Appendices to Electronic Communications Strategy Statement 2021-2023

Reference:	ComReg 21/70a
Version:	FINAL
Date:	30 June 2021

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1. Introduction

1.1   This document accompanies ComReg's Electronic Communications Strategy Statement 2021-2023 (ComReg Document 21/70) and contains two appendices:

- **Appendix 1 – The Economic and Legal Context**, including:
  ° The Macroeconomic Outlook;
  ° The Economics of Electronic Communications; and,
  ° The Legal Context

- **Appendix 2 – Trends and Challenges**, including an analysis of the following four key trends:
  ° Enhanced Connectivity and New Technologies
  ° The Consumer Experience
  ° The Evolution of Adjacent and Related Markets
  ° The Changing Future of Regulation in the Sector

1.2   This document should only be read in conjunction with ComReg Document 21/70. It is important to note that this document does not necessarily set out the Commission's final or definitive position on particular matters.

Annex: 1 The Economic and Legal Context

Overview

A 1.1 This appendix considers the broad policy context, encompassing economic and legal dimensions, in which ComReg forms its strategy for regulation of the electronic communications sector.

While trends toward digitalisation have led society to rely more and more on ECS and ECN, this trend has accelerated with the experience of Covid-19. The strategic significance of the sector has increased in terms of policy considerations. These developments have implications for investment incentives in the sector, as do the broader macroeconomic impacts of Covid-19 and the uncertainty about the future trajectory of the economy in the medium to long term.

A 1.2 The economic characteristics of the electronic communications sector remain such that market failures arise. The rationale for regulation, while evolving, is as relevant as ever.

A 1.3 This appendix considers the following sections in turn:

- The Macroeconomic Outlook;
- The Economics of Electronic Communications; and,
- The Legal Context.

The Macroeconomic Outlook

A 1.4 The electronic communications sector is affected by developments in the wider economy. The Covid-19 pandemic has rapidly accelerated digitalisation across the economy and has increased the use and reliance on ECS and ECN. The profound effects of Covid-19 on the global economy, which continue to unfold and develop, mean that the short-term outlook for the Irish economy is uncertain. The small, open nature of Ireland's economy also means that other international developments can significantly impact the economy. These circumstances have the potential to impact the markets ComReg regulates and monitors and the various stakeholders who engage with these markets.

Covid-19 and The Irish Economy

A 1.5 Digitalisation and connectivity have been essential for the continuity of economic and social activity during the Covid-19 pandemic. Businesses quickly moved to remote working, education moved online, and people have relied on video calls to see family and friends. Adoption of digital services has increased rapidly across the country. This step change in internet activities, especially in video calls and other video-related activities, has led to substantial increases in data traffic on networks. Figure 1 below shows the rate of growth of total data traffic in fixed and mobile networks has more than doubled compared to pre-pandemic years.

Figure 1: Year-on-Year percentage increase in Total Data Traffic (2017-2020)[1]
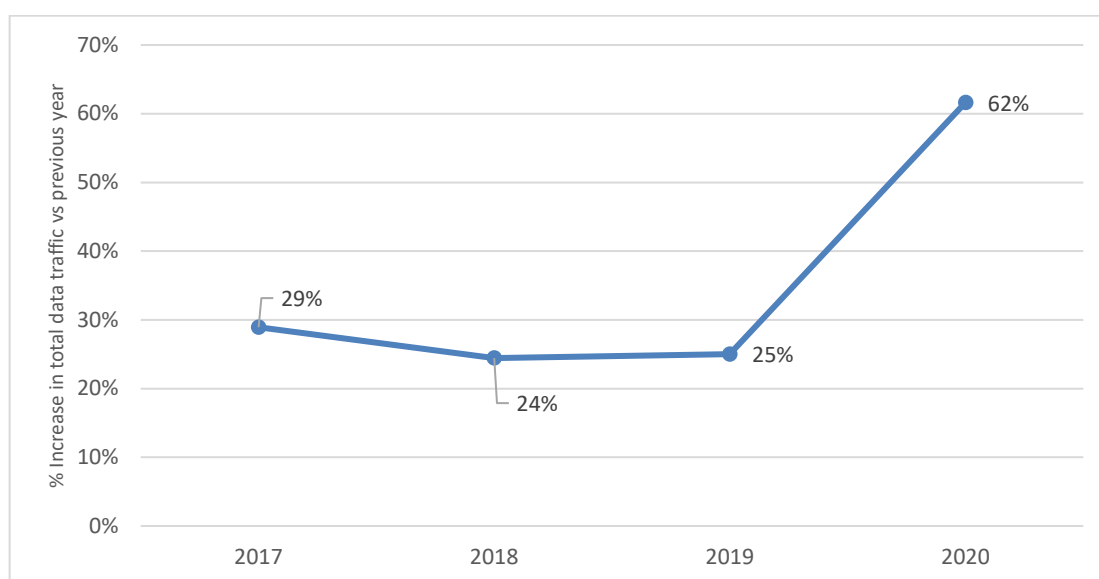

A 1.6 Covid-19 will have medium-run (and possibly long-run) implications for both demand and supply-side drivers within Irish markets including ECS. Sustained increases in both mobile and broadband traffic may further incentivise investments in new technologies that are more reliable and bring faster speeds, such as fibre and 5G. On the other hand, investment may be adversely affected if supply chain disruptions due to post-Covid-19 restrictions constrain production capacity.[2] The launch of new network devices (including 5G compatible smartphones) and services may be postponed. Users may not renew their mobile plans if they still foresee themselves spending the majority of their time indoors with adequate broadband for Wi-Fi calling/texting.

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[1] ComReg QKDR Q4 2020, (2021), ComReg Document 21/20
[2] Central Bank of Ireland, (2020), Q2 Quarterly Bulletin

A 1.7 The macroeconomic implications of Covid-19 are also uncertain. The Central Bank estimates that GDP will grow by 5.9% and 4.7% in 2021 and 2022, respectively.[3] The Central Bank projections also account for a "severe" scenario, in which sustained restrictions dampen economic activity until successful medical treatments are in place. This scenario foresees a weaker economic recovery, as shown in Figure 2 below. Although economic growth is expected, the uncertainty surrounding Covid-19 means that the trajectory is not clear.

Figure 2: Central Bank Economic Outlook Forecasts[4]

Central Bank Economic Outlook Forecasts (GDP, Modified Domestic Demand, Unemployment)
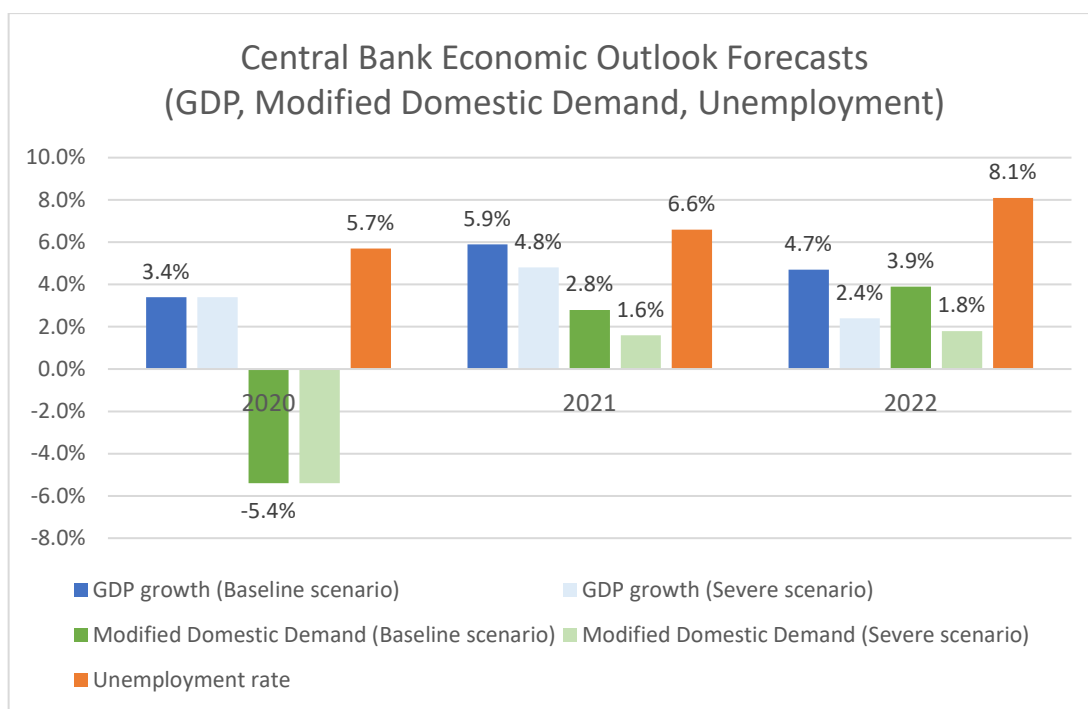
A 1.8 The longer-term impacts on growth will depend on the extent of scarring effects on the productive capacity of the domestic and global economy, among other factors.

International Developments and The Global Economy

A 1.9 The EU-UK trade deal[5] has important implications due to the small, open nature of the Irish economy. While the agreement has averted the threat of a 'No Deal' scenario, the new economic relationship introduces some new frictions to this trading relationship that may have repercussions for ECS markets. ComReg is actively monitoring the implications of Brexit on the electronic communications sector and has issued consumer guidance and information[6].

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[3] Central Bank of Ireland, (2021), Q2 Quarterly Bulletin
[4] Central Bank of Ireland, (2021), Q2 Quarterly Bulletin
[5] The EU-UK Trade and Co-operation Agreement took effect on 1 January 2021
[6] See ComReg's website: https://www.comreg.ie/consumer-information/brexit/

A 1.10 Broader trends in the global economy are also of relevance to the sector. Many ECS providers in Ireland operate as part of wider groups of companies, providing services in a number of countries. Investments in ECS in Ireland can depend on the domestic and international performance of these companies. Potential exists for geo-political tensions in the medium term, such as a perceived rise of nationalism within trade and immigration matters, and national security concerns. While global trade is projected to rebound in 2021 following the impact of Covid-19 on 2020 levels[7], trade volumes may grow at a slower pace.

A 1.11 Further uncertainty in the international taxation or business environment would likely adversely affect Ireland in particular. There have been attempts at the EU level to reform how digital multinational corporations ('**MNCs**') are taxed[8].

The Economics of Electronic Communications

A 1.12 The economic characteristics of ECS markets are fundamental to the dynamics in the sector. The commercial nature of private investment may mean that high-quality networks are only rolled out in areas where population densities are such that potential revenues from the end-users in those areas exceed costs. Furthermore, the quality of basic networks may not be maintained in areas where costs are high and competition is correspondingly weak. The commercial price of ECS may also be unaffordable for certain end-users who wish to purchase these services.

Market Failures

A 1.13 Market failures impede the ability of the normal competitive process to yield welfare optimal outcomes. The objective of economic regulation is to attempt to correct or compensate for the presence of market failures through appropriate interventions. Many of ComReg's statutory functions and objectives map back to an underlying market failure, examples of which are detailed in Table 1 below.

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[7] World Trade Organization, (2020), PRESS/862 PRESS RELEASE
[8] European Commission, (2018), Fair Taxation of the Digital Economy - Council Directive Proposals

Table 1: Market Failures in the ECS Sector

Market Power
Market power refers to the ability of one operator to profitably raise prices above, or reduce quality below, that which would prevail in a competitive market. Market power may stem from the reluctance or the inability of consumers to switch in response to a degradation of quality, escalating prices (for the same good), or changes in product/service terms and conditions. This may occur, for example, because switching is difficult or costly, or because limited or no comparable alternatives exist in the market.

Externalities
Externalities are the costs or benefits of an economic activity which are not fully incorporated into the decision process of the economic actor undertaking the activity. Intervention is thus required to promote behaviours that yield positive externalities and discourage activities with negative externalities. For example, a consumer's decision to join a network positively affects their own welfare, but as he/she joins, the network becomes larger and more connected, which further increases the welfare of other end-users on the same network (positive network externalities).

Information Asymmetry
Information asymmetry refers to the situation where parties to a transaction have different information. Asymmetric information can occur in ECS markets if, for example, a consumer does not understand the specifications or terms and conditions of a product/service they purchase. Consumers who have difficulty in obtaining and assimilating product/service information are typically more susceptible to adverse market practices e.g. deliberate misinformation from an ECS supplier.

Behavioural Bias
A behavioural bias is an irrational assumption or belief that may lead an invidual to make a sub-optimal decision. The ECS sector is characterized by complex products, fast-changing technology, and a dynamic service-provision environment – all of which make it sensitive to behavioural biases. Operators who understand behavioural biases may be able to extract additional revenue to the detriment of consumer welfare.

The Legal Context

A 1.14 Given the potential for market failures, ComReg's remit and powers allow it to intervene in various ECS markets (as appropriate) to help ensure these markets operate efficiently in the interests of society and end-users. While these fundamental rationales remain unchanged, as technologies and markets evolve, so too does the practical application of regulation. A key factor in this process is the evolution of the legal framework.

The European Electronic Communications Code

A 1.15 On 17 December 2018, the European Parliament adopted the European Electronic Communications Code ('**EECC**') or simply "the Code".[9] The Code is considered as a central piece of legislation to achieve Europe's Gigabit society and ensure full participation of all EU citizens in the digital economy and society.

A 1.16 The EECC, which is now in force across the EU[10], replaces the old suite of directives that comprised the EU Common Regulatory Framework for electronic communications (discussed in Explanatory Box 1: Background and Evolution of Legislation below). The EECC updates the main pillars of regulation in the sector, such as access regulation and consumer protection.

A 1.17 The EECC was created to provide a new legislative framework for ECS markets in Europe that allows for closer harmonization between the different markets across the European Union, and thus facilitates the move towards the Digital Single Market. The EECC places particular emphasis on the following:

- Incentivising investment in high-speed broadband networks;

- Updating end-user rights in relation to OTTs and bundles so as to create a more level playing field;

- Establishing rules around symmetric access to infrastructure;

- Putting into place modified procedures for market analysis and peer-revision of remedies;

- Having a consistent approach to spectrum management;

- Setting common 5G goals and spectrum bands;

- Redefining the approach to universal broadband access; and

- Addressing some governance issues related to the autonomy of National Regulatory Authorities ('**NRAs**') and the functioning of the Body of European Regulators for Electronic Communications ('**BEREC**')[11].

A 1.18 The EECC has four stated objectives - promoting competition; contributing to the development of the internal market; promoting the interests of EU citizens; and promoting the widespread access to, and take-up of, very high capacity networks (both fixed and wireless), for all end-users on the basis of reasonable price and choice. The fourth objective is new, relating to the connectivity of end-users through the promotion of investment in Very High Capacity Networks ('VHCN'),[12] and is embodied via measures, such as those related to co-investment.

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[9] Directive (EU) 2018/1972 of the European Parliament and of the Council of 11 December 2018 establishing the "European Electronic Communications Code (Recast) Text with EEA relevance".

[10] The EECC needs to be transposed into domestic law in each member state before it is fully effective in each state – see further below.

[11] Further information on BEREC can be found on its website: https://berec.europa.eu/

[12] The first three objectives, promoting competition, contributing to the development of the internal market and promoting the interests of EU citizens are existing objectives under the existing EU Common Regulatory Framework.

A 1.19 As such, for ComReg and Ireland generally, this means supporting the rollout of the highest capacity networks that are economically sustainable in a given area, while at the same time aiming for convergence in the network capacity available in different areas. This emphasis on connectivity in the EECC is reflected in our strategy, with the inclusion of a new strategic intent. Moreover, this objective broadly aligns with our vision for the electronic communications sector, that consumers and businesses in Ireland have affordable, high-quality, and widespread access to secure communications services and applications that support their social and economic needs.

A 1.20 With the advent of the EECC, ComReg will likely have a number of new functions and objectives, additional to those contained in the previous Common Regulatory Framework, including, for example, in relation to connectivity.

Explanatory Box 1: Background and Evolution of Legislation

Given the presence of market failures, ComReg was established by the Communications Regulation Act 2002[i] ("the 2002 Act") as the successor to the Office of the Director of Telecommunications Regulation (ODTR), which had itself been established in 1997[ii]. Over the last two decades the scope of our regulatory remit has changed, reflecting changes in domestic and European policy towards communications markets as well as changes in technology. Today, ComReg's core remit encompasses[iii]:

- The regulation of electronic communications networks and services;
- The management of the radio frequency spectrum and national numbering resource; and
- The regulation of postal services

ComReg also has a number of additional functions, including the regulation of Premium Rate Services ('PRS')[iv] , Emergency Call Answering Services ('ECAS')[v] , the reduction of the costs of high speed broadband deployment[vi] , roaming[vii] and net neutrality[viii] amongst others[ix]. In addition, ComReg has shared powers with the Competition and Consumer Protection Commission[x] and some shared and complementary powers with the Data Protection Commission in respect of specific aspects of data privacy[xi]. ComReg also has a variety of other powers and functions derived from national legislation.

Since 2002, electronic communications in EU member states have been regulated pursuant to a Common Regulatory Framework comprised of five principal directives[xii], The Framework Directive, The Authorisation Directive, The Access Directive, The Universal Service Directive, and The Privacy Directive. These directives were implemented in Ireland by way of a suite of domestic regulations made in 2003 and replaced in 2011, following the adoption by the EU in 2009 of two amending directives[xiii] (the Better Regulation Directive and the Citizens' Rights Directive).

The 2002 Act and the Framework Regulations set out a number of statutory objectives for ComReg to follow, which include:

- Promoting the interests of end-users of communications services
- Promoting investment and innovation
- Promoting competition, and
- Ensuring efficient management and use of the radio spectrum.

The EECC, which is now in force, replaces the old suite of directives that comprised the EU Common Regulatory Framework for electronic communications.

i The Communications Regulation Act 2002 has been amended by, inter alia, the Digital Hub Development Agency Act 2003, the Broadcasting (Amendment) Act 2007, the Communications Regulation (Amendment) Act 2007, the Broadcasting Act 2009, the Communications Regulation (Premium Rate Services and Electronic Communications Infrastructure) Act 2010, the Ministers and Secretaries (Amendment) Act 2011, the Communications Regulation (Postal Services) Act 2011, the Protected Disclosures Act 2014, the Competition and Consumer Protection Act 2014, the Freedom of Information Act 2014, the Communications Regulation (Postal Services) (Amendment) Act 2015, and the Communications Regulation (Postal Services) (Amendment) Act 2017.
ii By section 2 of the Telecommunications (Miscellaneous Provisions) Act 1996, which entered into force on 10 March 1997.
iii Section 10 of the 2002 Act.
iv Section 10(1)(cb) of the 2002 Act, inserted by the Communications Regulation (Premium Rate Services and Electronic Communications Infrastructure) Act 2010.
v Section 10(1)(ca) of the 2002 Act, inserted by the Communications Regulation (Amendment) Act 2007.
vi Directive 2014/61/EU of the European Parliament and of the Council of 15 May 2014 on measures to reduce the cost of deploying high-speed electronic communications networks; European Union (Reduction of Cost of **ix** Deploying High Speed Public Communications Networks) Regulations 2016 (S.I. No. 391 of 2016).
vii Various EU and domestic regulations from 2007 to 2017.
viii See, e.g., Regulation (EU) 2015/2120 of the European Parliament and of the Council of 25 November 2015 laying down measures concerning open internet access and amending Directive 2002/22/EC on universal service and users' rights relating to electronic communications networks and services and Regulation (EU) No. 531/2012 on roaming on public mobile communications networks within the Union.
ix For clarity, the list of powers and functions outlined here is not intended to be an exhaustive list. For more detail on ComReg's functions and powers, please see ComReg's website - https://www.comreg.ie/about/legislation/
x In respect of certain ex post competition legislation and consumer protection legislation, insofar as they apply to the electronic communications and PRS sector.
xi European Communities (Electronic Communications Networks and Services) (Privacy and Electronic Communications) Regulations 2011, S.I. No. 336 of 2011
xii Directive 2002/21/EC of the European Parliament and of the Council of 7 March 2002 (Framework Directive), Directive 2002/20/EC of the European Parliament and of the Council of 7 March 2002 (Authorisation Directive), Directive 2002/19/EC of the European Parliament and of the Council of 7 March 2002 (Access Directive), Directive 2002/22/EC of the European Parliament and of the Council of 7 March 2002 (Universal Service Directive).Directive 2002/58/EC of the European Parliament and of the Council of 12 July 2002 (Privacy Directive).
xiii Directive 2009/140/EC of the European Parliament and of the Council on 25 November 2009 amending Directives 2002/21/EC on a common regulatory framework for electronic communications networks and services, 2002/19/EC on access to, and interconnection of, electronic communications networks and associated facilities, and 2002/20/EC on the authorisation of electronic communications networks and services and Directive 2009/136/EC of the European Parliament and of the Council of 25 November 2009 amending Directive 2002/22/EC on universal service and users' rights relating to electronic communications networks and services, Directive 2002/58/EC concerning the processing of personal data and the protection of privacy in the electronic communications sector and Regulation (EC) No 2006/2004 on cooperation between national authorities responsible for the enforcement of consumer protection laws

Transposition

A 1.21 As the new Code is being introduced across the EU by way of a single new directive, this directive is being transposed into the national law of each Member State, and this process of transposition is entirely for each individual Member State to undertake. In Ireland, the primary responsibility for transposition of the new Code into domestic Irish law lies with the Department of the Environment, Climate and Communications ('**DECC**'). The transposition process to date has included extensive and ongoing engagement with relevant key stakeholders, including ComReg, industry, the Office of the Data Protection Commissioner, other Government Departments and the European Commission.

A 1.22 The Code was to be transposed by Member States by 21 December 2020. ComReg understands that the Code is now likely to be transposed into national law later in 2021[13]. In the interim, electronic communications providers must continue to comply with their obligations, ComReg continues to regulate the electronic communications sector under its existing powers, and ensure redress mechanisms for customers continue unchanged until new legislation is introduced. The Communications Regulation Act 2002 continues in force (without further change/amendment), and the suite of 2011 Electronic Communications Regulations continue in force until further legislation is introduced, which amends or repeals them.

A 1.23 ComReg's Regulatory Guidance on the End-User Rights of the European Electronic Communications Code was first published on 10 November 2020 and the first update was published on 23 December 2020. On 4 December 2020, DECC published draft regulations in respect of the end-user rights provisions of the Code.

A 1.24 In respect of the likely timing of transposition, DECC has most recently stated:

> *The Department has decided that the transposition of the enforcement provisions of the Code should be given effect to through primary legislation. However, it remains the Department's intention that much of the transposition will still be effected by way of statutory instrument… The Department is currently preparing Heads of Bill for a General Scheme for the proposed primary legislation. Where the General Scheme has been approved by Government, it is the intention of the Department to hold a public consultation on the Scheme. The remainder of the statutory instrument will also be consulted upon at this time. It is anticipated that this will be possible over the summer period.*[14]

[13] The Department's most recent current communications in relation to the Code can be found at its website, here: www.gov.ie/en/publication/339a9-european-electronic-communications-code-eecc/

[14] See footnote 13 above.

A 1.25 Full transposition of the new Code will provide regulatory certainty for business and citizens from a solid regulatory framework as a foundation to build trust, increase investment and rollout of digital infrastructure, and enable opportunity for citizens and society. Delivery of digital legislation to complete the Digital Single Market Strategy will enable ComReg to contribute to the delivery of the National Digital Strategy.

A 1.26 By 21 December 2025, and every five years thereafter, the Commission shall review the functioning of the EECC and report to the European Parliament and to the Council. Those reviews shall evaluate in particular the market implications and whether the *ex-ante* and other intervention powers pursuant to the EECC are sufficient to enable national regulatory authorities to address uncompetitive oligopolistic market structures and to ensure that competition in the electronic communications sector continues to thrive to the benefit of end-users.

A 1.27 In addition, by 21 December 2025, and every five years thereafter, the Commission shall review the scope of universal service, in particular with a view to proposing to the European Parliament and to the Council that the scope be changed or redefined. Furthermore, BEREC will publish an opinion by 21 December 2021 and will publish further opinions every three years thereafter, on the national implementation and functioning of the General Authorisation, and on their impact on the functioning of the internal market.

A 1.28 ComReg's various activities take account of the EECC, insofar as possible, and its strategy, vision, programme and activities set out in this Strategy Statement take into account the various provisions of the EECC. ComReg is mindful of the key features of the EECC and how they impact ongoing work streams.

Annex: 2 Trends and Challenges

Overview

A 2.1 The electronic communications sector is shaped by different social, economic, legislative, and technological forces. These forces become trends over time and drive the sector's development. Some have a positive impact on markets and act as catalysts for the advancement of communication technology and the value it can bring to Irish society; others present challenges that require industry innovation or government regulation so that they do not inhibit the proper functioning of the market.

A 2.2 ComReg analyses the various factors influencing the development of the electronic communications sector and its ecosystem. ComReg has identified four main trends which are likely to shape the sector, and which may pose regulatory challenges in the coming period. These are:

- Enhanced Connectivity and New Technologies
- The Consumer Experience
- The Evolution of Adjacent and Related Markets
- The Changing Future of Regulation in the Sector.

## Enhanced Connectivity and New Technologies:

Fixed Network Rollout

A 2.3 The increasingly important role played by faster ECN across the country will continue to shape Ireland over the coming 5 years.

A 2.4 Between 2011 and 2019, commercial network operators have invested €5.5 billion in expanding the reach of their fixed and mobile networks (See Figure 3 below).[15] Commercial fixed investments by operators have centred around the rollout of fibre network technologies and upgrading of existing networks (e.g. Cable networks), while copper-based networks are being phased out. In March 2021, Eircom published a 'white paper' on its proposal to switch off its legacy copper network. The efficient migration of customers from the copper network will require engagement and consultation with various stakeholders and will need to be undertaken in a manner that safeguards competition and the rights of end-users. With these investments, for example, by Q4 2020, 42.5% of total fixed broadband subscriptions advertised download speeds exceeding 100Mbps, compared with only 21.6% in Q4 2016.[16]

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[15] Eurostat

[16] Prior to Q1 2019, ComReg collected information from operators relating to advertised download speed. Since Q1 2019, sold download speed information has been collected from operators. There are minor differences in the definitions of advertised and sold speeds.

Figure 3: Fixed and Mobile Investment in ECN/S (2011-2019)[17]
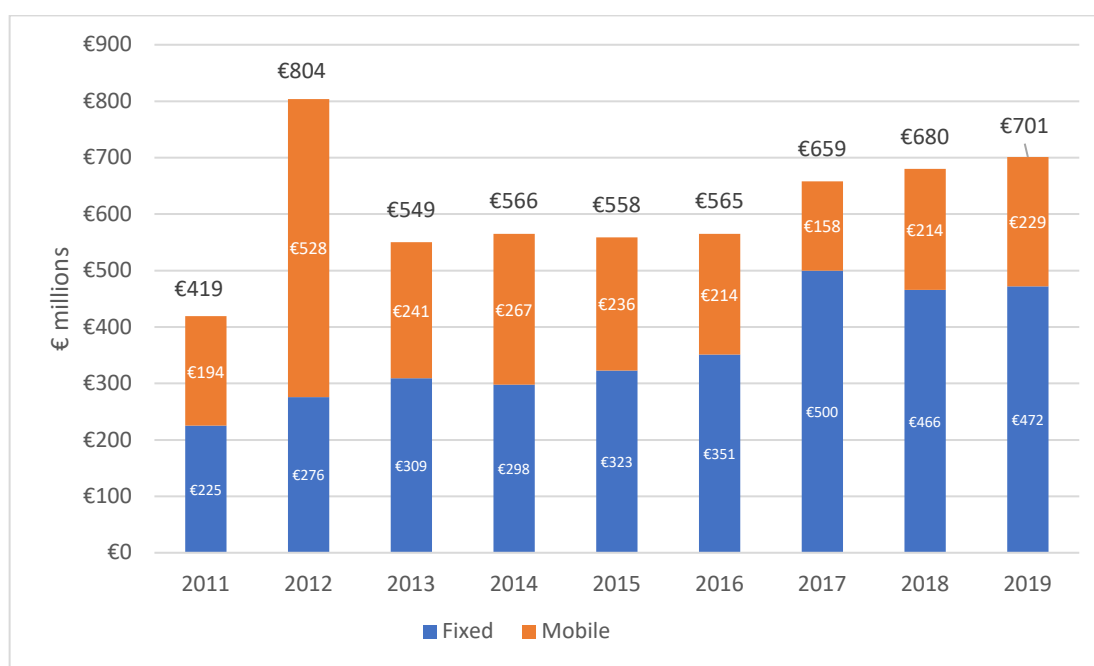
A 2.5 New networks with faster download speeds, lower latency and increased bandwidth can impact consumer experience and take-up of services available over these networks (e.g. TV services) and of products and services available in adjacent markets (e.g. better mobile handsets). However, as networks improve, consumers are likely to become more reliant on their ECS and ECN. This increased reliance on ECS and ECN can also lead to increased demand and higher expectations of the services provided. ComReg expects this trend to continue, especially with the likely widespread adoption of fibre and 5G networks in the future.

A 2.6 It is also worth noting that new networks (e.g. FTTH and 5G) are more energy efficient than legacy networks. These new networks can also play a role in creating a more sustainable economy, realising the benefits of remote working, e-Health, e-Banking and helping to manage demands on electricity networks (e.g. through smart-grids).

The National Broadband Plan

A 2.7 Despite the advances in network rollout so far, the geography and population distribution in Ireland can present challenges for the rollout of both fixed and wireless networks. Ireland's population density is lower than the EU average[18] and is highly concentrated around cities, with 63% of the population in urban areas[19]. The commercial realities of network rollout mean that network rollout may not occur in geographic areas where the population is sparse.

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[17] Eurostat
[18] 70 people per square kilometre vs 111 people per square kilometre. - "Population Density (people per sq. km of land area)", World Bank
[19] Central Statistics Office, (2016), "Infographic Census 2016"

A 2.8 The National Broadband Plan ('**NBP**') is the government's initiative to ensure the availability of high-speed fibre to the home ('**FTTH**') broadband services to all premises in Ireland through investment from commercial enterprises as well as intervention from the State in parts of the country where there are no private investment plans. The contract for the NBP was awarded and signed on the 19th of November 2019. The successful tender was led by Granahan McCourt and was followed with the incorporation of an Irish registered company called National Broadband Ireland ('**NBI**').

A 2.9 The State intervention area covers 538,000 premises, 1.1 million people, over 54,000 farms, 44,000 non-farm businesses, and 695 schools. Over the lifetime of this Medium-term Strategy, it is expected that the majority of this network rollout will have been completed.

5G Technology and other network developments

A 2.10 Until recently, 5G was a nascent development at the periphery of the global electronic communications sector. However, as the necessary spectrum bands have been assigned, operators have commenced the rollout of networks, device manufacturers have started developing and selling 5G handsets, and international bodies have clarified standards.

A 2.11 In June 2017, ComReg granted 3.6 GHz licenses to five operators following a spectrum auction. Mobile operators in Ireland have begun to roll out 5G services. However, widespread adoption will depend on the availability and take-up of new 5G enabled handsets and use cases.

A 2.12 Growth in the use of 5G and other developments in mobile networks can have implications for service offerings and competitive dynamics in the sector in future, as seen in Explanatory Box 2 below.

A 2.13 Besides 5G, there are several other new technologies that aim at increasing and improving connectivity. Two of them are Wi-Fi 6 and Low Earth Orbit ('**LEO**') Satellites.

A 2.14 Wi-Fi 6 is the next generation Wi-Fi technology currently being deployed, capable of delivering reliant, fast, widespread, and traffic-heavy connectivity. Integrating 5G network technology with Wi-Fi 6 technology will allow operators to optimise traffic across access networks and provide efficient indoor-outdoor coverage. Offloading to Wi-Fi can provide cost savings for mobile operators delivering 5G without affecting quality. Used together, these technologies can support large deployments of Internet of Things ('**IoT**') devices and facilitate use cases like connected vehicles and smart cities where there will be a mix of fixed and mobile devices. Some service providers across Europe started to offer Wi-Fi 6 in Europe in 2019[20]. Manufacturers have also released Wi-Fi 6-compatible devices and/or routers.

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[20] For example, Swisscom and Telefonica have launched Wi-Fi 6, 10 Gbps gateways and repeaters in Europe in late 2019. ("Swisscom Launches First Wi-Fi 6, 10 Gpbs Gateway and Repeater in Europe, Powered by SoftAtHome

Explanatory Box 2: 5G Networks and Non-Ionising Radiation (NIR)

Mobile technologies and services have evolved steadily over the past three decades and continue to do so. Ireland's first "2G" mobile network was launched in 1993. In those early days, users were limited to voice calls, though within a few years they could also send and receive text messages. The early 2000s saw the first 3G networks and with them the first mobile internet services. These were followed by 4G networks in the early 2010s which offered faster mobile internet services.

5G is the next generation of mobile technology. The coming decade should see the rollout of 5G networks across Europe and indeed most of the world. 5G will operate alongside other technologies to provide still faster data speeds and better connectivity. 5G is also a technology which would enable connectivity between wireless devices. This should support the expected massive growth in the number of wireless devices such as in machine-to-machine (M2M) communications and the Internet of Things (IoT).

Compliance with limits on non-ionising radiation (NIR) is a requirement of all licences and the general authorisation irrespective of the technology used or the service been provided. As part of its spectrum management function, every year ComReg measures NIR levels in public areas at a minimum of 80 different sites, located throughout Ireland. These are chosen based on demographic and geographic factors. To date, over 1400 sites have been surveyed and NIR levels at all sites have been found, without exception, to fall well below the international limits for public exposure set by the International Commission on Non-Ionizing Radiation Protection (ICNIRP).

ComReg does not have any role in relation to the health effects of Non-Ionising Radiation (NIR), occupational exposure to NIR, the limits that should apply, or planning matters, and does not make decisions in relation to the location or installation of telecommunications masts. These matters are dealt with by other public bodies, including:

- **Dept of Environment, Climate and Communications (DECC)** – responsible for setting policy relating to the health effects of NIR
- **Environmental Protection Agency (EPA)** – provision of independent expert advice on exposure to NIR and the monitoring of scientific/technological developments likely to impact on public exposure to NIR
- **Local Authorities** – responsible for the siting of telecommunications masts and equipment
- **Health and Safety Authority (HSA)** – regulates exposure to NIR in the workplace

The EPA note that the effects of RF EMF (Radiofrequency Electromagnetic fields), including the frequencies used and envisaged for 5G, have been subject to significant research. The ICNIRP issues guidelines to limit exposure to EMF and protect workers and the public from potential harmful effects. The ICNIRP guidelines are endorsed by the World Health Organization (WHO) and the European Commission. No health effects have been shown at levels below the ICNIRP guidelines for members of the public, as such no consequences for public health are expected from exposure to 5G.

Software", November 2019; "Telefonica reinvents its Digital Home Connectivity with the new Smart WiFi 6 Amplifier", June 2020).

Explanatory Box 3: Emerging Technologies

OpenRAN

Radio Access Networks ('RAN') are used to connect devices to a mobile network. RAN vendors such as Ericsson, Nokia and Huawei supply hardware and software to telecoms operators. In a traditional RAN, hardware and software are coupled, and are not interoperable between vendors. Thus, operators may be heavily reliant on their chosen vendor. However, Open RAN aims to disaggregate mobile base stations by standardising open interoperable interfaces between the radio and signal processing elements, with the aim of increasing supply chain diversity, lowering costs and increasing innovation.[i] This could enable operators to avail of multivendor deployments, reducing dependence on individual vendors and enabling a more competitive vendor market.[ii] While operators typically rely on a limited number of RAN vendors operating in a concentrated market, the introduction of Open RAN could reduce barriers to entry for new vendors to introduce their own services and allow operators to customise their network, creating a more agile RAN.

Software Defined Networks & Network Function Virtualisation

Technological developments may allow new network management possibilities that enable a single physical network to support a number of virtual networks with different performance characteristics.[iii] Two key technical developments that make this possible are Software Defined Networks ('SDN') and Network Function Virtualisation ('NFV'). NFV decouples network functions from proprietary hardware appliances so they can run in software. SDN transfers network functions from the hardware to the software layer and is complementary to NFV for network management.[iv] These developments effectively allow for the creation of separate networks that share one physical infrastructure, with each network designed to meet its own specific requirements. This could allow operators to provide services with different performance characteristics to different customers using the same physical network. This may be particularly useful given that different types of use cases for mobile networks in the future may have different requirements in terms of download speed, reliability or latency. Services can be targeted at particular sectors (verticals), opening up opportunities for new business models.

i O-Ran Alliance, (2020), "O-RAN Specifications"
ii O-Ran Alliance, (2018), "O-RAN: Towards an Open and Smart RAN", White Paper
iii BEREC, (2018), Study on Implication of 5G Deployment on Future Business Models, A report by DotEcon Ltd and Axon Partners Group
iv OECD, (2019), The Road to 5G Networks: Experience to Date and Future Developments

A 2.15 In the last few years, there has been a resurging interest in LEO satellites to offer ECS. These satellites typically orbit earth at a lower altitude than existing broadband satellites (from 180km to 2,000km) and have the potential to offer higher capacity (up to 23.7 Tbps[21]), broader coverage, and lower latency than existing broadband satellite networks[22]. Because of their altitude, there must be a full constellation of satellites that communicate with each other and with devices on the Earth in order for service to be provided. These constellations will allow for broadband network coverage in areas where the rollout of fixed networks is not commercially viable. It is possible that the future use cases of LEO satellites will focus on either niche applications or in helping reach universal broadband coverage in remote areas, rather than directly competing with traditional broadband services. Nonetheless, their retail potential of offering an alternative version of current services cannot be ignored.

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[21] Del Portillo, I., Cameron, B., and Crawley, E., (2018), "Technical Comparison of Three Low Earth Orbit Satellite Constellation Systems to Provide Global Broadband"
[22] European Commission, (2017), "Low-Earth orbit satellites: Spectrum access"

Demand on Networks

A 2.16 Results from ComReg's Quarterly Key Data Report ('**QKDR**')[23] in Figure 4 below show the increasing volumes of fixed and mobile data traffic in recent years, with particular increases arising in 2020, following the emergence of Covid-19.

Figure 4: Total Fixed and Mobile Data Traffic[24]
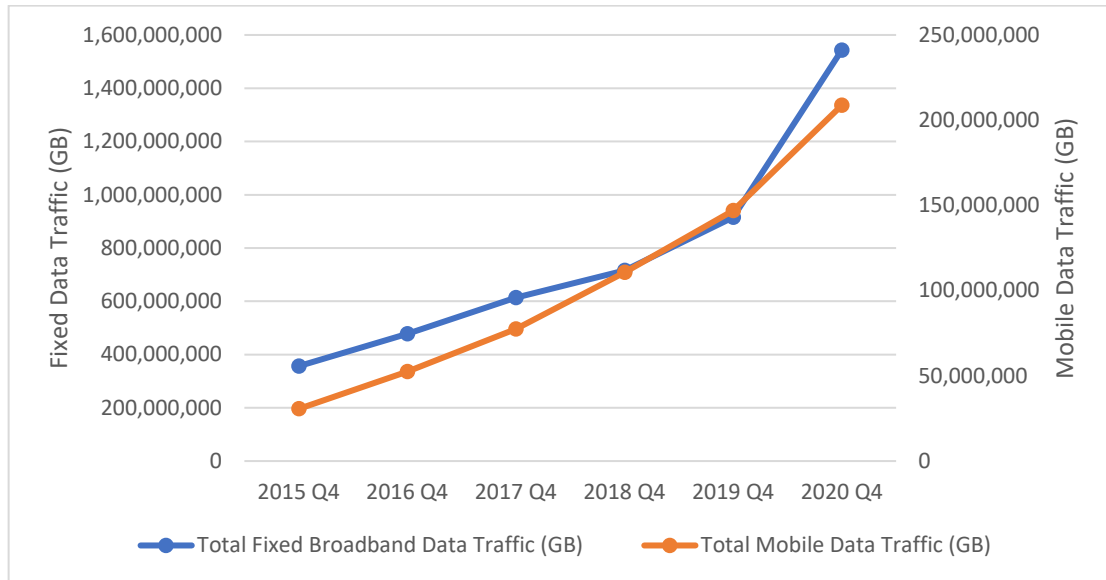
A 2.17 Figure 1 (above) shows the year-on-year percentage increase in total data traffic on fixed and mobile networks. The figure shows a reasonably constant level of growth of total data traffic of around 24-29% in the years preceding the pandemic when the rate of growth more than doubled (rising to 62%).

A 2.18 Increasing demands for data are expected to continue. In the future, meeting the needs of Irish consumers accessing data-hungry applications (such as video streaming and social media) from mobile devices will require not only the improved coverage of mobile networks, but also the ability of consumers and services to roam seamlessly between mobile and fixed broadband networks. The National Broadband Plan and the availability of additional spectrum through future spectrum awards are key enablers to meet this challenge.

A 2.19 Patterns of use are also changing. ECN and ECS are increasingly being relied upon for crucial economic activities, such as working from home. In this context, the quality of service (e.g. reliability) may be even more important than when doing other activites online (e.g. streaming video content). In this regard, the reliability, resilience and security of networks is becoming increasingly important.

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[23] ComReg QKDR Q4 2020, (2021), ComReg Document 21/20
[24] ComReg QKDR Q4 2020, (2021), ComReg Document 21/20.

Network Security and Resilience

A 2.20 A key consideration regarding networks and connectivity is the increasing need of improving their security and resilience. The growing number of connected devices and the exponential increase in data that IoT and other technologies function on add an extra layer of vulnerability to networks. In addition, the increase in the number of devices accessing a network and the growing reliance of consumers on ECN increases the potential threat of malicious attacks and security risks. Other risks to network security and reliability include climate change and weather events,such as floods and storms.

Network reliability and security has advanced with each technology. One of these challenges is that communications are no longer confined to individuals but have come to include communications between devices as well as within vertical industries. This brings about new business models with a broad range of security needs. Additionally, the more online life becomes, the more sensitive the information transferred becomes and the higher the risk and potential for damage from a cyberattack are. ComReg works with other organisations to protect consumers from scams and other malicious attacks by increasing awareness of these security issues.

The Consumer Experience

A 2.21 Related to the trend of increased and improved connectivity is the changing user experience and expectations of Irish consumers. As part of this trend, ComReg notes the growing reliance on connectivity, the increased adoption and usage of new technologies and the persisting non-uniform end-user experience.

Growing Reliance on Connectivity

A 2.22 Over the last 10 years, the development of networks and the adoption of new technologies have enabled people to connect in ways they had never done before. There is virtually no part of our lives which remains untouched by innovations in digital connectivity[25]. In 2019, over 90% of Irish households had an internet connection at home and had been engaged in a wide range of internet activities[26].

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[25] European Commission, Digital Agenda Scoreboard Key Indicators
[26] Central Statistics Office, (2019), Information Society Statistics – Household

A 2.23 Covid-19 has rapidly accelerated trends towards further digitalisation, moving even more of our lives online. In November 2020, 76% of online users estimated that their household use of broadband had increased since March.[27] Seven in ten workers believe that they will be working more from home after the crisis than they did before and agree that the traditional way of conducting voice-based conference calls will change to video-based conference calls[28]. Moreover, the January 2021 National Remote Working Strategy[29] published by the Department of Enterprise, Trade and Employment ('**DETE**') underlines the enduring nature of these developments, proposing a range of actions which will promote remote working beyond Covid-19.

A 2.24 Other digital services such as e-Government, e-learning, and cloud storage services are becoming increasingly popular in recent years[30], and Covid-19 may further accelerate adoption of new online services (e.g. e-Health).[31] Online activities (including remote working) are also becoming more important for businesses. Over the next decade it is likely that public services, such as health, education and public administration will depend heavily on widespread, reliable, secure and resilient ECS/ECN to deliver services to consumers and businesses. As a result, ComReg expects the relationship between the ECS sector and these key adjacent markets will grow in importance and value.

A 2.25 The Digital Economy and Society Index ('**DESI**') 2020 report ranks Ireland as first in Europe in terms of integration of digital technology[32], with Ireland leading Europe in all three indicators under e-commerce (i.e. SMEs selling online, e-commerce turnover and selling online cross-border). Irish companies also rank relatively high in the report on the use of big data, cloud services and social media.

Continued Adoption of New Technology

A 2.26 Along with the growing reliance on connectivity, consumers continue to adopt new technologies. As shown in Figure 5 below, smartphones are now used in nearly every home, and the use of tablets continues to increase while laptops are used in more than 80% of homes. Smart TV's are now present in more than two thirds of homes while nearly one in three households use a smart home device.

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[27] Comreg, (2021), 'Impact of Covid-19 on consumer use and perception of telecommunications services - 4th Survey Q4 2020,' ComReg Document 21/06
[28] Ericsson, (2020), Ericsson Mobility Report 2020
[29] Department of Enterprise, Trade and Employment, (2021). "Making Remote Work: National Remote Working Strategy"
[30] Central Statistics Office, (2019), Information Society Statistics – Household
[31] Ericsson, (2020), Ericsson Mobility Report 2020
[32] European Commission, (2020), Digital Economy and Society Index (DESI) 2020: Thematic Chapters

Figure 5: Home (%) with devices connected to Fixed Broadband 2013-2020[33]
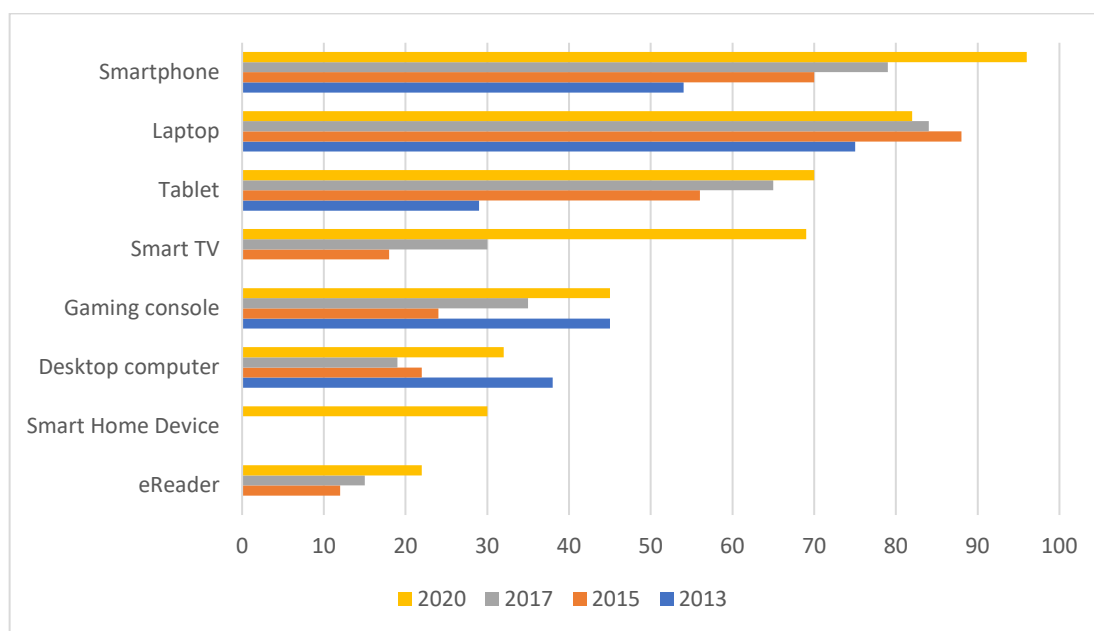
A 2.27 While new technologies continue to be adopted, consumers expect this trend to continue. Figure 6 below shows the current and anticipated use of various technologies in 2025 by online users.

Figure 6: Current and Anticipated Future Technology Use[34]

	Past Use - 2017	Current Use - December 2020	Anticipated Future Use (in 2025)
	%	%	%
Petrol/ Diesel based Car	84	77	⬇46
Tablet/ iPad	65	65	60
TV Streaming Box	13	43	44
Smart Watch/ Wearable Fitness Tracker	9	40	⬆44
Smart Speaker	-	29	⬆37
Apple/ Android Pay	7	25	⬆35
Smart Home Thermostat	4	12	⬆35
Hybrid Car	4	5	⬆36
Other Smart Home Devices	3	21	⬆35
Fully Electric Car	-	N/A	21
Sem-Autonomous Car	-	N/A	12

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[33] ComReg Connectivity Survey, (2021), ComReg Document 21/30 and ComReg Ireland Communicates Survey, (2017), ComReg Document 18/23a

[34] ComReg Technology Survey (2021), ComReg Doc 21/32b, Digital Services & Online Safety Survey, (2021), ComReg Document 21/09 and ComReg Ireland Communicates Survey, (2017), ComReg Document 18/23a

A 2.28 The continued growth in the use of IoT devices anticipated over the coming years will be driven by improved functionality, the growing availability of high capacity fixed networks, and the development of 5G networks. ComReg recognises that the availability and adoption of many emerging technologies may not be uniform – it will likely be led by younger consumers, living in urban areas, where disposable incomes are higher and faster access networks are available.

Non-Uniformity of Experience

A 2.29 This increased adoption of technology and services has not been uniform throughout the country nor across demographics. As mentioned above, there are differences in connectivity levels between urban and rural areas, largely due to differences in the availability of networks. In addition, there are other areas where commercial rollout will be slower and there will likely remain a need for ex-ante regulation.

A 2.30 In March 2021, the Irish Government published '*Our Rural Future*', its plan to transform rural Ireland over the next five years. Amongst other things, the Plan highlights the role that our telecommunications networks will play in promoting remote working and revitalising the rural economy. The Plan notes that the rollout of the NBP will help bring new opportunities in areas like e-Health, remote learning, online trading and new technologies. The Plan commits to having 20 percent of the public service working remotely, with incentives to encourage people to settle in rural areas, to be served by 400 remote working hubs.

A 2.31 The use and take-up of ECS also varies across age groups. ComReg's Connectivity Survey 2020[35] shows that a considerably higher proportion of those aged 18-34 have access to a fixed broadband service at home compared to those over 55 (86% vs 58%). Younger cohorts also use a wider variety of online services on a daily basis, such as email, video content, online banking, online shopping and have adopted new technologies, such as smart watches or smartphone payments. See Figure 7 below for a breakdown in technology ownership and usage by age.

A 2.32 A noticeable discrepancy persists in smartphone ownership, with nearly all (99%) of mobile phone users aged 18-24 having a smartphone, compared to just 59% of those aged over 65.[36] Though, this has increased from less than half (47%) of those aged over 65 in 2019.[37]

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[35] Mobile Consumer Experience Survey, (2019), ComReg Document 19/101
[36] Behaviour & Attitudes, (2020), "Techscape 2020"
[37] Mobile Consumer Experience Survey, (2019), ComReg Document 19/101

Figure 7: Ownership/Usage of Technologies in the Home[38]

	18-34	35-54	55+
	%	%	%
Access to Fixed Broadband at home	86	81	58
Access to a home phone service	25	39	49
Access to a mobile phone	97	98	91
Watch TV on a(n) Tablet/ iPad	11	9	1
Watch TV on a Smart TV	76	75	48
Watch TV on a smartphone	21	14	5
Use Netflix	62	46	18
Daily use of Email*	92	91	81
Daily use of Messaging apps*	90	86	74
Daily use of Video content*	76	64	39
Daily use of Online banking*	51	40	31
Daily use of Online shopping*	25	22	7
Smart watch/wearable fitness tracker**	46	43	32
Apple pay or Android pay**	40	26	14
*Results from ComReg's Digital Services & Online Safety survey (Online) ***Results from ComReg's Technology Survey 2021 (Online)**			

Consumer Behaviours

A 2.33 Consumers' confidence in choosing optimal telecom goods and services is subject to various factors. The nature of the electronic communications sector creates an environment that is particularly complex and difficult for consumers to make decisions in. Because of these industry characteristics, consumers may not always make the best choices and operators may choose to further distort the market by choosing carefully how they present information and choices to consumers in order to increase profits.

The Consumer Experience

A 2.34 The pattern of network rollout across the country as well as the varying levels of technology adoption across demographics mean that consumer experiences in the sector are not uniform. These developments imply new, or more sharply drawn, digital divides. Given the increasing reliance on connectivity in daily life, these varying levels of digital inclusion are potentially more acute and socially divisive than ever before, and will therefore draw regulatory as well as political attention over the coming period.

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[38] ComReg Connectivity Survey, (2021), ComReg Document 21/30, ComReg Digital Services & Online Safety Survey, (2021), ComReg Document 21/09 and ComReg's Technology Survey, (2021), ComReg Document 21/32b

A 2.35 As set out in the Strategy Statement, a significant numbers of consumers continue to experience issues when availing of ECN / ECS and PRS. Billing, contractual and service issues have been and remain the main ECN / ECS issues raised by consumers, while number portability and switching concerns have increased significantly more recently. Issues with PRS persist in particular in respect of subscribing, representing a significant percentage of total contacts received.

A 2.36 ComReg also notes the results from the 2020 CXi Survey[39] for Ireland showing the Communications sector to be a poor at delivering customer experience, when compared to other sectors of the economy.

Related Markets and Services

A 2.37 A third trend identified is that of how changing dynamics in related markets can influence the electronic communications sector. As these related markets evolve, lines between markets get blurred and change the industry's structure and competitive landscape. ComReg considers input markets, complementary markets and downstream markets under this trend.

Figure 8: Related Markets and Services
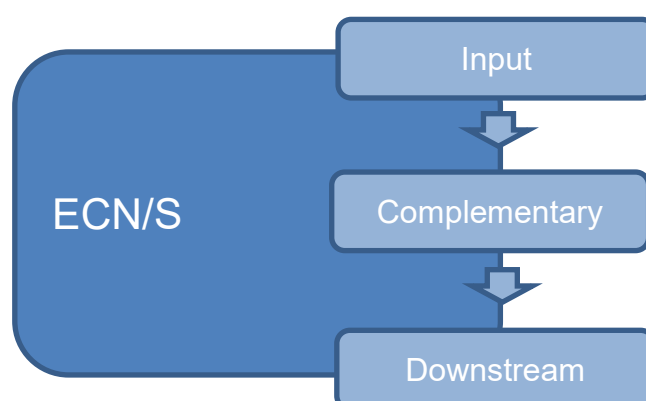
Input Markets

A 2.38 Input markets include areas such as network equipment manufacturers which create the equipment to facilitate the use of ECS. Input markets affect the sector in various ways, such as the cost of network rollout, quality of service and security. Two developments are considered in the context of input markets, eSims and Artificial Intelligence.

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[39] https://thecxcompany.com/wp-content/uploads/2020/10/2020-CX-Report.pdf

A 2.39 The embedded Sim (**eSim**) is the most recent iteration of the Sim card technology which allows for over-the-air provisioning of network services without the need of a physical card. It is resistant to physical shocks, vibrations and humidity, and has a long lifespan. The eSim is therefore suitable for large scale M2M deployments such as in the car industry, where physically changing Sims would not be economically feasible. It is also suitable for various consumer device uses such as mobile handsets and wearables. Because of these characteristics and the potential use cases it offers, eSims have the potential of changing the competitive landscape in the mobile, M2M, and related markets. For example, in the M2M case, eSims may significantly reduce switching costs in cases where there are many connected devices in a system. Intermediaries may even take on the challenge of finding the best offers for businesses and managing their subscriptions. For consumers, eSims may enable multi-device subscriptions.

A 2.40 The full potential and development of eSims will depend on the standards adopted by industry. There are currently no operators in Ireland offering eSims. However, a number of device manufacturuers already include an eSim in mobile handsets sold in the Irish market. ComReg continues to monitor this space and any developments in it.

A 2.41 Another important trend is the use of Artificial Intelligence ('**AI**') as an input in the ECS sector. As discussed in Explanatory Box 4 below, AI is being used in the sector in a variety of ways, from optimising the use of radio resources to reducing operation costs via customer services chatbots.

Explanatory Box 4: Artificial Intelligence

According to the European Commission (EC), AI "refers to systems that display intelligent behaviour by analysing their environment and taking actions – with some degree of autonomy – to achieve specific goals".[i] AI systems can be purely software based (e.g. image analysis software, search engines, translation tools, facial recognition technologies) or embedded in hardware devices (e.g. drones, IoT devices, advanced robots, autonomous vehicles).

In the ECS sector, Artificial Intelligence is already used for a range of functions. Operators have introduced machine learning algorithms to optimise the usage of radio resources to minimise energy consumption[ii] as well as using chatbots to engage with customers. An Ericsson report which surveyed 132 telecoms service providers globally found that more than half of operators expected to have adopted AI by the end of 2020, with a further 19% looking to adopt by 2023. The main areas where operators are seeing the benefits of AI are through service quality management (17%) and operational cost savings (16%).[iii]

Although the use of AI can bring significant benefits across sectors and is expected to increase considerably, it is also associated with a number of concerns, including regarding bias, opacity, safety, liability and ethics. For example, AI systems can learn from data to improve. However, if the data used contains an inadvertent bias or is incomplete, this may lead to bias being embedded within AI systems and deployed at scale.[iv] The EC is expected to propose a regulatory framework on AI in 2021.

Given the increasing role played by digitalisation in society and the foundational nature of ECS services, it is imperative that ComReg, at a minimum, maintains an awareness of these developments and keeps on open dialogue with other sectoral regulators. In this regard, ComReg will continue to work collaboratively with the Economic Regulators Network (ERN) on issues relating to developments in European digital legislation and the implications for Irish digital policy and regulation.

i European Commission, (2017), "Artificial Intelligence for Europe"
ii ComReg Document 20/27
iii Ericsson, (2018), "Employing AI techniques to enhance returns on 5G network investments"
iv McKinsey Global Institute, (2019), "Tackling bias in artificial intelligence (and in humans)"

Complementary Markets

A 2.42 Complementary markets (e.g., handsets or IoT devices) are important to consider as they affect the quality of experience of using ECS services, including coverage and security.

A 2.43 A complementary market of relevance to ComReg is the market for consumer handsets. ComReg's 2019 MCE Survey shows that 40% of respondents owned a Samsung smartphone, while 32% had an Apple iPhone[40]. Over the coming years, ComReg expects that these handsets will play a key role, alongside fibre and 5G networks, in advancing people's use, experience and reliance on ECS.

A 2.44 Related to the brand of a handset itself, is the operating system of a device. These markets are relevant because the quality of the operating system and the handset may influence the consumer experience. A user might perceive download speeds to be slower than they are paying for, their network coverage worse, and their overall ease of use different simply because their device has a smaller antenna, a different look and feel, or a poor-quality screen.

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[40] Mobile Consumer Experience Survey, (2017) , ComReg Document 17/100a

A 2.45 Over the coming period ComReg's understanding of the traditional mobile handset may change as device manufacturers innovate and consumers begin to adopt other complementary devices such as smart watches and Virtual Reality or Augmented Reality headsets.

Downstream markets

A 2.46 Downstream markets, such as Over-the-Top (**'OTT'**) services[41], are also considered, as consumer demand for ECN/S is ultimately driven by consumers' desire to participate in these downstream markets (e.g. to communicate with friends, family, colleagues or to be entertained).

A 2.47 While ECS plays a fundamental role, OTTs offer a range of services to consumers to enable them to communicate, work, learn and be entertained. For example, the availability of video conferencing and team virtual collaboration applications have facilitated the working from home "revolution" driven by Covid-19. By December 2020, 82% of online users use OTT messaging apps at least daily while 59% view video content daily.[42] The rise of these messaging, voice and video calling OTT services has impacted network traffic and revenues of traditional telecoms operators and this is expected to continue.

A 2.48 Broadcasting markets have also been impacted significantly by the rise of OTT services. There are 1.2 million users of subscription-based video services in Ireland and this number is expected to grow[43]. ComReg's Connectivity Survey 2021 found that 40% of respondents use Netflix while 13% use Amazon Prime.[44] In response to this rising pressure from OTT services, Irish broadcasters are enhancing their online presence, offering catch-up players (used by 20%[45]) and live, cultural and sports content. Notably, Sky and Virgin Media have launched OTT video services NowTV and VirginMedia Player, respectively. Eir has also launched an online offer partnered with AppleTV. Notably, the Covid-19 crisis also led to a temporary increase in live TV viewing.[46]

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[41] OTT services refer to communication services provided over the internet, including sending messages (via platforms such as WhatsApp), making calls (via applications such as Zoom), and watching TV (via streaming services such as Netflix).
[42] Digital Services & Online Safety Survey, (2021), ComReg Document 21/09
[43] Statista, (2020), "Video Streaming (SVoD) Ireland"
[44] ComReg Connectivity Survey 2021, ComReg Document 21/30
[45] ComReg Connectivity Survey 2021, ComReg Document 21/30
[46] See TAM Ireland's monthly TV Overviews https://www.tamireland.ie/category/viewing-trends/. TAM Ireland data show an 11% increase in live TV viewing between March 2019 and March 2020. March 2021 data show a 12% decrease compared with March 2020 data, suggesting a return to pre-COVID-19 levels of TV viewing.

A 2.49 Although a wide array of benefits have been created by digitalisation, it is becoming increasingly clear that the digital economy poses a wide range of challenges. Governments, regulators and wider society are becoming increasingly aware of the potential harms associated with the digital economy, including concerns relating to the market power of digital platforms, harmful content online, privacy and security, among others. ComReg's Digital Services & Online Safety Survey in December 2020 found that two-thirds of online users report becoming more conscious of their privacy online in the last year and 57% recognise the challenge of harmful content online.[47]

A 2.50 There has been a notable development in the regulatory environment of the broadcasting and online service markets. In January 2020, the Online Safety and Media Regulation Bill was published.[48] The proposed Bill seeks to provide for the establishment of a Media Commission (including an Online Safety Commissioner) which would replace the Broadcasting Authority of Ireland ('**BAI**').[49] The Media Commission's powers will be extended to policing content uploaded on social media websites. This will allow them to address issues such as children's access to harmful content and adult material by enforcing policies such as requiring parental controls and age verification tools on websites. The Bill proposes investigatory and compliance powers for the Media Commission, including administrative financial sanctions.

The Future of Regulation in the Sector

A 2.51 The final key trend identified relates to the rate of change of regulation in the sector. With the recent formation of a new government and a new European Commission (EC), a range of developments in the regulation of the ECS and related sectors will arise during the course of this strategy statement. The EC has made 'A European Green Deal' and 'Making Europe fit for the digital age' two of its key pillars for its current mandate. Both of these pillars have implications for the development of regulation in the ECS and related sectors.

A 2.52 The European Electronic Communications Code ('**EECC**'), adopted in December 2018, was created to provide a new legislative framework for ECS markets in Europe that allows for closer harmonization between the different markets across the European Union, and thus facilitates the move towards the Digital Single Market. At the same time, the 2020 Programme for Government has committed to the publication of a National Digital Strategy and to bolster ComReg's enforcement powers. A number of the key developments that will take place in relation to the regulation of the sector (and related markets) are discussed in detail below.

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[47] Digital Services & Online Safety Survey, (2021), ComReg Document 21/09
[48] Department of Tourism, Culture, Arts, Gaeltacht, Sport and Media, (2020). Online Safety and Media Regulation Bill https://www.gov.ie/en/publication/d8e4c-online-safety-and-media-regulation-bill/
[49] Online Safety and Media Regulation Bill

Legislative Changes and Developments

A 2.53 Over the coming period there will be a number of legislative changes and developments that will impact ComReg's role and mandate. ComReg, in its preparation of this ECS Strategy, has considered the impact of these legislative developments. Throughout the document, where appropriate, ComReg has sought to address these developments.

- **Consumer Protection mandate:** The EU has been developing its New Consumer Agenda, which contributes to the development of ComReg's mandate under Irish Law. The Consumer Rights Bill is now in the government's Spring Legislative Programme to transpose the relevant EU Directives, and to update and consolidate the statutory provisions on consumer rights and remedies in relation to contracts for the supply of non-digital services, unfair contract terms, and information and cancellation rights. National legislation is also being developed for ComReg in respect of the Consumer Protection Cooperation Regulation.

- **Cybersecurity Strategy for the Digital Decade:** ComReg has an evolving role under this EU strategy including: the Directive on Security of Network and Information Systems (NIS Directive and proposed NIS 2 Directive) both in respect of the inclusion of electronic communications as an essential service and the related digital infrastructure sector; the Telecoms Security Rules resulting from the 2019 EU Recommendation 2335; and the legislative proposal for additional measures on critical infrastructure protection. ComReg seeks to ensure effective and efficient legislative development to enable compliance by telecom operators and digital businesses to protect the infrastructure for delivery of their essential services.

- **Broadband Cost Reduction:** ComReg is participating in the delivery of the toolbox of best practices resulting from the review of the Broadband Cost Reduction Regulation. ComReg foresees a continued role in this area as the requirements evolve.

- **Privacy and Electronic Communications:** ComReg's role in respect of electronic privacy is evolving and ComReg has a continued input into the development and subsequent implementation of the proposed EU E-Privacy Regulation and EU proposed derogation from the Privacy and Electronic Communications Directive 2002/58/EC (Irish S.I. No. 336 of 2011). These proposals are still being debated at EU level, and, in the interim, ComReg's monitoring and enforcement role continues under the old Directive (2002/58/EC).

- **Market Surveillance:** ComReg is the designated Market Surveillance Authority in respect of two EU Directives - the Electromagnetic Compatibility Directive[50] ('**EMCD**') and the Radio Equipment Directive[51]

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[50] The EMCD is transposed into Irish law by way of the European Union (Electromagnetic Compatibility) Regulations 2017 (S.I. No. 69/2017)

[51] The RED is transposed into Irish Law by way of the European Union (Radio Equipment) Regulations 2017 (S.I. No. 248/2017).

('**RED**'). As the Market Surveillance Authority for the Radio Equipment Directive, ComReg is also responsible for the safety requirements of the Low Voltage Directive[52] ('**LVD**'), as they apply to radio equipment. The purpose of market surveillance is to prevent non-compliant products from entering the market, anywhere in the EU, and to seek out and remove non-compliant products which have entered the market. The new EU "Goods Package" Regulation (EU) 2019/1020 on market surveillance and compliance of products applies from 16 July 2021.

New EU Proposals and Expected Future Proposals

The EU Regulation will bring in a number of important changes that will drive ComReg's evolving role as a Market Surveillance Authority including:

- A requirement for an EU-based economic operator responsible for certain compliance tasks for products that fall under the regimes listed (broadly, the CE marking regimes).

- Responsibilities for fulfilment service providers in respect of products that fall under the legislation listed and are handled by them where there is no other EU-based economic operator with responsibility for compliance.

- A minimum set of powers that Member States must provide to their market surveillance authorities.

- A requirement for Member States to lay down rules for penalties for breaches of legislation to the extent they have not already done so.

- The ability for Member States to authorise their market surveillance authorities to "the totality of the costs of their activities with respect to instances of non-compliance" from the relevant economic operator in certain circumstances.

- Provisions to increase the exchange of market surveillance related information between market surveillance authorities, including the establishment of a Union Product Compliance Network that will be composed of representatives from each Member State.

- Provisions to increase cooperation between customs authorities and market surveillance authorities, including specific details on the release for free circulation of products, suspension of release for free circulation and refusal to release for free circulation.

A 2.54 As noted above, the EC has made 'Making Europe fit for the digital age' a key pillar of its current mandate. To achieve this, its digital strategy sets out a number of initiatives related to the ECS sector. It proposes an update of the Broadband Cost Reduction Regulation, an Updated Action Plan on 5G (and 6G), a new Radio Spectrum Policy programme and an initiative on 5G Corridors.[53]

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[52] The LVD is transposed into Irish Law by way of the European Union (Low Voltage Electrical Equipment) Regulations 2016 (S.I. 345/2016)

[53] Communication From The Commission To The European Parliament, The European Council, The Council, The European Economic And Social Committee And The Committee Of The Regions, Shaping Europe's Digital Future, 19.2.2020 COM(2020) 67 Final

A 2.55 Although a wide array of benefits have been created by digitalisation, it is becoming increasingly clear that the digital economy poses a wide range of challenges. In December 2020, the EC published the Digital Services Act ('**DSA**') and Digital Markets Act ('**DMA**') legislative proposals. The DMA will establish an ex-ante regulatory framework for specific digital platforms designated as "Gatekeepers". These gatekeepers will be subject to a set of obligations and prohibitions which seeks to ensure contestable and fair markets in the digital sector. The DSA will set out "uniform rules for a safe, predictable and trusted online environment." These rules aim to better protect consumers online and foster innovation, growth, and competitiveness in the single market.

A 2.56 ComReg has been closely monitoring these developments. Given the need for strong collaboration in Ireland, ComReg is engaging with the Economic Regulators Network ('**ERN**'), in particular with colleagues from the Competition and Consumer Protection Commission ('**CCPC**') and the BAI on the topics of digital regulation. ComReg has also contributed to the work of BEREC on these issues, with a particular focus on the DMA. Parallels have been drawn between the DMA proposal and the ex-ante regulatory framework applied in the ECS sector. As such, ComReg's experience in the ECS sector may be relevant as the debate on these proposals evolves.

A 2.57 A legislative proposal on AI is also expected in 2021. ComReg will continue to monitor these developments and engage with the ERN and relevant government departments, as necessary.

Climate Change, Energy and ECS

A 2.58 Responding to Climate Change has become a key priority at both European and national level. There is also increasing awareness and attention being placed on the relationship between the ECS sector and climate change. On one hand, the ECS sector can be an enabler for decarbonisation, enabling greenhouse gas emission ('**GHGE**') reductions across sectors of the economy, from remote working to smart agriculture, to smart meters, among others. On the other hand, the digitalisation of the economy and ever greater use of ECS services could potentially increase the carbon footprint of the sector itself and increase e-waste.

A 2.59 The EC has emphasised the importance of a sustainable digital sector. It will consider measures to improve the circular economy performance of the digital sector as well as its energy efficiency, ranging from ECS networks to data centres to ICT devices.[54] Over the next decade a symbiotic relationship between ECS/ECN and energy markets is likely to emerge, as efficient management of the electricity grid will rely on connectivity to ECS/ECN and smart meters.

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[54] Communication From The Commission To The European Parliament, The European Council, The Council, The European Economic And Social Committee And The Committee Of The Regions. The European Green Deal COM/2019/640 Final

A 2.60 In addition to assessing the need for more transparency on the environmental impact of ECS and more stringent measures when deploying new networks, the importance of the circular nature of devices has been highlighted in the Circular Economy Action Plan. Internationally, a number of regulatory bodies in the ECS sector have begun taking action on this topic, including Arcep[55] (the French ECS regulator) and the Radio Spectrum Policy Group[56] ('**RSPG**'). ComReg is also actively contributing to the work of a newly formed expert networking group on Sustainability at BEREC.

A 2.61 Given the breadth of initiatives that will be pursued to assess and address the carbon footprint of the ECS sector in the coming years, this is a key trend which ComReg will need to monitor.

Explanatory Box 5: Call for Inputs - Connectivity and Decarbonisation

In December 2019, ComReg published a Call for Inputs on Connectivity and Decarbonisation.[i] The purpose of the Call for Inputs was to enable ComReg to better understand the electronic communications sector's relationship with climate change, including how the sector can assist in facilitating decarbonisation across the economy, how the sector can reduce its own carbon footprint and how it can adapt to a changing environment.

ComReg received seven responses to the Call for Inputs which were subsequently published.[ii] The Call for Inputs and the responses received highlighted that the ECS sector can be an enabler for GHGE reductions across a variety of sectors of the economy, such as transport, electricity, industry and agriculture. Notably, respondents from beyond the ECS sector (e.g. energy, agriculture) emphasised the reliance they will place on connectivity to deliver reductions in GHGE in the coming years.

At the same time, ECS operators highlighted their ongoing efforts to estimate and reduce the GHGE associated with their operations. Several operators noted their documented targets and future plans to decarbonise and highlighted the environmental benefits associated with the transition to fibre, from copper networks.

[i] ComReg Document 19/126 [ii] ComReg Document 20/27

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[55] For Example, Arcep, (2020), "Networks And The Environment", Https://En.Arcep.Fr/News/Press-Releases/View/N/Networks-And-The-Environment.Html
[56] RSPG, (2019), "Work Programme For 2020 And Beyond"