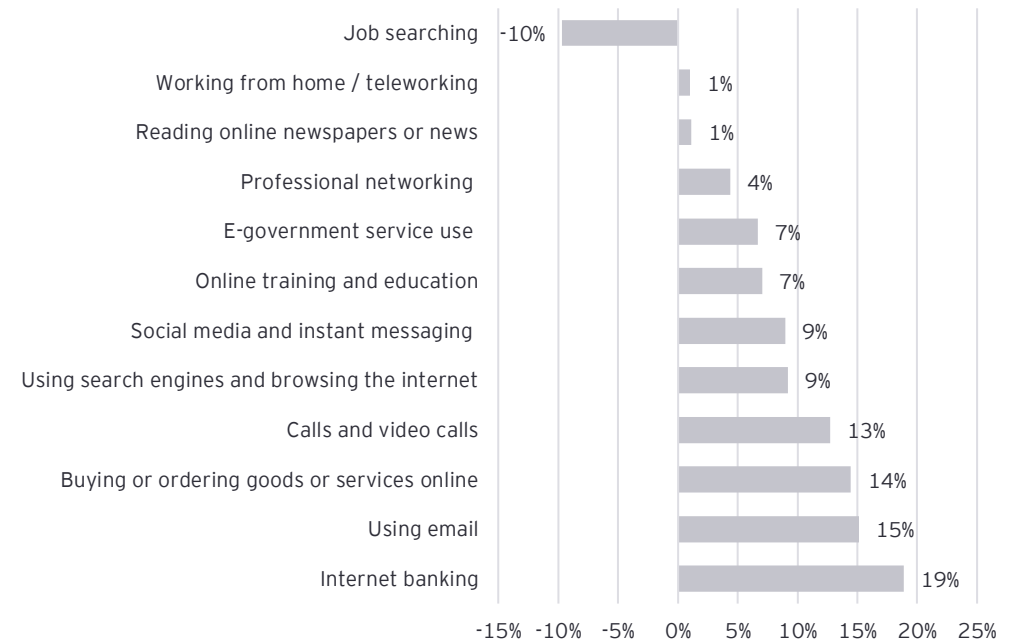
**Current broadband usage: Proportion of respondents in the Intervention Area who say they use the service very often or often in comparison to the rest of Ireland**



While the disparity in use of online services will be due in part to current poor connectivity in the Intervention Area, it will also be due in part to an older rural population in Ireland.<sup>63</sup> However, as rural connectivity improves, use of online services is likely to increase among all age groups, and the network will support people living in the Intervention Area in the long term to access online services.

Compared to urban areas, more rural areas of Ireland are most likely to see an increase in service use across almost all online services as a result of having access to higher broadband speeds, illustrating some of the individual benefits of state intervention to people living in the Intervention Area. Internet banking, using email and buying or ordering goods or services online are the activities that people would be most likely to do more of as a result of having higher broadband speeds.

**Proportion of respondents in the Intervention Area stating they would definitely or probably use services more as a result of higher broadband speed in comparison to the rest of Ireland**



Data for all charts sourced from ComReg Broadband Connectivity Survey, fieldwork September to December 2020.

## Individual benefits

### Connectivity supports remote working and brings new employment and learning opportunities

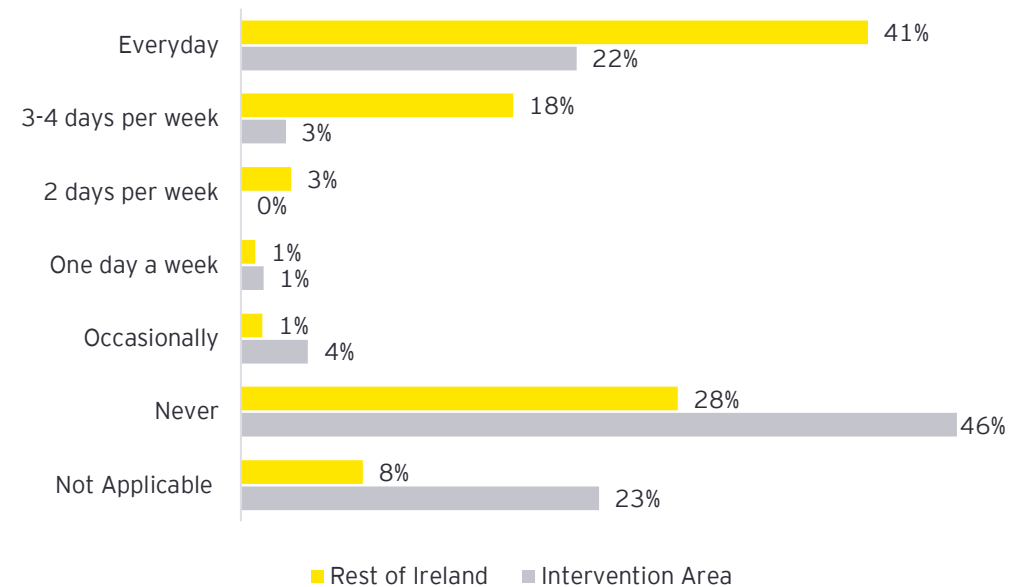
While companies have been advertising jobs that can be carried out from home for many years, the pandemic has caused a seismic shift in the way we work, with millions of people adopting full-time remote working overnight. As noted in Section 3, a national survey in November 2021 of Irish employees across a wide range of sectors found that 65% of respondents continued to work remotely, despite just 23% never working remotely before COVID-19. The shift to remote working is unlikely to reverse even when the pandemic is over: the survey found that the majority of respondents (94%) would like to work remotely after the pandemic, either part- or full-time.

Currently, there are inequalities in remote working across Ireland: people in the Intervention Area are less likely to be working from home than people living in the rest of Ireland. In part, this disparity is due to the nature of the rural economy, where people living in the Intervention Area are more likely to be working in the agriculture or hospitality sectors. But this does not fully explain the gap in remote working: only 23% of respondents from the Intervention Area said that remote working was not applicable for their type of work. Poor connectivity issues are likely to play a significant role in the gap in remote working.

By allowing people to work from home in the Intervention Area, state intervention can also support people in living wherever they want, and where they are most productive, by providing the high-speed broadband infrastructure that allows them to do so. The national survey in October 2020 of Irish employees found that 23% of respondents would consider relocating to another location in Ireland due to their experience of remote working since COVID-19. The proportion of respondents saying they would consider relocating in Ireland was higher in Dublin than in any other region, at 29%.<sup>23</sup>

In addition to supporting employment opportunities, connectivity also provides opportunities to learn and improve skills. One in every seven (14%) of internet users surveyed in March 2020 said they had done an online course, compared with 12% of internet users surveyed in January 2021.<sup>64</sup> High-speed broadband will give households in the Intervention Area access to online learning and skills development resources.

#### Number of days remote working



Source: ComReg Broadband Connectivity Survey, fieldwork September to December 2020.

## Individual benefits

### Connectivity saves households time and money

Compared to shopping in person, people shopping online have a greater choice of goods and services allowing consumers to also choose the lowest cost provider. Online shopping also reduces fuel and travel-related costs and saves people time, providing more opportunities for leisure activities.

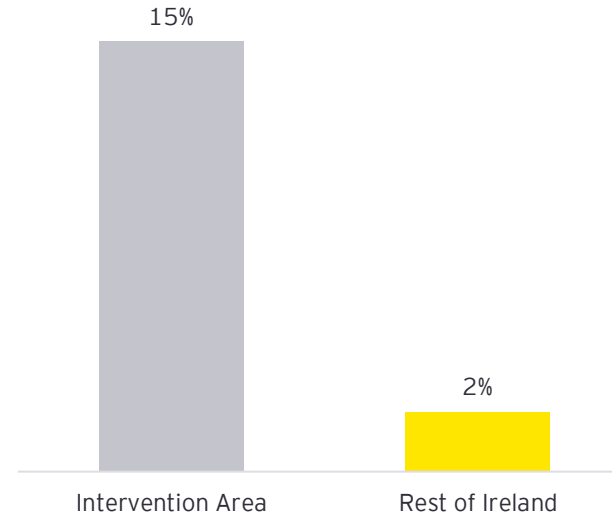
The initial cost-benefit analysis for the NBP was positive despite a conservative assumption for online sales at 10% of total retail spending based on 2012 data. The proportion of spending that is online has significantly increased since 2012; while equivalent data does not exist for Ireland, data for the UK suggests that the proportion of shopping that was online rose from 9.3% in 2012 to 19.2% in 2019. The outbreak of COVID-19 has accelerated online shopping behaviours, with data for the UK suggesting that spend online increased to 29.1% in 2021 as a result of new behaviours developed during the pandemic. Assuming a similar progression of online spending in Ireland, and using a forward-looking assumption that the proportion of spend that is online is 20% rather than 10%, the benefits associated with the NBP could be €270m higher than initially anticipated.

### NBI's network will deliver competition and choice for consumers

Competition in telecoms services brings many benefits to consumers, including choice, higher quality and lower prices. Currently, 12% of households in the Intervention Area state that their primary reason for choosing their current broadband supplier is that they are the only supplier in the area (compared to 2% of households in the rest of Ireland).

The high-speed broadband network delivered by NBI will be open on a wholesale basis to a range of broadband providers in the residential and business markets, meaning that households in the Intervention Area will be able to choose the provider that is more able to meet their needs. Consumer choice will drive further competition on price and quality. To date, there are 40 retailers now offering broadband services to consumers.

#### Proportion of respondents saying the main reason they selected their current broadband provider is because it is the only provider available in their area



Source: ComReg Broadband Connectivity Survey, fieldwork September to December 2020

#### The counterfactual

While any investment has risks, there are risks associated with failure to invest as well.

In the absence of state intervention, it is unlikely that people living in the Intervention Area will have access to high-speed broadband in the near future. If the State did not invest in extending broadband, a lack of connectivity could make the Intervention Area a less attractive area for some people to live as online services become increasingly critical to our working and personal lives, particularly for the next generation.

This could risk undermining the rural economy, forcing people to move for education or work, and disrupting rural communities. Additionally, it could mean that people living in the rest of Ireland would be less likely to move to the Intervention Area, reinforcing the status quo. Without state intervention, people living in rural Ireland could be left behind, unable to access online services.



## Individual benefits

### Conclusion: Individual benefits

The rollout of high-speed, reliable broadband in rural Ireland will bring social equality and access to the range of online services enjoyed in urban areas. It will also provide new opportunities in employment and skills development, contributing to rural development.

Providing people in the Intervention Area with high-speed broadband will in turn, deliver benefits for people living across the rest of Ireland. For example, enabling remote working in the Intervention Area could support people moving to more rural areas, which can reduce pressures in cities and support the rural economy. People living in towns and cities across Ireland work with rural businesses when they have confidence in the connectivity in rural areas, while families can more easily keep in touch through video calling no matter where they live.

The benefits accruing to individuals living in the Intervention Area will extend to people and businesses across the whole of Ireland, leading to a more inclusive and equitable country, where all individuals will be able to access the benefits provided by high-speed broadband. This equality is fundamental to the social progress of all within the State.



# References

1. DECC, (February 2022). *Harnessing Digital - The Digital Ireland Framework*. <https://www.gov.ie/en/publication/adf42-harnessing-digital-the-digital-ireland-framework/#the-plan>
2. European Commission, Directorate-General for Communications Networks, Content and Technology, Broadband coverage in Europe 2020 : mapping progress towards the coverage objectives of the Digital Agenda : final report, 2022. <https://data.europa.eu/doi/10.2759/27414>
3. Eurostat, (December 2020). EU SILC Survey, Distribution of population by degree of urbanisation, dwelling type and income group. [https://ec.europa.eu/eurostat/databrowser/view/ILC\\_LVHO01\\_\\_custom\\_1513595/bookmark/table?lang=en&bookmarkId=02255622-edef-4fec-80da-a1ce32edaf98](https://ec.europa.eu/eurostat/databrowser/view/ILC_LVHO01__custom_1513595/bookmark/table?lang=en&bookmarkId=02255622-edef-4fec-80da-a1ce32edaf98)
4. Ibid
5. Viavi Solutions (2019), How Enhanced DSL Technologies Optimize the Last Copper Mile. <https://www.viavisolutions.com/en-us/literature/how-enhanced-dsl-technologies-optimize-last-copper-mile-white-papers-books-en.pdf>
6. White & Case, (December 2020) *Funding Europe's Broadband Ambitions*. [Funding Europe's broadband ambitions | White & Case LLP \(whitecase.com\)](https://www.whitecase.com/insights/publications/2020/12/funding-europe-s-broadband-ambitions)
7. Très Haut Débit, (December 2020) <https://agence-cohesion-territoires.gouv.fr/france-tres-haut-debit-53>
8. Department of Public Expenditure and Reform, (October 2021). *National Development Plan 2021-2030*. <https://www.gov.ie/en/press-release/7ac57-government-launches-the-renewed-national-development-plan-2021-2030/>
9. European Commission, (November 2021). *The Digital Economy and Society Index*. <https://digital-strategy.ec.europa.eu/en/policies/desi>
10. PwC, (April 2019). *NBP Cost Benefit Analysis Report*. <https://s3-eu-west-1.amazonaws.com/govieassets/8527/a8f88041f1f44255b0716f38e17b9448.pdf>
11. Central Statistics Office, (May 2020). *Pulse Survey - Our Lives Online - Remote Work November 2021*. <https://www.cso.ie/en/releasesandpublications/FP/FP-PSOLO/pulsesurvey-ourlivesonline-remoteworknovember2021/introductionandsummaryofmainresults/>
12. IBEC (2021) Returning to the Workplace 2021 <https://www.ibec.ie/connect-and-learn/media/2021/05/16/new-ibec-research-reveals-business-expectations-for-return-to-workplaces>
13. Office for National Statistics (2022). Internet sales as a percentage of total retail sales. <https://www.ons.gov.uk/businessindustryandtrade/retailindustry/timeseries/j4mc/drsi>
14. BMI (2021). How many general practice consultations occur in Ireland annually? <https://bmcpimcare.biomedcentral.com/articles/10.1186/s12875-021-01377-0>
15. Department of Enterprise, Trade and Employment (2021). Making Remote Work: National Remote Work Strategy. <https://www.gov.ie/en/publication/51f84-making-remote-work-national-remote-work-strategy/>
16. Cebr for Openreach, (April 2021). Ultrafast full fibre broadband: A platform for growth. COVID-19 update. [https://www.openreach.com/fibre-broadband/full-fibre-impact?utm\\_campaign=cebr&utm\\_medium=presspage&utm\\_source=online&utm\\_term=cebr2021](https://www.openreach.com/fibre-broadband/full-fibre-impact?utm_campaign=cebr&utm_medium=presspage&utm_source=online&utm_term=cebr2021)
17. Estimated 1.3% increase in GVA (equivalent to the 1.3% GVA increase calculated by Cebr for Openreach). Ireland GVA based on World Bank data for 2019. <https://data.worldbank.org/indicator/NY.GDP.FCST.CD?locations=IE>
18. Department for Digital, Culture, Media and Sport, (2021). Superfast Broadband Programme - State aid Evaluation Report 2020. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/956797/Gov.uk\\_upload\\_-\\_Superfast\\_Broadband\\_State\\_Aid\\_Evaluation\\_main\\_report\\_redacted\\_for\\_publication\\_with\\_alt\\_text\\_v1.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/956797/Gov.uk_upload_-_Superfast_Broadband_State_Aid_Evaluation_main_report_redacted_for_publication_with_alt_text_v1.pdf)
19. Department for Digital, Culture, Media and Sport, (2018). Evaluation of the economic impact and public value of the superfast broadband programme. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/734855/Superfast\\_Integrated\\_Report.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/734855/Superfast_Integrated_Report.pdf)
20. Cebr for Openreach, (April 2021). Ultrafast full fibre broadband: A platform for growth. COVID-19 update. [https://www.openreach.com/fibre-broadband/full-fibre-impact?utm\\_campaign=cebr&utm\\_medium=presspage&utm\\_source=online&utm\\_term=cebr2021](https://www.openreach.com/fibre-broadband/full-fibre-impact?utm_campaign=cebr&utm_medium=presspage&utm_source=online&utm_term=cebr2021)
21. Reuters, (March 2021). "EU recovery funds for telecom networks must help competition - Vestager". <https://www.reuters.com/article/us-italy-broadband-vestager-idUSKCN2AU2BZ>
22. European Commission, (July 2021). *NextGenerationEU: European Commission endorses Ireland's recovery and resilience plan*. [https://ec.europa.eu/commission/presscorner/detail/en/ip\\_21\\_3727](https://ec.europa.eu/commission/presscorner/detail/en/ip_21_3727)
23. NUI Galway Whitaker Institute & Western Development Commission, (October 2020). Remote working during COVID-19. <http://whitakerinstitute.ie/wp-content/uploads/2020/04/Remote-Working-National-Survey-Phase-II-Report-Oct-2020-Final.pdf>

## Appendix

24. Ibid
25. OECD, (January 2021). *The role of online platforms in weathering the COVID-19 shock*. <https://www.oecd.org/coronavirus/policy-responses/the-role-of-online-platforms-in-weathering-the-COVID-19-shock-2a3b8434/>
26. ITU, (July 2020). *Economic impact of COVID-19 on digital infrastructure*. [https://www.itu.int/en/ITU-D/Conferences/GSR/2020/Documents/GSR-20\\_Impact-COVID-19-on-digital-economy\\_DiscussionPaper.pdf](https://www.itu.int/en/ITU-D/Conferences/GSR/2020/Documents/GSR-20_Impact-COVID-19-on-digital-economy_DiscussionPaper.pdf)
27. Aleksic and Lovric, (2014). Energy Consumption and Environmental Implications of Wired Access Networks. <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.1001.1481&rep=rep1&type=pdf>
28. ESRI, (December 2021). *Enhancing the attractiveness of the island of Ireland to high-value foreign direct investment*. [https://www.esri.ie/system/files/publications/RS133\\_0.pdf](https://www.esri.ie/system/files/publications/RS133_0.pdf)
29. Ibid
30. GSMA, (June 2020). *IoT connections forecast: the impact of COVID-19*. <https://www.gsma.com/iot/resources/iot-connections-forecast-the-rise-of-enterprise/>
31. IFA, (2020). *Smart Farming*. <https://smartfarming.ie/about-smart-farming/>
32. Business Insider, (2021). *Smart Farming in 2020*. <https://www.businessinsider.com/smart-farming-iot-agriculture?r=US&IR=T>
33. McKinsey, (2020). Agriculture's connected future. [https://www.smartfarmnet.com/uploads/2/2/6/9/22690204/agricultures\\_connected-future-how-technology-can-yield-new-growth-f.pdf](https://www.smartfarmnet.com/uploads/2/2/6/9/22690204/agricultures_connected-future-how-technology-can-yield-new-growth-f.pdf)
34. Anthropocene, (2019). Here's how precision agriculture could help farmers reduce fertilizer use. <https://www.anthropocenemagazine.org/2019/04/heres-how-precision-agriculture-could-help-farmers-reduce-fertilizer-use/>
35. The Breakthrough Institute, (2020). Rural broadband for agricultural sustainability. <https://thebreakthrough.org/issues/food/rural-broadband>
36. Hands Free Hectare. <https://www.handsfreehectare.com/>
37. IFA, (2021). Irish Farm Report. <https://www.ifac.ie/irish-farm-report/>
38. IFA, (2022). Irish Farm Report. <https://www.ifac.ie/irish-farm-report/>
39. Skillnet Ireland, (2019). Digital Agriculture Technology: Adoption and attitudes study. <https://www.skillnetireland.ie/wp-content/uploads/2019/11/IFA-Skillnet-Digital-Agriculture-Technology.pdf>
40. National Economic and Social Council, (June 2021). *Digital Inclusion in Ireland: Connectivity, Devices & Skills*. <https://www.nesc.ie/publications/digital-inclusion-in-ireland-connectivity-devices-skills/>
41. Jithin Das V., Shubham Sharma and Abhishek Kaushik. (2019). Views of Irish Farmers on Smart Farming Technologies: An Observational Study. [https://www.researchgate.net/publication/332388792\\_Views\\_of\\_Irish\\_Farmers\\_on\\_Smart\\_Farming\\_Technologies\\_An\\_Observational\\_Study](https://www.researchgate.net/publication/332388792_Views_of_Irish_Farmers_on_Smart_Farming_Technologies_An_Observational_Study)
42. Ibid
43. Skillnet Ireland, (2019). Digital Agriculture Technology: Adoption and attitudes study. <https://www.skillnetireland.ie/wp-content/uploads/2019/11/IFA-Skillnet-Digital-Agriculture-Technology.pdf>
44. RoomIt by CWT, (2019). Research reveals key differences in business traveller hotel preferences by country. <https://news.mycwt.com/pressreleases/roomit-by-cwt-research-reveals-key-differences-in-business-traveler-hotel-preferences-by-country-2886515>
45. Motorola Solutions, (2013). The growing importance of Wi-Fi in hotels. <https://btmabthr.com/elearningatDoor/mar15/Motorola-The-Growing-Importance-of-Wifi-in-Hotels.pdf>
46. EY, (2020). Potential impact of Covid-19 on Irish Tourism [https://www.ey.com/en\\_ie/covid-19/potential-impact-of-covid-19-on-irish-tourism](https://www.ey.com/en_ie/covid-19/potential-impact-of-covid-19-on-irish-tourism)
47. Fáilte Ireland, (2021) Digital that Delivers - A Programme to Transform Irish Tourism's online experience and digital distribution capability 2021 - 2025 <https://www.failteireland.ie/FailteIreland/media/WebsiteStructure/Documents/COVID-19/Supports/Digital-that-Delivers-Guidelines.pdf>
48. EY, (2019). *How does digital government become better government?* [https://www.ey.com/en\\_uk/government-public-sector/how-does-digital-government-become-better-government](https://www.ey.com/en_uk/government-public-sector/how-does-digital-government-become-better-government)
49. Estonia, (2018). *e-Estonia guide*. <https://e-estonia.com/wp-content/uploads/eestonia-guide-2018.pdf>
50. eHealth Ireland. <https://www.ehealthireland.ie/>
51. EIT Health, (April 2020). *Portal allows Irish GPs to treat patients remotely*. <https://eithealth.eu/covid-19-news/portal-allows-irish-gps-to-treat-patients-remotely/>
52. Mac Domhnaill, C., Mohan, G. and McCoy, S. "Home broadband and student engagement COVID-19 emergency remote teaching", Distance Education. <https://doi.org/10.1080/01587919.2021.1986372>
53. Cullinan, J., Flannery, D., Harold, J. *et al*. The disconnected: COVID-19 and disparities in access to quality broadband for higher education students. *Int J Educ Technol High Educ* **18**, 26 (2021). <https://doi.org/10.1186/s41239-021-00262-1>

## Appendix

54. ComReg's Broadband Connectivity Survey, fieldwork September to December 2020.
55. BMC Public Health, (2019). *Associations of internet access with social integration, wellbeing and physical activity among adults in deprived communities*. <https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-019-7199-x>. <http://whitakerinstitute.ie/wp-content/uploads/2020/04/Remote-Working-National-Survey-Phase-II-Report-Oct-2020-Final.pdf>
56. Tilda, (May 2020). *Internet access and use among adults aged 50 and over in Ireland*. [https://tilda.tcd.ie/publications/reports/pdf/Report\\_Covid19InternetReport.pdf](https://tilda.tcd.ie/publications/reports/pdf/Report_Covid19InternetReport.pdf)
57. ComReg, (November 2020). *Impact of COVID-19 on consumer use and perception of telecommunications services*. [https://www.comreg.ie/?dln\\_download=impact-of-COVID-19-on-consumer-use-and-perception-of-telecommunications-services-q4-2020](https://www.comreg.ie/?dln_download=impact-of-COVID-19-on-consumer-use-and-perception-of-telecommunications-services-q4-2020)
58. Facebook, (October 2020). *Findings from our Facebook Communities Insights survey*. <https://www.facebook.com/community/whats-new/facebook-communities-insights-survey/>
59. Cebr for Openreach, (April 2021). *Ultrafast full fibre broadband: A platform for growth. COVID-19 update*. [https://www.openreach.com/fibre-broadband/full-fibre-impact?utm\\_campaign=cebr&utm\\_medium=presspage&utm\\_source=online&utm\\_term=cebr2021](https://www.openreach.com/fibre-broadband/full-fibre-impact?utm_campaign=cebr&utm_medium=presspage&utm_source=online&utm_term=cebr2021)
60. Regeneris Consulting for CityFibre, (March 2018). *The Economic Impact of Full Fibre Infrastructure in 100 UK Towns and Cities*. <https://www>
61. Ibid
62. WIK-Consult, (November 2020). *Copper switch-off: European experience and practical considerations*. [https://www.wik.org/fileadmin/Studien/2020/Copper\\_switch-off\\_whitepaper.pdf](https://www.wik.org/fileadmin/Studien/2020/Copper_switch-off_whitepaper.pdf)
63. Central Statistics Office, (2016). *Census*. <https://www.cso.ie/en/releasesandpublications/ep/p-cp3oy/cp3/urr>
64. Central Statistics Office, (May 2020). *Impact of COVID-19 on ICT usage by household*. <https://www.cso.ie/en/releasesandpublications/ep/p-ictc19/impactofCOVID-19onictusagebyhouseholds/onlinelearning/>



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