

# The Digital Infrastructures and Connectivity Plan

for society,  
economy and  
the territories



GOBIERNO  
DE ESPAÑA

VICERREINADO  
TERCERA DEL GOBIERNO

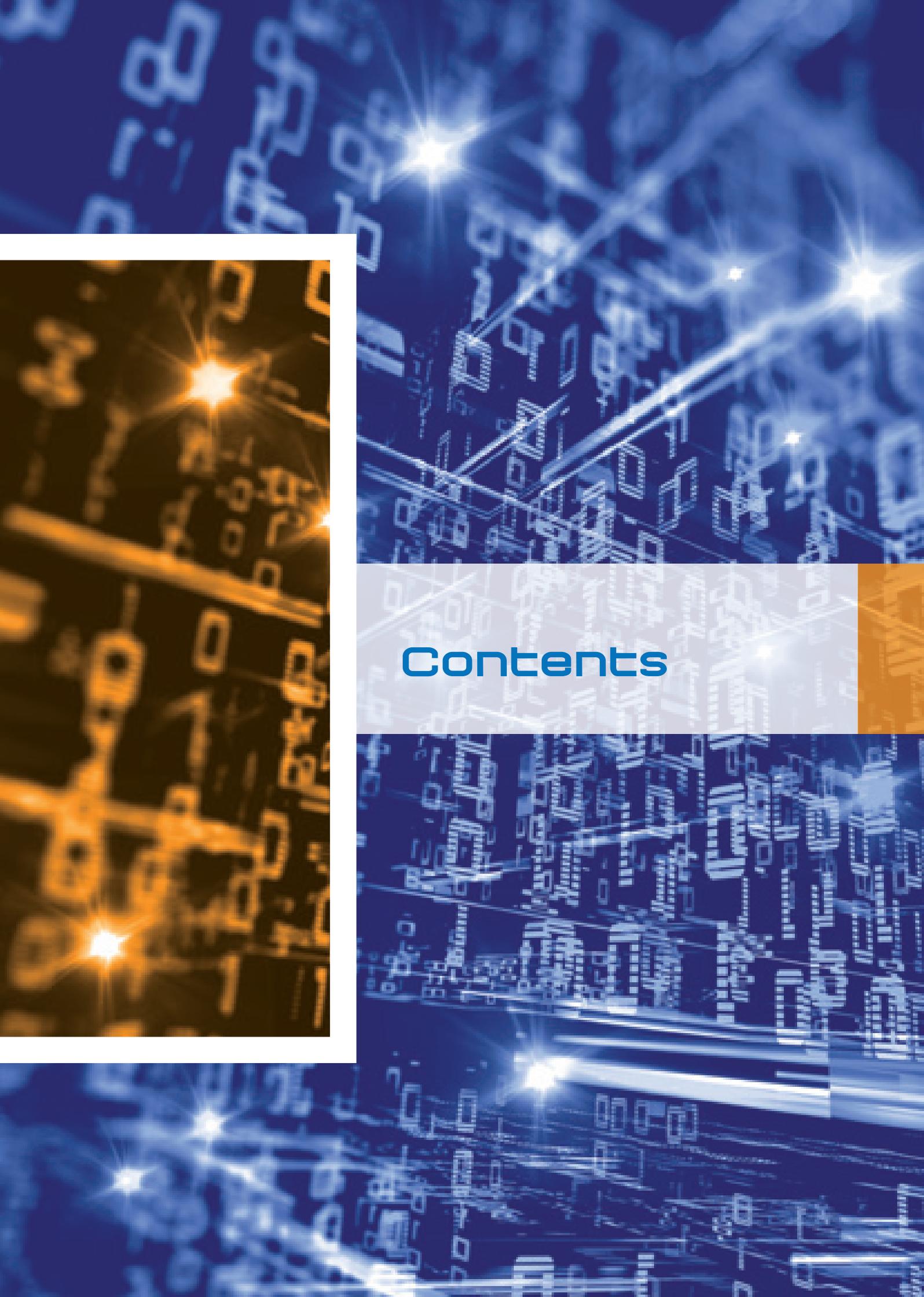
Ministerio  
de Asuntos Económicos  
y Transformación Digital



**ESPAÑA  
PUEDE.**

ESPAÑA  
DIGITAL  
2025





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# Executive Summary

**Digital connectivity is a key factor for the development of economic activity, for the increase in productivity, for the promotion of innovation and for territorial and social structuring.** In fact, access to digital networks is becoming increasingly necessary to make public services available, to develop economic activity and to participate actively in society.

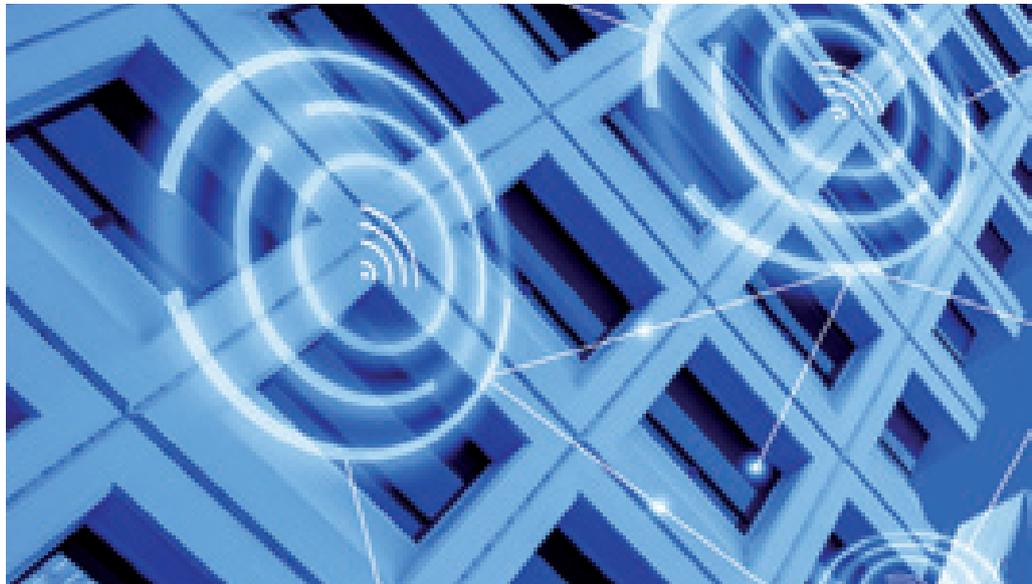
**Today, Spain has a large broadband network and digital infrastructures that are widespread throughout the country, thanks to public and private investment programs.** Since the liberalisation of the industry, more than two decades ago, the development of connectivity infrastructures has been led by operators and companies in the telecommunications sector and complemented by public actions which have led to an exponential improvement and extension of the infrastructures, facilities and services available to users in terms of digital connectivity.

**The role of the public sector has been and is particularly relevant in two main areas: encouraging investment and ensuring balanced development.** On the one hand, Spain has established a framework that favours private investment in networks and infrastructures, which has been a model for the updating of Community legislation in the form of the European Electronic Communications Code, currently being transposed. On the other hand, it is necessary to ensure that the development and deployment of infrastructure takes place in a socially and territorially balanced manner, leaving no one behind, regardless of the personal, social, gender, economic or geographical status of individuals and companies.

**This vision, which puts the digital transformation and therefore the necessary connectivity for its development in the foreground, has been reinforced and accelerated by the impact of the COVID-19 and is shared from the European level.** The construction of a Single Digital Market, which is reflected in the financing lines of the Multiannual Financial Framework 2021-2027, and the budgetary reaction to the impact of the pandemic in the form of European Recovery Funds, in which the digital transformation in the most immediate term constitutes one of the key pillars of the Union's economic reactivation, certify this.



**Within the European Union, Spain is well positioned in the field of connectivity and digital transformation.** Our country is ranked 11th out of 28 member states in the DESI<sup>1</sup> index and is a reference in the deployment of optical fibre infrastructure in both urban and rural areas, reaching second place in the deployment of fibre to the home, only surpassed by a much smaller country in terms of population and geographical extension. This deployment is the result of the successful liberalisation of the sector, supported by a pioneering regulatory framework that has favoured the mobilisation of large investment, the development of connectivity and competing service infrastructures that have allowed a 22% fall in the price of ICT services in the period 1998-2018 (compared to a 53% increase in the CPI in the equivalent period), as well as a great capacity for resilience even at times of large increases in the demand for connection such as those experienced as a result of the global pandemic.

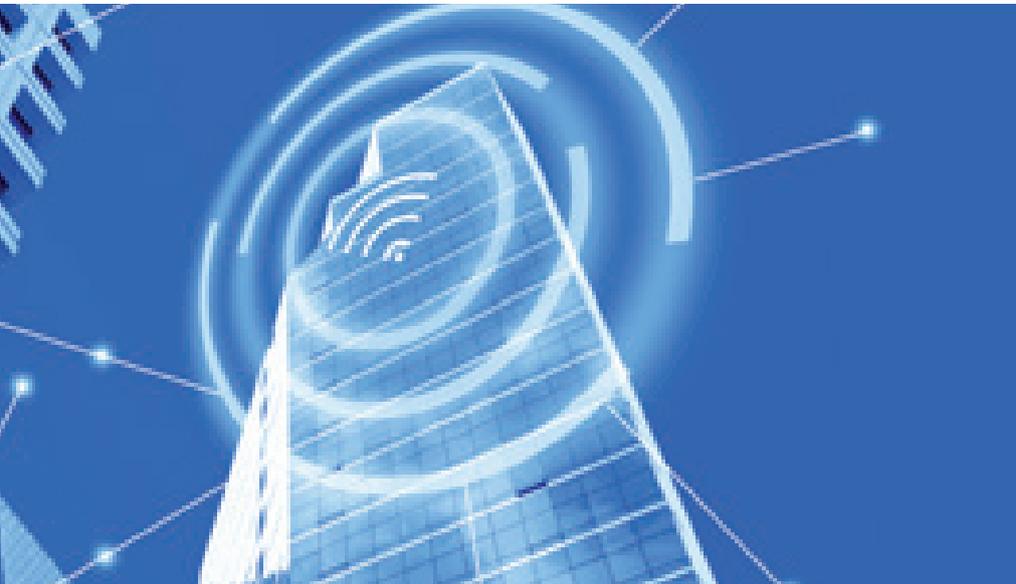


**But the achievements so far are not enough. The future commitment to very high capacity and capillary digital connectivity is essential.** For a developed country to maintain and gain in competitiveness and well-being, investment in the telecom sector is necessary, not only due to the economic weight of the industry in direct terms, which in Spain has 12,000 companies and 132,000 high quality jobs generated, but also due to the strategic importance of connectivity as a vehicle for digital transformation, to increase productivity, economic growth and the generation of employment. Similarly, it is a lever to facilitate territorial cohesion in a country that has part of its population scattered in rural environments, without forgetting that connectivity acts as a facilitating axis for social cohesion, allowing access to health, social and educational services.

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<sup>1</sup>Digital Economy and Society Index.

**Furthermore, Spain can position itself as an essential connectivity node in southern Europe** in view of the different investment projects for the deployment of international infrastructures by different operators, and the interesting transnational initiatives under study with neighbouring countries, in the field of data storage and secure satellites, as well as corridors for the connected car. With international telecommunications networks that directly connect the country to four continents, an extremely high-quality electricity grid and a privileged geographical location, Spain has the opportunity to generate economic wealth through the attraction and construction in our country of these cross-border digital infrastructures, both underwater cable moorings and data processing infrastructures.



**This Digital connectivity and infrastructures Plan develops the first of the axes contained in the Digital Spain 2025 Strategy and is aligned with the key objectives of the Agenda 2030. Digital Spain 2025 sets out a transversal objective which is strongly aligned with the Sustainable Development Goals (SDA) and Agenda 2030:** the use of connectivity and digitalisation as tools which make a considerable contribution to closing the different digital gaps which exist for socio-economic, gender, generational, territorial, or environmental reasons. Based on the available infrastructures, a set of reforms and investments are proposed which are aimed at completing access to digitisation throughout the country, both in relation to digital and connectivity infrastructures and in terms of technological innovation in driving sectors, reinforcing Spain's role as one of the driving forces behind digitisation in the EU as a whole.

As indicated, **The Digital Connectivity and Infrastructures Plan responds to the first of the objectives of the “Digital Spain 2025” strategy: to guarantee adequate digital connectivity for the entire population, promoting the disappearance of the digital divide between rural and urban areas.** The goal in 2025 is for 100% of the population to have coverage of more than 100 Mbps and to position Spain as the reference pole for cross-border digital interconnection infrastructures in southern Europe. Connectivity is one of the central pillars to allow the successful development of the remaining projects for the digital transformation of the country and which will be implemented in the development of the Digital Spain 2025 Strategy. For this reason, it is necessary to decisively tackle the challenge of extending the footprint of digital networks and infrastructures to the whole territory. These must be robust, secure, of excellent quality and service, with adequate capacity for each need, and sized to respond to growing social and economic demand.

**This Digital Connectivity and Infrastructures Plan is complemented by the Strategy for the promotion of 5G Technology, also envisaged in the “Digital Spain 2025” Agenda.** Although both programs have a common objective in terms of increasing the country’s connectivity index, the different degree of maturity and development of 5G, as well as its impact on the transformation of economic sectors compared to other access technologies (fibre optics, satellite, etc.), make it advisable to tackle it specifically and from different perspectives<sup>2</sup>.

**The key objectives of this Plan are: to contribute to the reduction of the digital divide, to the promotion of economic growth by direct and indirect means as an enabling vehicle for digital transformation, to the strengthening of territorial cohesion and to the fight against the territorial gap.** These objectives will be achieved through the development of a series of key measures, highlighting:

- ❖ **Extension of ultra-fast broadband**, of at least 100 Mbps for 100% of the population, with a focus in the transition period on strengthening broadband connectivity with a minimum access speed of 30 Mbps in those geographical areas that currently do not have broadband connections.
- ❖ **Connectivity vouchers to finance the connection of vulnerable groups at risk of exclusion due to the difficulty of access to connectivity for economic reasons.** The need for this type of measure has become more evident in a context of semi-presential education due to the impact of COVID-19, in which some families have not been able to telework or access a basic service such as the education of their children.
- ❖ **1Gb connectivity in the technology islands:** industrial areas, data centres, logistics centres, research centres and other specific locations where the use of data is extremely intensive and whose competitiveness depends largely on an agile and robust connection.

<sup>2</sup>In the Connectivity Plan, the main perspective of action is to complement the effort of the private sector in geographical and social areas where there are still insufficient coverage and service spaces. In the Strategy for the promotion of 5G technology, the public initiative focuses on facilitating and promoting the development of this new technology from its first steps, so the focus in this case is on accelerating and supporting the sector’s development plans in specific cases of use and on the early deployment of infrastructures.



- ✔ **Connectivity vouchers for SMEs**, associated with their digitalisation programs.
- ✔ **A clear commitment to cross-border digital infrastructures, the attraction and development of data infrastructures and Cloud technologies.**

All of this is supported by some transversal lines which will serve as a support for the rest of the measures:

- ✔ **Integration of energy efficiency in technological development and evolution towards carbon-neutral technologies.**
- ✔ **The development of a regulatory framework that guarantees legal security.** This will make it possible to establish an appropriate context for generating investment and ensure access to digital connection for the entire population, regardless of their geographical location, through the new General Telecommunications Law.
- ✔ **The renewal of public information systems for data-based decision-making.** The measure will give greater efficiency to the development of infrastructure and planning of investments in connectivity, clearly betting on digital cartography and Artificial Intelligence.

Public investment planned for The Digital Connectivity and Infrastructures Plan amounts to a total of 2,320 million euros over the period 2021-2025. This set of measures, which together with the promotion of 5G technology will mobilise more than 4 billion euros over the next five years, constitutes the roadmap towards a more cohesive Spain. In particular, the aim is to move towards a scenario where the rural world can enjoy the same economic and social opportunities that connectivity provides in high-density urban areas, more socially cohesive, where access to public services is within the reach of all layers of citizens, in a society and economies embarked on the search for a new production model where the efficiency gains of the digital transformation are passed on to people and result in the generation of resilient and quality jobs. A country equipped with a modern and robust infrastructure, capable of supporting the increases in demand generated by the technification of society.

The Digital Connectivity and Infrastructures Plan for society, the economy and the territories needs the active involvement of all the agents involved for its success. The Plan is conceived as a public-private collaboration effort, in the execution of which the Ministries responsible for sectorial policies, Autonomous Communities and Local Bodies, companies and social agents will actively participate.

The diagnosis of the situation presented in this Plan, as well as the sum of proposals, measures and actions planned as courses of action, have been shared with the Consultative Council for Digital Transformation and the Permanent Commission on Telecommunications, Digital Infrastructures, Digital Connectivity and the Audiovisual Sector, from whom their opinions and considerations have been gathered and incorporated. The main agents and companies of the industry and other interested partners have also been consulted and taken into account, in order to make this Plan a participative instrument of public-private collaboration that will contribute to the Digital Transformation of Spain.



# 01

## Introduction



## 1.1 Introduction

**Spain has a network of digital infrastructures and a regulatory framework that places us in a privileged position to face the digital transformation that society needs to promote more sustainable, lasting and inclusive growth, which reaches society as a whole and reconciles the opportunities offered by the digital world with the essential values of our society. The evolution of technology, the acceleration in the digitisation of society and the identification of gaps in accessibility to the digital world require a renewed effort to deploy networks and infrastructure, eliminating digital divides and generating new opportunities for growth. This Plan, which develops the first of the axes included in the Digital Spain 2025 Strategy, is dedicated to this objective.**

The effectiveness of digital connectivity for economic and social development is fed by two complementary aspects. On the one hand, the availability of digital infrastructures (telecom networks, data centres, etc.) without which digitisation is not possible and, on the other, the adoption of digital services by end users, whether citizens or companies.

If the strategic importance of the digital sector, which goes beyond its quantitative weight in the country's GDP, was already well known, this reality has become evident to everyone during the period of confinement experienced during the COVID-19 health crisis. Not only do the digital media enable people to be informed, to compete in a global market, to access essential public services, etc., but for many people and organisations, during the pandemic, they have been practically the only means available for maintaining work, educational activity, social relations, and family ties.

But it is also relevant to consider the importance of actions on the telecom sector from the point of view of its internal dynamics. Telecommunications and digital infrastructures are a capital-intensive sector, whose investments feed gross fixed capital formation year by year, generating assets that remain in the country's wealth endowment. But, above all, digital networks and infrastructures are the basis for the digital transformation of the rest of the economic sectors, given that without their presence digital services cannot exist, and the use of these services by the rest of the companies is a key lever for improving competitiveness in the economy as a whole.

The relevance of this sector transcends its relative weight in the economy and makes it a strategic point for public intervention. Both public investments and the strategic policies of the administrations in the field of telecommunications have an induced effect on the development of investments in the territories, actions which directly affect the availability of public services, economic activity, and the productivity of the economies.

We can conclude that these characteristics justify not only the

## 1.2. The context of the European Union

public funds allocated to the sector in the past, but also the recognition of the key role played by digital infrastructures as technological enablers in the digital transformation processes. They are, therefore, one of the cornerstones in the Agenda for Change, in the Digital Strategy 2025 and in the Plan for Recovery, Transformation and Resilience of the Spanish Economy.

**The Digital Connectivity and Infrastructures Plan is aligned with the European Union's objectives on activities related to the digital transformation, such as the construction of the Digital Single Market<sup>3</sup> and the European Gigabit Society<sup>4</sup>. The Plan itself will serve as a vehicle for channelling European funds, mainly through the ERDF 2021-2027 and the Recovery and Resilience Mechanism, as well as complementing the actions in support of connectivity directly managed by the European Union.**

The European Union has established in recent years a number of policies and actions to promote the achievement of a Digital Single Market. In an international framework where competitiveness is increasing, having specialised and competitive regions is crucial when it comes to ensuring the future of the member states. In this sense, as previously mentioned, digital infrastructures play a key role as an enabler of the digital transformation.

For this reason, to develop an efficient Connectivity and Digital Infrastructures Plan which is integrated into the EU's global strategy, it is essential to have a clear vision of the main European instruments in terms of digital transformation:

**Digital Single Market.** The aim of the Digital Single Market Strategy is to ensure that Europe's economy, industry, and society benefit fully from the new digital era. Together with electronic solutions and data, and cross-border digital services, it is an integral part of the EU's Digital Europe Project. The central aim of this strategy is to further expand the Union's digital economy and to break down the regulatory walls between EU Member States. The three 'pillars' of the European Commission's strategy are:

- 🔗 Access to online products and services.
- 🔗 Conditions for digital networks and services to grow and prosper.
- 🔗 Growth of Europe's digital economy.

The Digital Single Market Strategy has resulted in more than 30 pieces of legislation across the digital services value chain: Telecoms, Digital Platforms, e-Commerce, Audiovisual Services, Re-use of Public Information...

**European Gigabit Society.** Through the Communication "Towards a European Gigabit Society", the European Commission has signed up to the importance of Internet connectivity for the digital single market and the need for Europe to be able to deploy the networks for its digital future. To this end, the Gigabit Society envisions itself as a high-speed European society, where the avai-

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<sup>3</sup>"A Strategy for Europe's Digital Single Market" COM(2015) 192. <https://eur-lex.europa.eu/legal-content/ES/ALL/?uri=celex%3A52015DC0192>

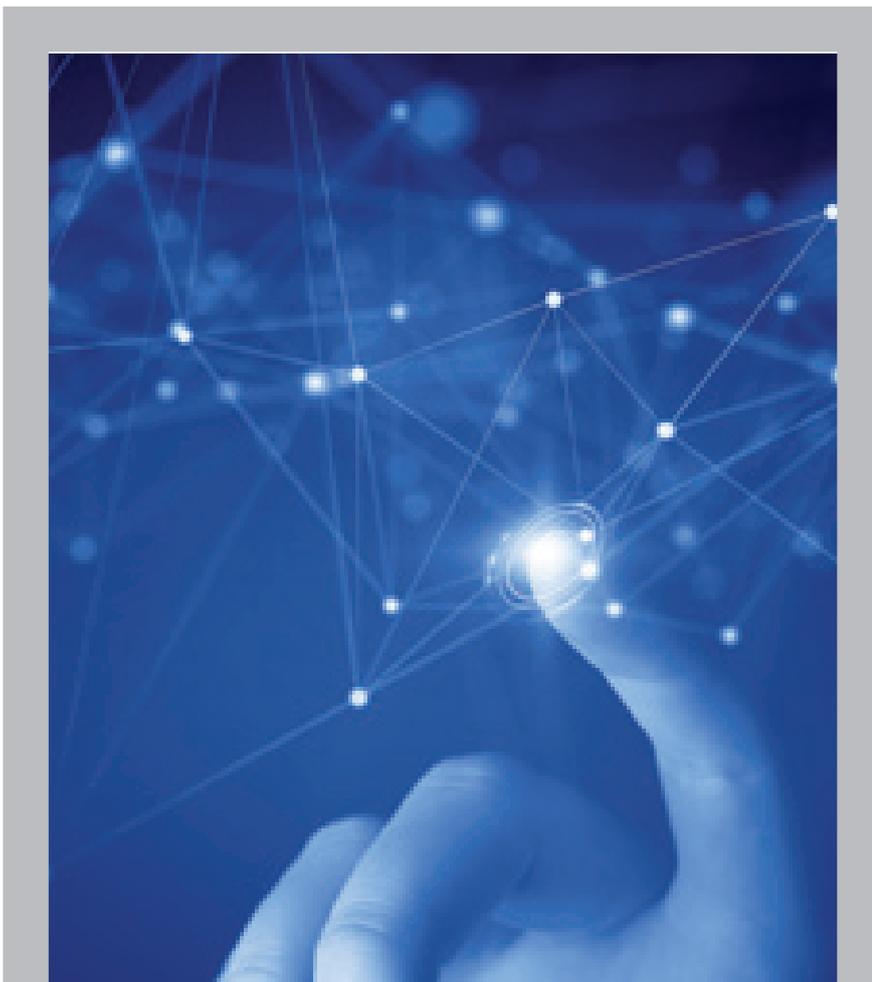
<sup>4</sup>Connectivity for a competitive digital single market - towards a European Gigabit society

lability and deployment of very high-capacity networks enables the widespread use of products, services, and applications in the digital single market. The Commission's vision is deployed in three strategic objectives for 2025:

- ✔ For growth and jobs in Europe, high-speed connectivity for the places that drive socio-economic development;
- ✔ For Europe's competitiveness, 5G coverage for all cities and all major land transport routes;
- ✔ For Europe's cohesion, that every European household should have access to an internet connection with a minimum speed of 100 Mbps.

To make this vision become real, the Communication proposed a series of initiatives aimed at creating the right conditions for the necessary investments to be made, mainly by the market. These include a major reform of the regulatory framework for electronic communications, in the form of a legislative proposal to accompany a European Electronic Communications Code<sup>5</sup> and BEREC Regulation<sup>6</sup>, a 5G Connectivity Action Plan for Europe<sup>7</sup> and other financial policies and measures, at Union, national and local levels, including the "WiFi for Europe" initiative to promote the widespread availability of Wi-Fi connections for citizens throughout the EU.

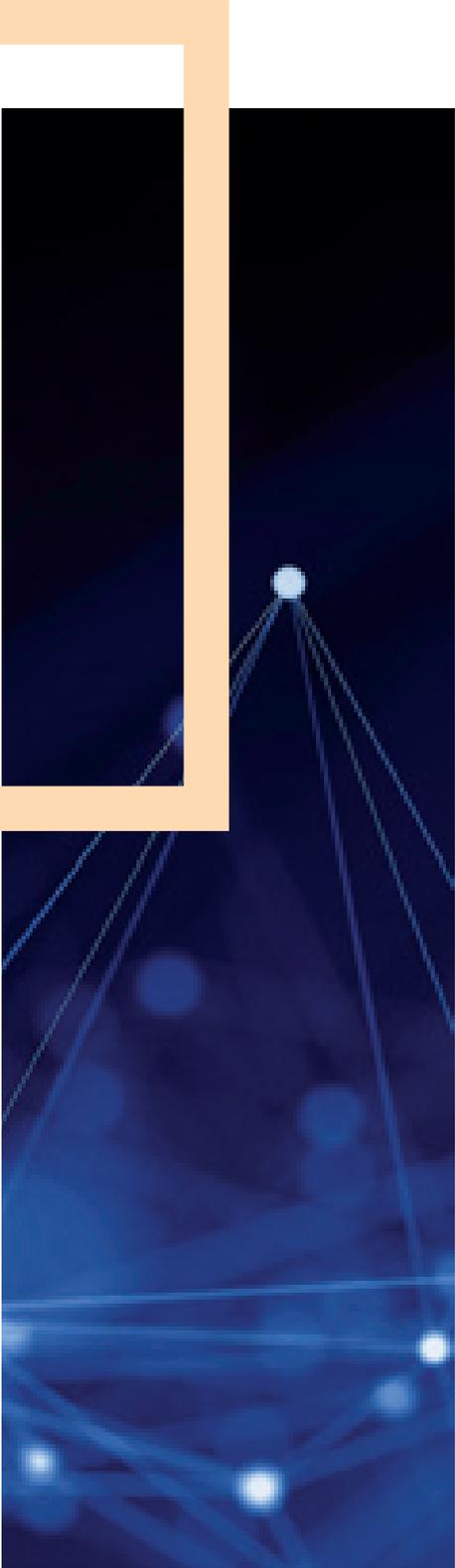
**Europe's Digital Future.** Europe is at the forefront of today's for-



<sup>5</sup><https://www.boe.es/doue/2018/321/L00036-00214.pdf>

<sup>6</sup>The Body of European Regulators for Electronic Communications (BEREC) and the BEREC Support Agency (BEREC Office) See <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018R1971&- from=EN>

<sup>7</sup>[https://ec.europa.eu/spain/news/20190225\\_5G-connection-the-takeoff-of-the-digital-transformation-Europe\\_es](https://ec.europa.eu/spain/news/20190225_5G-connection-the-takeoff-of-the-digital-transformation-Europe_es)



midable economic and geopolitical challenges, in which major technology multinationals play a major role. It is therefore essential to develop our own digital capabilities to maintain our strategic independence and to contribute proactively to the development of appropriate, responsible, fair, and sustainable solutions, worldwide. In this context, the European Commission has presented the communication “Shaping Europe’s digital future”<sup>8</sup>. The European strategy contains a set of measures for a digital transformation that is in the interest of all and reflects the best of Europe: its open, fair, diverse, democratic, and self-confident character. The strategy presents a European society driven by digital solutions that put people first, open up new opportunities for business and give impetus to the development of reliable technology that promotes an open society and a dynamic and sustainable economy.

**European Data Strategy**<sup>9</sup>. A Europe fit for the digital age is now a key priority for the Union. In its recent communications on artificial intelligence and data strategy, the Commission highlighted the creation of a single market for data, in particular industrial and commercial data, as a key factor in the digital economy. This strategy promotes investment in next generation infrastructure for storing and processing data and the development of cloud computing capabilities.

**To promote all these initiatives, the European Union has therefore set up different financing mechanisms, including the Recovery and Resilience Mechanism and the new Multiannual Financial Framework for 2021-2027.**

**Multi-annual Financial Framework.** From the financial point of view, the boost for the Digital Transformation is included in the European budget proposals after a broad reform of the one currently being negotiated for the period 2021-2027, which is articulated through investments from (1) the Structural Funds in the different regions supported by the cohesion policy; (2) the Connecting Europe Facility<sup>10</sup>; (3) the Horizon Europe R&D&I programme (Horizon Europe<sup>11</sup>); and (4) a new specific programme for Digital Europe (Digital Europe<sup>12</sup>).

**Recovery and Resilience Mechanism.** The European Commis-

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<sup>10</sup><https://ec.europa.eu/inea/en/connecting-europe-facility>

<sup>11</sup>[https://ec.europa.eu/info/horizon-europe\\_en](https://ec.europa.eu/info/horizon-europe_en)

<sup>12</sup><https://ec.europa.eu/digital-single-market/en/europe-investing-digital-digital-europe-programme>



sion's proposal on the Next Generation EU includes a new Recovery and Resilience Mechanism whose investment, in addition to recovery from the crisis caused by the COVID-19, it considers one of its priorities to finance investments related to the Digital and Green Transition - Green Pact, with a view to boosting strong economic recovery from the second half of 2020. These Community programs will help to reduce Europe's investment deficit with respect to China and the United States, which the European Commission estimates at 125 billion euros.

**The liberalisation of the telecom sector in Spain triggered an unprecedented period of investment and development of private telecom infrastructure. As a result of this process, Spain now has wide and extensive digital infrastructures which place the country at the head of the European Union in terms of the availability of NGA<sup>13</sup> networks and in a privileged position to face the great challenges of the future.**

**In the national framework, it should be noted that Spain has one of the most technologically advanced and extensive networks of all the EU Member States.** The incumbent operator's fixed copper network has been progressively replaced by a varied and diverse access infrastructure, mostly based on optical fibre and developed in competition, which provides coverage to more than 14 million households<sup>14</sup>.

The transformation that has taken place over the last thirty years

### 1.3. The national context

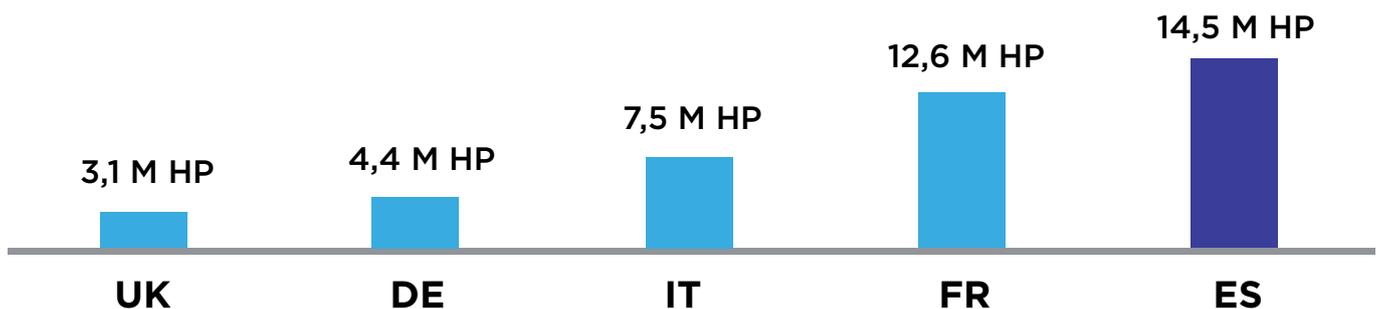


Chart 1. FTTP coverage (total number of households) in the European Union (Jun-2019)  
Source: DESI 2020

<sup>13</sup>Next generation access (NGA) describes high-speed networks and quality of service. This is generally considered to be a symmetrical line with a download and download speed of at least 24 Mb.

<sup>14</sup>According to the data in the annual DESI 2020 report. See [https://administracionelectronica.gob.es/pae\\_Home/pae\\_OBSAE/Posicionamiento-Internacional/Comision\\_Europea\\_OBSAE/Indice-de-Economia-y-Sociedad-Digital-DESI-.html](https://administracionelectronica.gob.es/pae_Home/pae_OBSAE/Posicionamiento-Internacional/Comision_Europea_OBSAE/Indice-de-Economia-y-Sociedad-Digital-DESI-.html)



in terms of the construction and deployment of other digital infrastructures is also significant. Firstly, since 1995, four generations of mobile phone networks have been handed over, which currently support the wireless communication of more than 55 million mobile voice and broadband lines and 6 million lines for machine-to-machine communication.<sup>15</sup> In addition, it is also necessary to mention satellite networks, which offer the footprint of broadband services throughout the territory, digital infrastructures of a cross-border nature, Internet traffic exchange points and underwater cables, and data centres deployed throughout the national territory.

**This development of digital infrastructures in Spain would not have been possible without a regulatory framework that has favoured investment by private operators and free competition.** In the last ten years alone, operators have invested almost fifty billion euros<sup>16</sup> in the development of telecommunications networks, of which approximately eight thousand million have been invested in state-of-the-art FTTH networks.



Thanks to the liberalisation of the market, new players have appeared in the sector, resulting in a competitive environment that has favoured more competitive prices. This situation, together with the high levels of network coverage currently available, has allowed the development of innovative and competitive telecommunications services, with falling prices that have encouraged their use and adoption by all citizens. A clear example is the difference between the growth of general prices and the prices of ICT services in Spain: while the general CPI between 1998 and 2018 increased by more than 53%, the index of prices of ICT services not only did not increase at the same rate, but also decreased by more than 22%<sup>17</sup>.

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<sup>15</sup>See CNMC report 2019, [http://data.cnmc.es/datagra-ph/jsp/inf\\_anual.jsp](http://data.cnmc.es/datagra-ph/jsp/inf_anual.jsp)

<sup>16</sup>See CNMC annual report [http://data.cnmc.es/datagra-ph/jsp/inf\\_anual.jsp](http://data.cnmc.es/datagra-ph/jsp/inf_anual.jsp)

<sup>17</sup>The INE's Service Sector Price Index, the telecommunications sector (CNAE 61) has recorded a fall of 83 points since 2017

**The digital infrastructures in Spain have managed to pass a “stress test” with flying colours in the face of the sudden and exponential growth in demand for connectivity experienced during the period of confinement resulting from the COVID-19 crisis.** Despite traffic increases of up to 80% over normal levels, the network infrastructure has maintained adequate service levels without incidents exceeding those of pre-pandemic periods.

Nevertheless, in an environment such as Spain, which has large extensions of territory with a low population density, one of the major concerns that persists is the digital gap. To tackle this problem, specific programs have been developed to extend the availability of NGA in areas with special difficulties. Complementing the investment efforts of private companies, aid programs for broadband deployment by public administrations have contributed to the development of these infrastructures, encouraging their deployment in areas with less attractive economic conditions, significantly in rural and less densely populated environments, through the mobilisation of up to €600 million in state aid between 2013 and 2020.



**However, despite the efforts made, the persistence of the digital divide is still observed in certain places.** Connectivity in our country still has room for improvement on the way to the digital transformation of society as a whole. During the COVID 19 crisis, the quality and resilience of telecom networks was highlighted but other weaknesses were revealed: digital gaps concerning territory coverage, the lack of affordability of services for certain groups, the gap due to gender and digital training aspects.



# 02

## The Connectivity and Digital Infrastructures sector in Spain

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Business Strategy

Innovation

Concept

Solution

**According to national accounting data<sup>18</sup>, the telecom sector<sup>19</sup> is positioned as the fourth largest activity in the Spanish economy in terms of turnover, amounting to 34.2 billion euros in 2019.**

It is estimated that, in 2019, around 15,000 productive units were operating in the sector, made up of 12,000 companies registered in the national register of installers plus the 6,247 companies recorded in CNAE 61 “Telecoms”.

The telecom sector has a very dual structure, with a large majority of small companies (92% were micro-companies with less than 9 employees or no employees), although it is companies with more than 50 employees which generate 85% of the turnover, with an average turnover of 400M euros per company.

In terms of jobs and productivity, according to the latest data from the INE’s Labour Force Survey corresponding to the third quarter of 2020, in CNAE 61 - the telecoms sector - the number of people employed in telecoms was 132,300, which shows the capital intensive use that characterises it and also explains the productivity of the sector, which is double the national average.

In addition, the sector hires highly qualified and strategic employment in the midst of the digital transformation: specialists in network installation and deployment, software developers, artificial intelligence, big data or cyber security<sup>20</sup>.

**The relevant relative weight in the economy, together with the atomisation of the business structure, make the sector a strategic point for the national economy, where public investments have an important dragging effect on global economic activity and on productivity.**

## 2.1. Productive structure of the telecom services sector

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<sup>18</sup>Source INE. Chapter 61 CNAE <https://www.ine.es/jaxiT3/Tabla.htm?t=25038>

<sup>19</sup>The telecoms sector is made up of companies engaged in cable, wireless, satellite or other telecoms activities. It should be noted that all the economic activities related to connectivity are not only composed of telecoms services, although this segment concentrates the bulk of the companies with the highest level in terms of turnover.

<sup>20</sup>Source: <https://www.digitales.es/wp-content/uploads/2019/03/ESTRATEGIA-FORMACION-DIGITA-LES-oct19-3.pdf>

## 2.2. The connectivity value chain

In the provision of telecom services, there are various actors involved in the value chain:

- ♥ Equipment manufacturers (software and hardware).
- ♥ Suppliers of network infrastructure, transport, and signal broadcasting: cable, radio, optical media or satellite.
- ♥ Telecom service providers.
- ♥ Content providers: data and audio-visual.
- ♥ Device manufacturers.

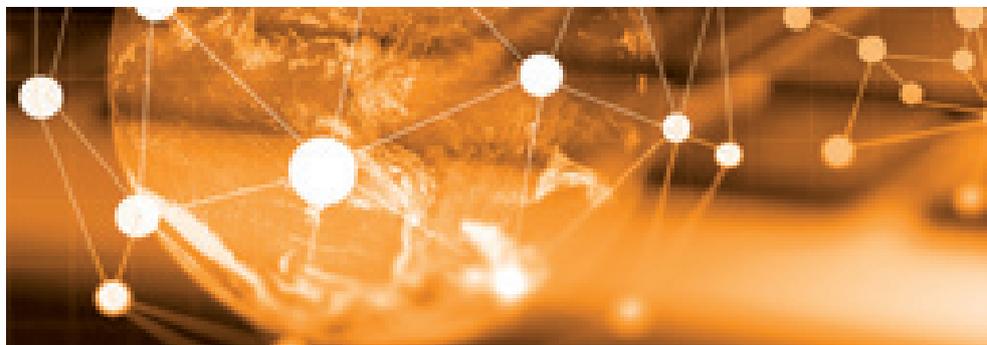
**Equipment manufacturers.** According to the latest edition of the report drawn up by AMETIC<sup>21</sup> on the results of the Information Technology (IT) sector in Spain for 2018, the three main segments of activity that make up the IT market have made positive progress: IT Services have grown by 8.8% and have achieved a turnover of 18,661 million euros; the software market has grown by 7.2% and has obtained 3,501 million euros; and hardware has grown by 1.7% with 4,653 million euros.

More precisely, in terms of software, management software (ERP, CRM...) is the most widely used by companies and supports the growth base of this segment. The renewal of the technology park brings with it the consolidation of the figures for operating systems. On the contrary, a slowdown in the line of development tools is observed.

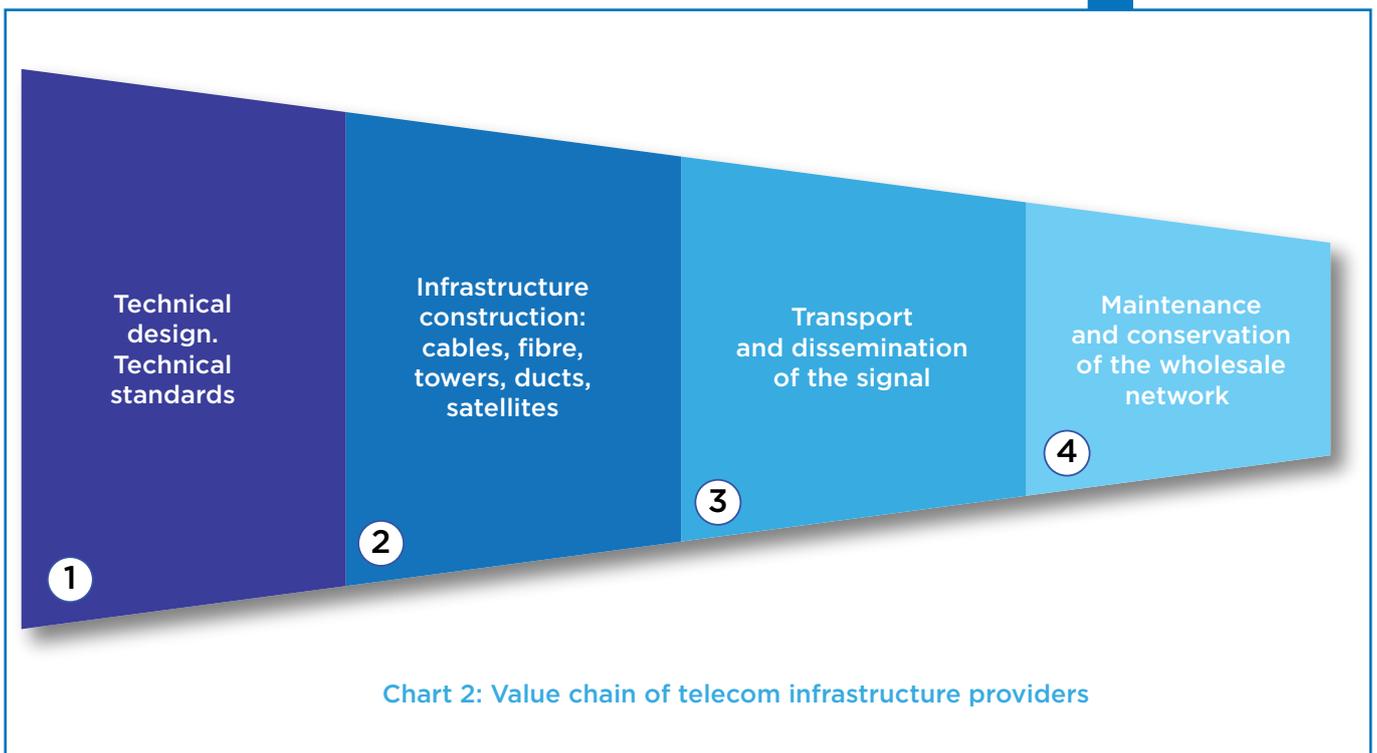
On the other hand, there has also been a very significant increase in the cloud. The new cloud solutions have driven the growth of services (XaaS) to the detriment of other traditional software or hardware products. The market progression is mostly due to the renewal of products by the private sector. The progress of e-government has also had a positive impact, leading to a greater supply of software products and IT services by the public sector.

In terms of hardware, the computer segment was negatively affected by chip supply problems and global trade policies in 2018. The slight increase is based on the renewal of obsolete equipment in the technology park. New institutional projects and demand from the private sector in general have had a positive impact on hardware growth. However, from the public sector, the generalised trend of budget freezing that occurred in 2018 made it difficult for the Administration to introduce new technological versions.

<sup>21</sup><http://ametic.es/es/prensa/la-facturacion-del-sector-de-las-tecnologias-de-la-informacion-ti-crece-por-quinto-ano>



**Telecom infrastructure providers.** In general, the model for the design, construction, operation, and maintenance of telecom networks is basically concentrated on the actions of private companies, guided by criteria of efficiency and economic profitability. For this reason, areas with greater difficulty of access due to their orography and lower population density take longer to be served by network deployments or public intervention must be used to cover them.



Given the complex process involved in the deployment of a telecom network and the associated long maturation period, it has been common practice for telecom network operators to bring forward the deployment of such infrastructure in anticipation of future demand. For this reason, the networks that are expected to be needed in the future are currently being built.



However, certain elements have been identified that will undermine the continuity of this dynamic in the coming years. On the one hand, the increase in the coverage of areas not yet covered implies higher investment costs, either because they are far from the transmission networks already deployed, or because they are areas of complicated terrain which require the installation of more network elements than in other areas. It should be noted that Spain is among the most mountainous countries in Europe, which particularly penalises the deployment of networks in our rural areas.

In addition, the evolution of telecom operators' income in recent years, especially in Europe, shows a clear downward structural trend, beyond occasional movements. Given that the financing of most telecoms networks comes mainly from private capital, this trend casts doubt on whether this same scheme will be sufficient to maintain the pace and capillarity of the construction of the latest generation networks needed to meet social demands.

Finally, it is necessary to underline the increasingly pro-active role being played by the installation and maintenance services of telecoms networks in the installation of key digital devices to contribute to the energy efficiency and accessibility objectives set out in Agenda 2030.

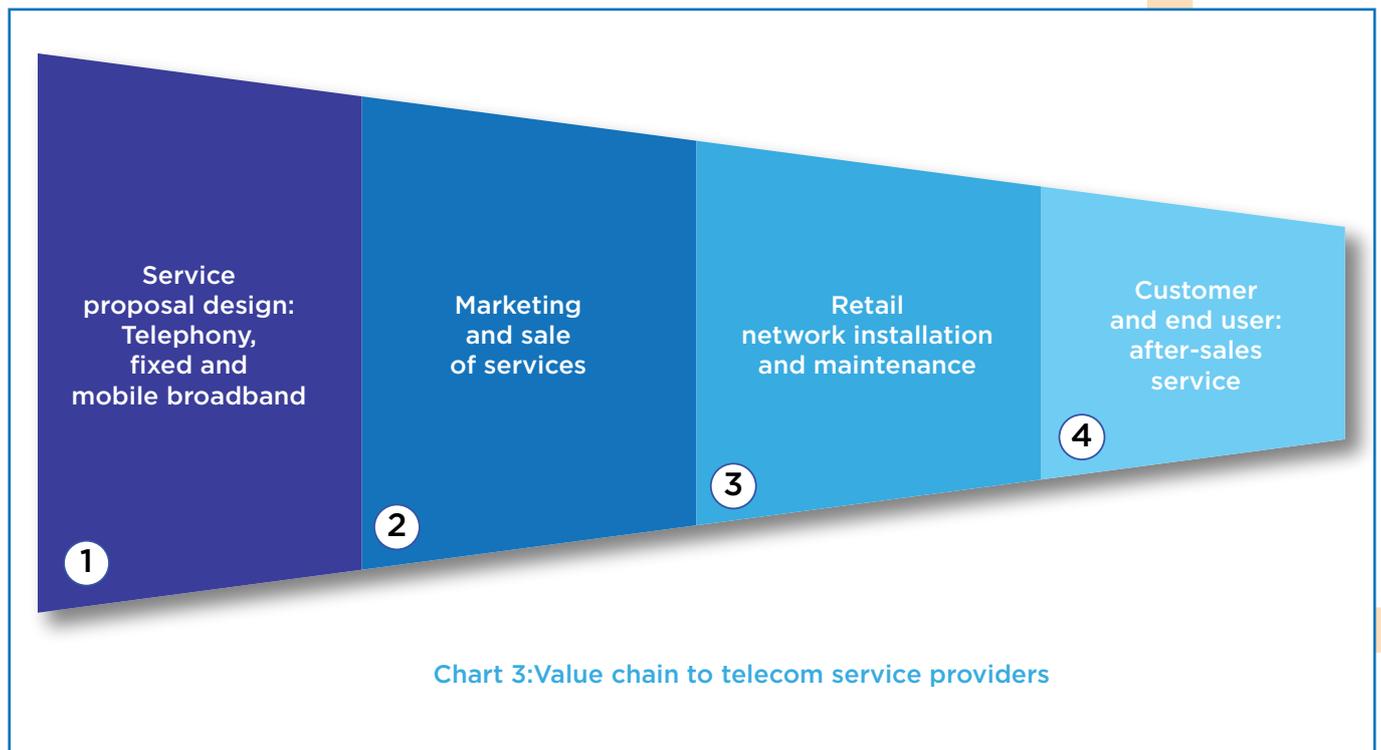
The integration of digital domotics facilities in buildings and homes is a key instrument for improving the quality of life of citizens. Domotics can contribute to both energy efficiency and accessibility, understood not only for people with functional diversity, but also for elderly or dependent people. It should not be forgotten that currently between 30-35% of the population has limited autonomy, and this is a percentage that is clearly increasing due to the ageing of the population and especially in rural areas that are the target of the Demographic Challenge policies.

Digital technology is available for installation in social centres or in homes to facilitate independent living for people with limited autonomy but who prefer to live at home rather than in social care centres such as residential homes or health institutions. In addition to saving on health care resources, this type of device improves the quality of life and independence of people who would otherwise be unable to access it.



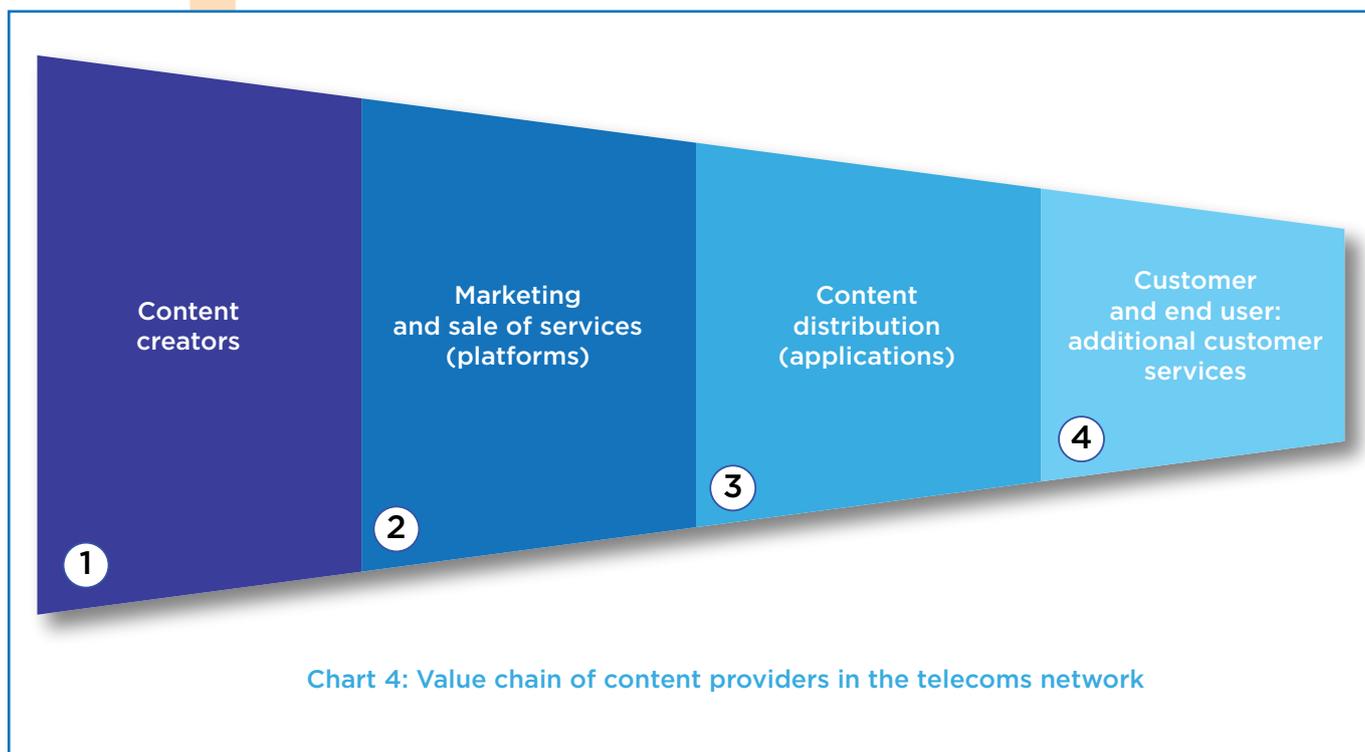
Similarly, home automation service installers (software and control devices) can also contribute to improving the energy efficiency of homes and buildings by digitally controlling protective elements (blinds, windows, awnings, air conditioning systems, lights, etc.) and household appliances (switching on, off and control).

**Telecoms service providers.** The telecoms service, together with the creation of content, is currently undergoing a profound transformation that is resulting in constant business movements. Although the sector's traditional tenet has been to integrate the operation of telecoms networks and the provision of customer services, in recent years there has been a tendency for the main companies in the market to segregate the operation of networks into separate business units or even to outsource them, both in fixed and mobile networks<sup>22</sup>.



<sup>22</sup>Such as, for example, the creation of the infrastructure company Telxius in 2016 by Telefónica, the creation of Vodafone Europe's "TowerCo" and the whole movement to acquire Cellnex in recent years.

**Content providers.** Content creators are multiple and very diverse. On the one hand, the large audiovisual, cultural, and informative content companies are identified, but it is necessary to include in this category the users themselves (whether individuals or corporations) who become the creators of the content through web applications or social networks.



Although it is necessary to recognise the value of content in the development of telecoms and its spectacular social demand, the regulatory framework that governs the construction and operation of telecoms networks is very different from the one that affects the content and services. While the latter are scarcely regulated, the telecoms networks and services have specific regulations largely established by means of Community directives, such as the Electronic Communications Code, which has resulted in Law 9/2014, of 9 May, General of Telecoms<sup>23</sup> and its development regulations, the audio-visual contents are regulated by the audiovisual regulations, which in Spain are established in Law 7/2010, of 31 March, General of Audiovisual Communication<sup>24</sup>.

<sup>23</sup>Law 9/2014, of 9 May, General Act on Audio-visual Communication: <https://www.boe.es/buscar/pdf/2010/BOE-A-2010-5292-consolidado.pdf>

<sup>24</sup>Law 7/2010, of 31 March, General Act on Audio-visual Communication: <https://www.boe.es/buscar/pdf/2010/BOE-A-2010-5292-consolidado.pdf>



Digital services are only subject to the provisions of Law 34/2002 of 11 July 2002 on information society services and electronic commerce<sup>25</sup> and the transposition of Directive 2000/31/EC of the European Parliament and of the Council of 8 June 2000 on certain legal aspects of information society services, in particular electronic commerce, in the Internal Market (Directive on electronic commerce)<sup>26</sup>, which is currently being revised in the EU.

In addition to the differences in the regulatory framework, there are also major differences in the development of the market in recent years. While digital services continue on an unstoppable upward trend, telecoms services, as noted in the previous section, continue to be the opposite.



### Device manufacturers

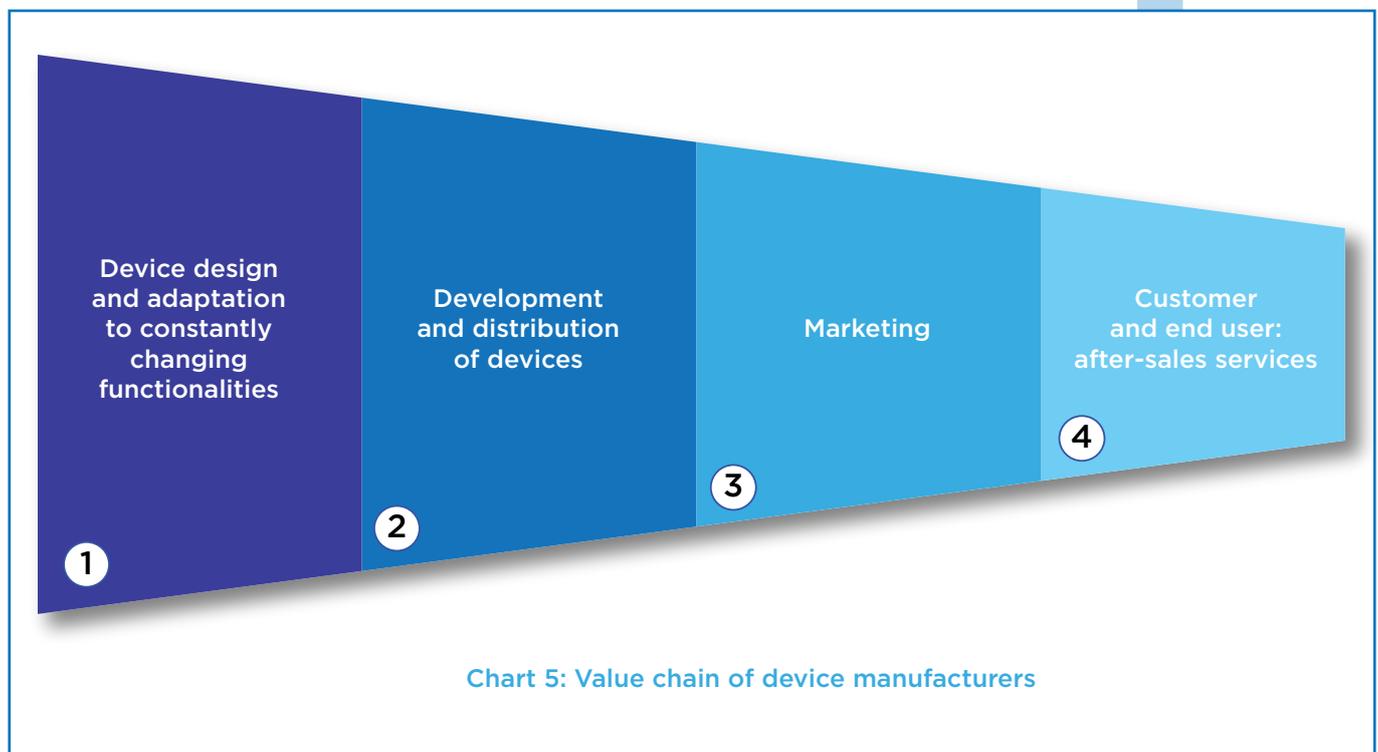


Chart 5: Value chain of device manufacturers

As we have seen in the previous section, the different value chains must work together since, from the point of view of final usability (therefore, universal access), the device does not make sense without content, the content is not capable of reaching the user without service and operability and the service is not feasible without the construction and maintenance of the network infrastructure.

<sup>25</sup>Law 34/2002, of 11 July, on information society services and electronic commerce <https://www.boe.es/buscar/pdf/2002/BOE-A-2002-13758-consolidado.pdf>

<sup>26</sup>Directive 2000/31/EC of the European Parliament and of the Council of 8 June 2000 on certain legal aspects of information society services, in particular electronic commerce, in the Internal Market (Directive on electronic commerce)

## 2.3. Telecom networks: Spain in the European and Global context

A large part of the investment to be made in the sector will go towards financing the deployment of high-capacity telecoms networks. The telecoms sector has one of the highest capital expenditures of the Spanish economy, over 20% in general terms, and for this reason, accumulated investments in networks in Spain have exceeded 50 billion euros in the last 10 years<sup>27</sup>.

The wide extension, resilience and high speed of the network in Spain are indicators of the competitiveness and maturity of the sector, both in national terms and in comparative terms with neighbouring countries.

The DESI (Digital Economy and Society Index), drawn up by the European Commission, assesses the relative position of countries in five major dimensions of the digital society: connectivity, human capital, internet use, technological integration and digital public services.

**The latest DESI index published, on 2019 data, placed Spain in 11th place of the total 28 countries of the European Union, ahead of countries such as Germany, France, and Italy.**

**Spain's position is even more outstanding in terms of connectivity, especially Spain's good situation in fibre-to-the-home network coverage (FTTP<sup>28</sup>), ranking second in the EU<sup>29</sup>, well above countries of similar size to ours such as France, Germany or Italy<sup>30</sup>.** In this section, the data on new fixed generation coverage (94% of households with access to broadband networks of more than 30 Mbps) also stand out. It should be noted that the FTTH networks deployed after years of investment and strong infrastructure competition between operators have made it possible for Spain to have the most extensive fibre-to-the-home network in Europe, with 53,649,263 access points<sup>31</sup>.

<sup>27</sup>See CNMC [http://data.cnm.es/datagraph/jsp/inf\\_anual.jsp](http://data.cnm.es/datagraph/jsp/inf_anual.jsp)

<sup>28</sup>FTTP: Fiber To The Premises, fiber to the distribution device closest to the end user. Among other configurations, it includes fibre to the home (FTTH), which is the one used in Spain.

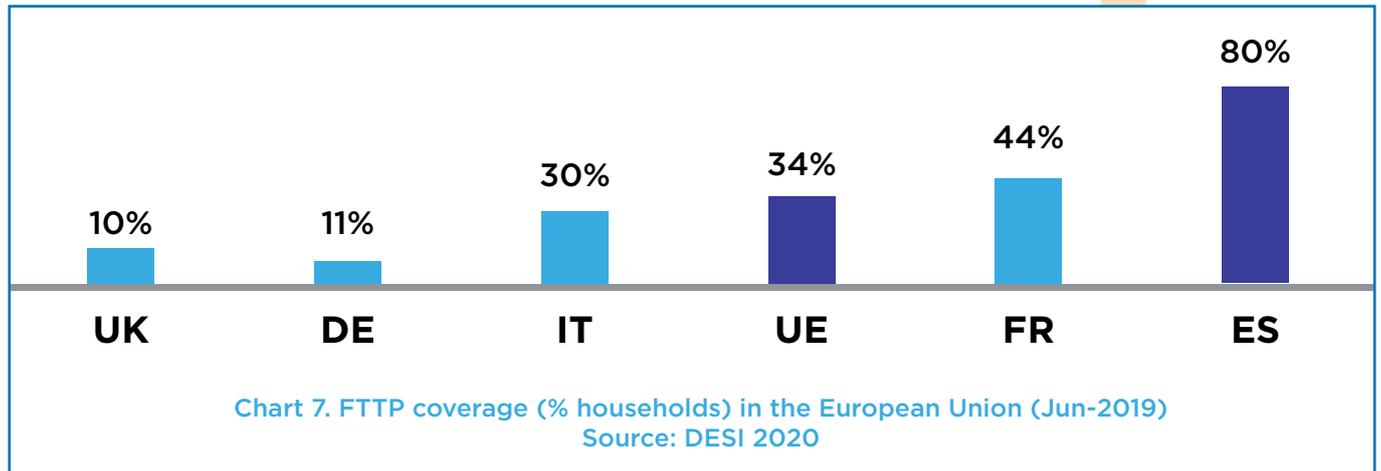
<sup>29</sup>Only behind a much smaller country like Latvia

<sup>30</sup>The country that ranks first, Latvia, covers 65,000 km<sup>2</sup>, has less than 2 million inhabitants and its terrain is completely flat. Spain, on the other hand, has an area of more than 500.00 km<sup>2</sup>, has more than 47 million inhabitants established in a natural environment and with a mountainous orography, as rich as complex for the deployment of infrastructure.

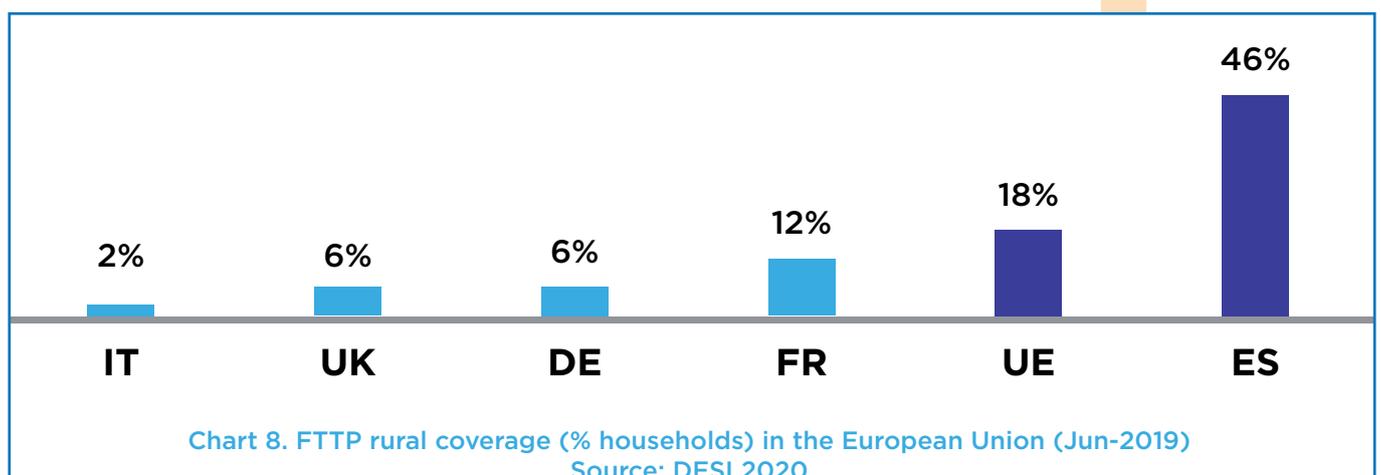
<sup>31</sup>Source: CNMC [http://data.cnm.es/datagraph/jsp/inf\\_anual.jsp](http://data.cnm.es/datagraph/jsp/inf_anual.jsp)



There are few international comparisons concerning the availability of networks developed with a homogeneous methodology. However, various consultancy firms have aggregated data from different sources to determine the level of progress of fibre deployments in the different geographical blocks. Some of these comparisons place Spain in fifth place in the overall ranking<sup>32</sup>.



**In terms of rural areas, in 2019 Spain was fifth in the European ranking for rural coverage with fibre**, with coverage rates that exceeded the absolute FTTP coverage percentages in France, Germany and the United Kingdom. This environment is always more difficult to address because of its lower profitability. However, although there has been substantial progress in recent years, there is still ample room for improvement.



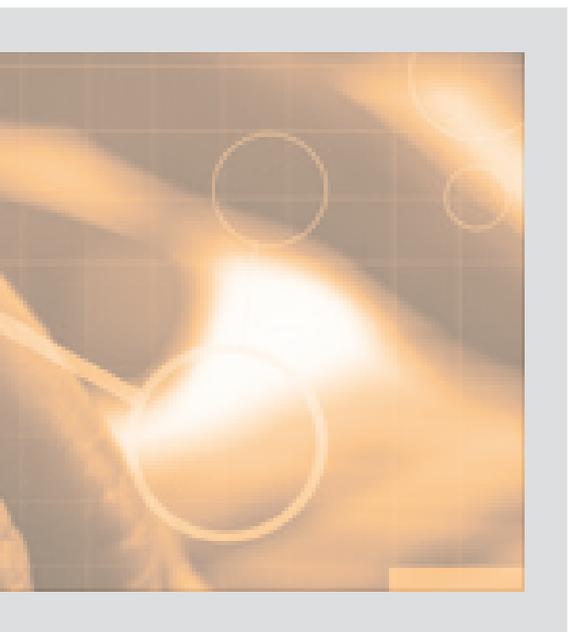
<sup>32</sup>5th edition of the study "Arthur D. Little's Global FTTH/B"  
<https://www.adlittle.com/en/RaceToGigabitFiber>

## 2.4. Coverage and capillarity of connectivity infrastructures

As a complement to European Union statistics, every year the Secretariat of State for Telecoms and Digital Infrastructures (SE-TELECO) publishes the report entitled “Broadband Coverage in Spain”, which analyses in depth the levels of broadband coverage by technology and by speed, both fixed and mobile, paying special attention to rural areas. The most recent report, with data up to 30 June 2019<sup>33</sup>, also includes details on both technology and speed by Autonomous Community and by province.

**The results of the last year of this report show a very high national population coverage in mobile telephony, both in 3G (HSPA) and 4G (LTE) technology, in both cases exceeding 99.8 per cent. In terms of fixed broadband coverage, there has been strong growth in connections over 30 Mbps to 94 percent of the population<sup>34</sup>.**

Private investment by operators, together with public aid, has achieved 83,6% population coverage<sup>35</sup> with NGA networks offering more than 100 Mbps, and is expected to reach at least 91.25% by the end of 2021 when the ongoing work of the projects supported under the public intervention program for the deployment of broadband, PEBA-NGA, is completed, and without considering the additional investment decisions of individual operators.



<sup>33</sup><https://avancedigital.gob.es/banda-ancha/cobertura/Paginas/informes-cobertura.aspx>

<sup>34</sup>The 800 MHz Plan has had a significant impact on 30 Mbps coverage in 2019

<sup>35</sup>According to CNMC data, 61.9 million accesses to new generation networks (NGA) were reached in December 2019.

The coverage of networks capable of offering more than 30 Mbps was 86.6 percent of the population in rural areas, according to 2019 data, and those of networks capable of offering more than 100 Mbps in those areas reached 49.8 percent. Although coverage levels in urban environments are very high, these data show that there is still ample room for improvement in rural areas and this despite the accelerated growth in recent years and the good position in global comparisons.

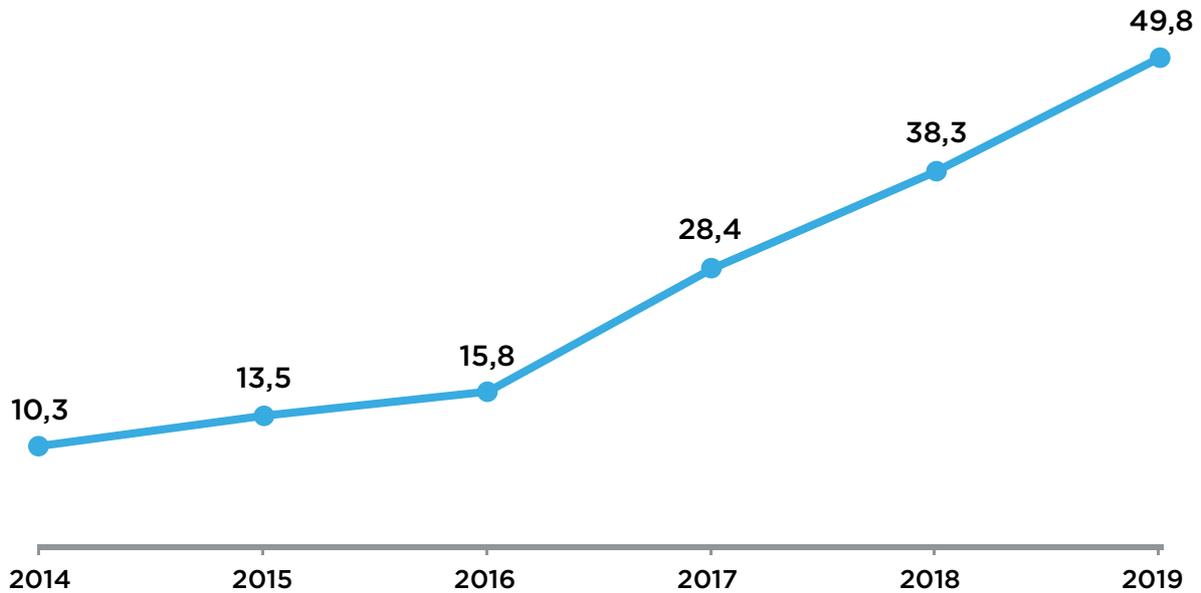


Chart 1. Fixed broadband coverage at speeds  $\geq$  100 Mbps in rural areas (% households) (2014-2019)  
Source Annual reports on broadband coverage in Spain: Ministry of Economic Affairs and Digital Transformation

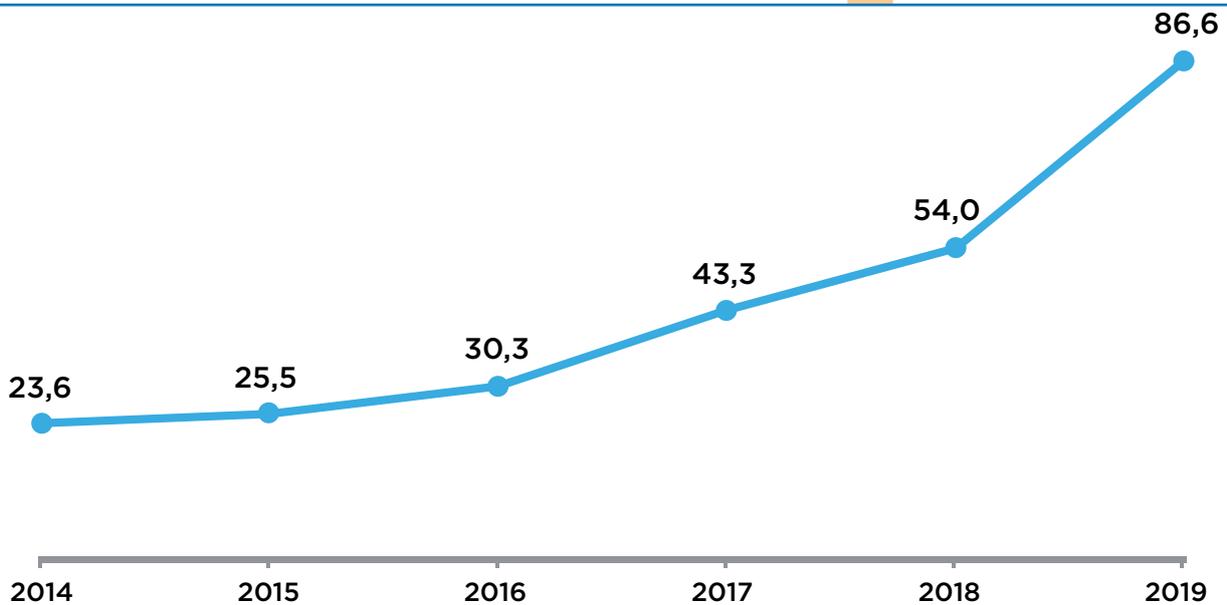
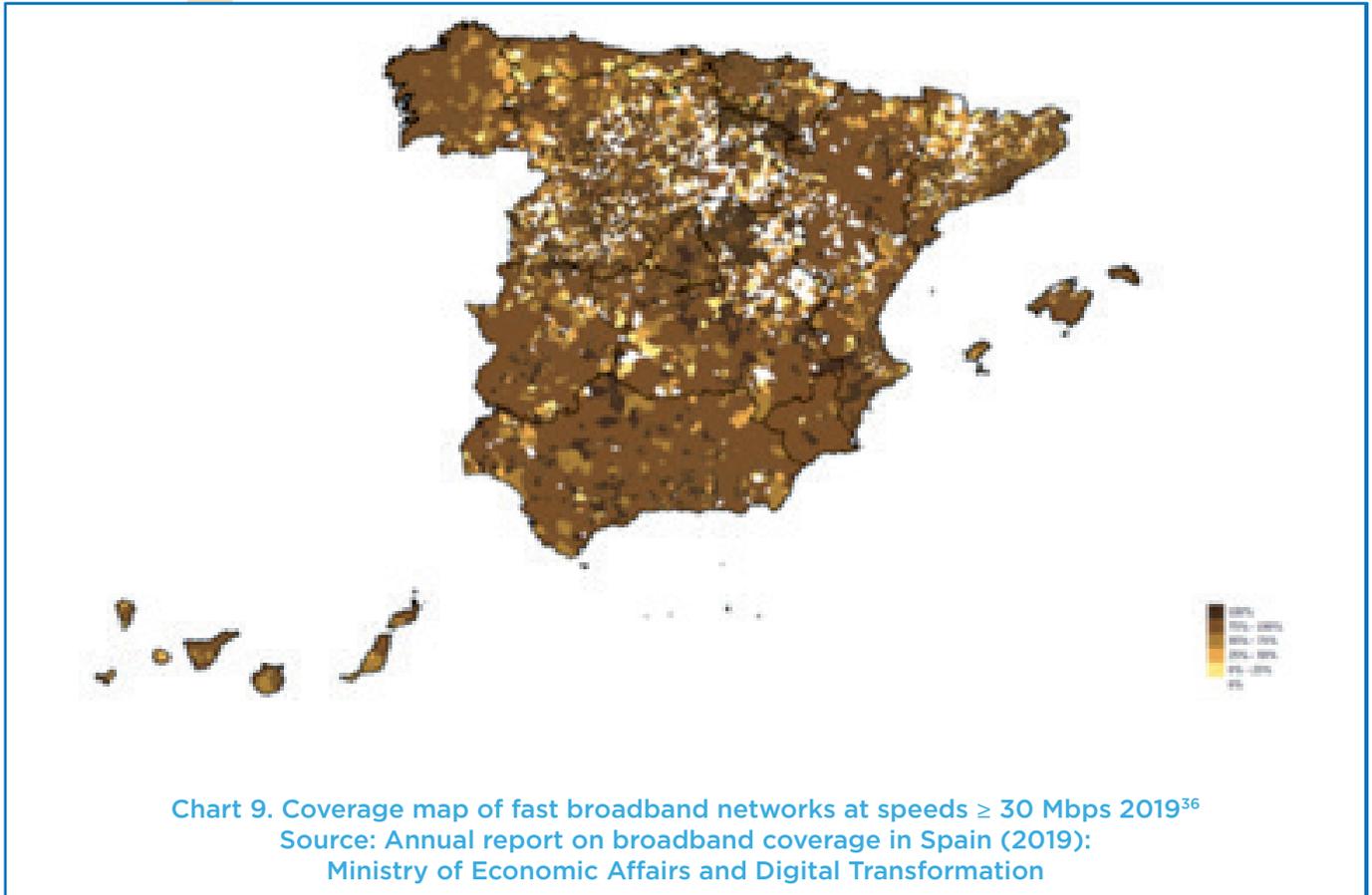


Chart 2. 30 Mbps fixed broadband coverage in rural areas (% households) Source Annual reports on broadband coverage in Spain: Ministry of Economic Affairs and Digital Transformation

The following chart shows the geographical imbalances in the coverage of Spain's deployment maps in those territories that are sparsely populated. With regard to coverage of more than 30Mbps, it can be seen that almost the entire population was covered in 2019.



<sup>36</sup>Includes coverage per household at the municipality level provided by networks at speeds of at least 30 Mbps for the provision of broadband services from a fixed location, including coverage by VDSL, wireless networks  $\geq 30$  Mbps, HFC and FTTH. Exceptions are satellite technology which, by definition, has coverage over 100% of the population.



Similarly, it can also be seen that networks offering speeds above 100 Mbps are concentrated in the most densely populated areas, while in areas with low population density such infrastructure is not yet available.

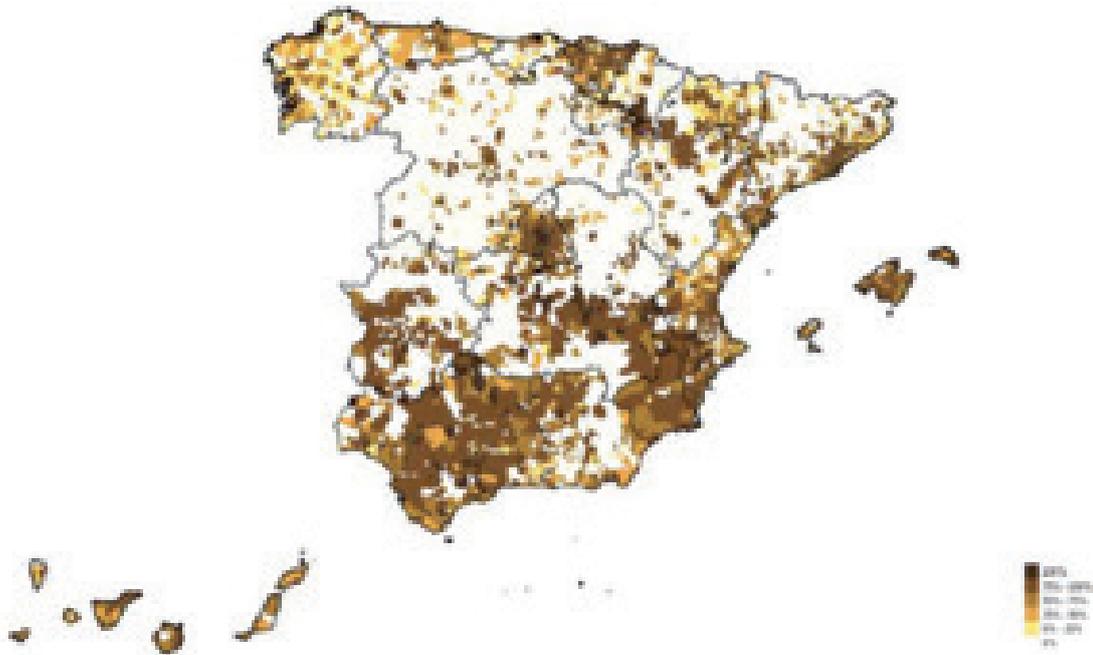
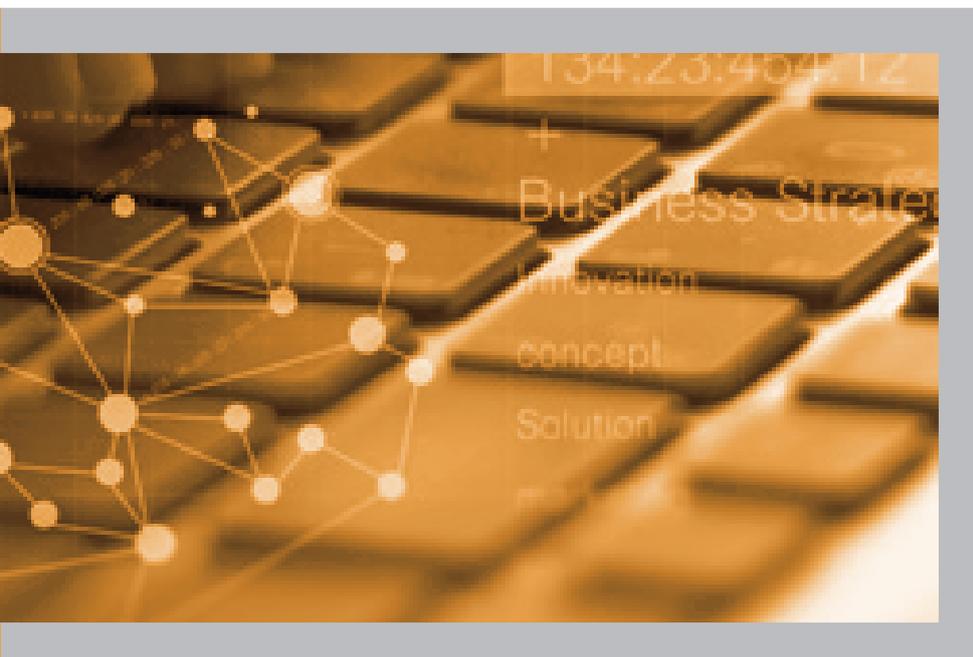


Chart 10. Coverage map of fast broadband networks at speeds  $\geq 100$  Mbps (2019)<sup>37</sup>  
Source: Annual report on broadband coverage in Spain (2019):  
Ministry of Economic Affairs and Digital Transformation



<sup>37</sup>Includes coverage per household at municipality level provided by networks at speeds of at least 100 Mbps for the provision of broadband services from a fixed location, including HFC coverage and FTTH. The exception is satellite technology which, by definition, has coverage over 100% of the population.

## 2.5. Public support for the deployment of telecommunications networks



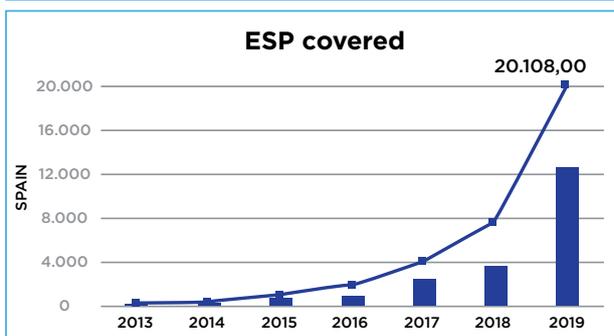
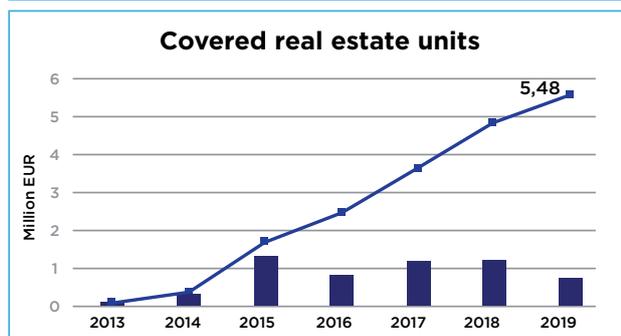
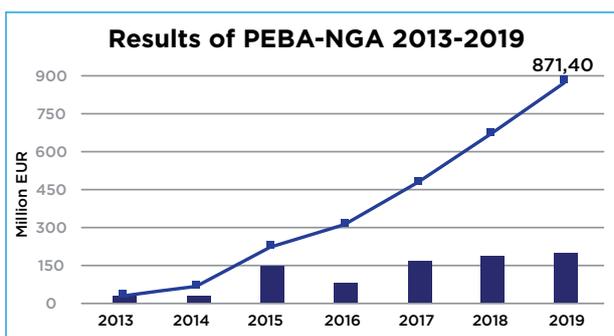
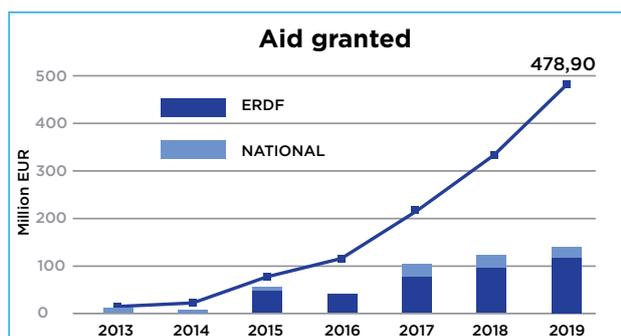
Regarding mobile broadband connectivity, the map of Spain shows significant coverage throughout the territory by 4G LTE technology of 99.4%<sup>38</sup>. There is still room for improvement both in terms of network extension and in ensuring coverage and data speeds throughout the municipality and the perception of service quality.

Along with private investment in network deployment, it is worth highlighting the actions of the Spanish Government and the rest of the public administrations that have been complementing private initiative with the aim of promoting network growth in areas with lower population density to balance deployments in terms of inter-territorial balance.

Among the most outstanding public support programs in recent years are the following:

**Broadband Extension Plans (PEBA).** Aid granted by the Ministry of Economic Affairs and Digital Transformation, co-financed by the ERDF, for the deployment of NGA networks offering speeds higher than 100Mbps in white areas<sup>39</sup>, in the public aid terminology of the European Union. In the period 2013-2020, almost 600 million euros have been granted and an investment of almost 1 billion euros has been mobilised in NGA networks

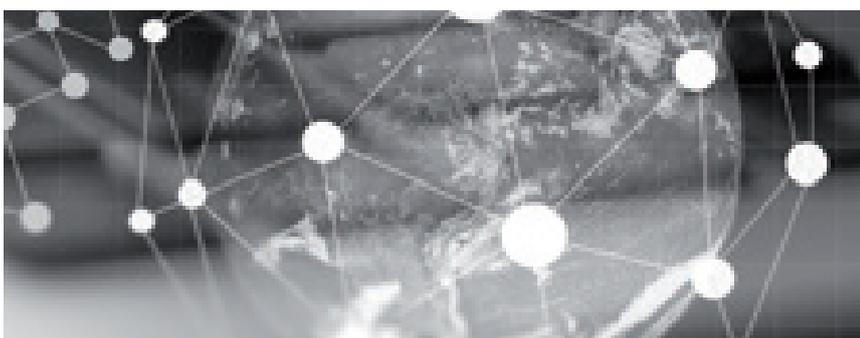
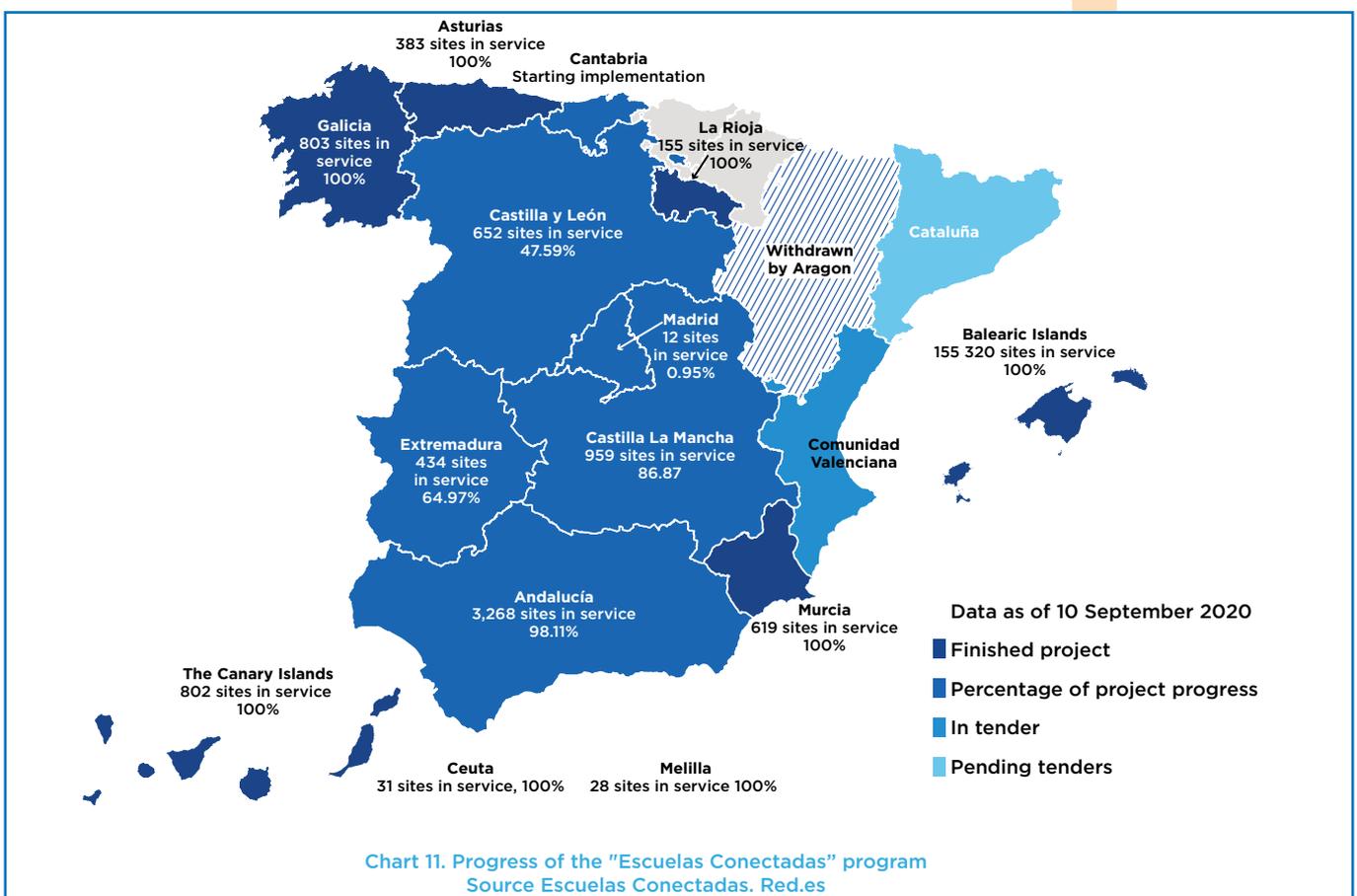
**Plan 800.** In the tender for the 800MHz band used by the successful operators to provide 4G services, coverage obligations were established for the winning operators: network deployment to provide broadband connection services at 30Mbps for 90% of the citizens of municipalities with less than 5,000 inhabitants, under certain conditions of quality and availability. As a result of this commitment, coverage with LTE networks reached more than 86% in rural areas by 2019.



<sup>38</sup>[https://www.cnmcc.es/sites/default/files/3083420\\_5.pdf](https://www.cnmcc.es/sites/default/files/3083420_5.pdf)

<sup>39</sup>Areas where there are no broadband networks capable of offering speeds above 30Mbps

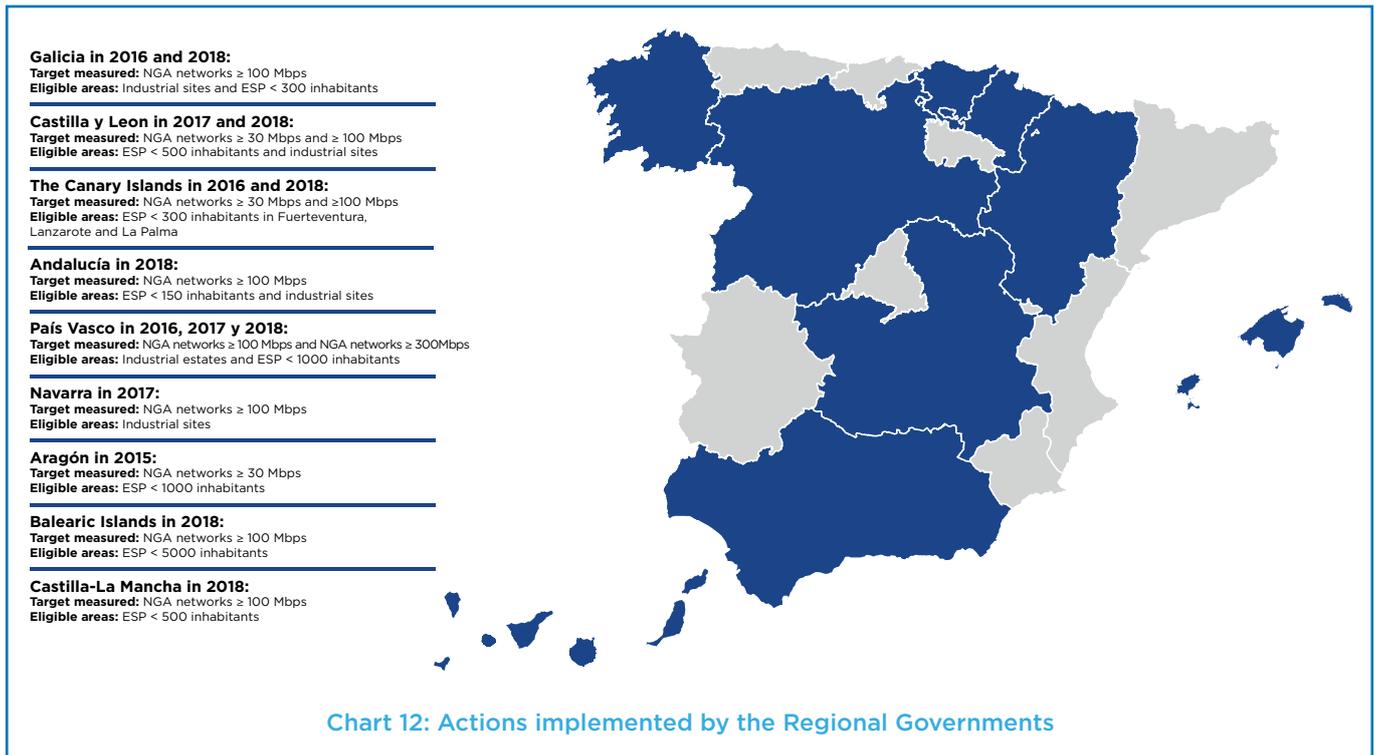
**Connected Schools.** With the purpose to provide schools with fast broadband access, the Connected Schools Programme is currently being developed. Through collaboration between the various administrations involved in the process of digitalisation and modernisation of pre-university educational centres, a series of investments in infrastructure is being made to provide 100Mbps connectivity to the centres agreed with each Autonomous Region. Within the programme, special attention is given to centres which, due to their location or rural nature, present greater difficulties in providing the necessary infrastructure for digital education<sup>40</sup>.



<sup>40</sup>The Connected Schools program has completed its actions in four Autonomous Communities: Galicia, Asturias, La Rioja and Murcia, where 100% of the schools are connected and, in the rest of the Autonomous Communities, it is making progress in connecting all its schools.



In addition to the programs described above, developed by the General State Administration, actions of a regional nature must be added. Valuing the importance of broadband deployment for social and economic development, the different regional administrations have designed complementary programs which have been coordinated with those developed by the State Secretariat for Telecommunications and Digital Infrastructures. As an example, the following graph<sup>41</sup> shows a summary of those notified in recent years.



## 2.6. Adoption, use and demand for Connectivity services

Just as important as having advanced digital infrastructures is their use and exploitation by users. In the business sphere and especially among SMEs, digital adoption is still low. As far as personal behaviour is concerned, there is a trend towards social uses, leisure, and entertainment and much less so in the more professional areas.

According to the DESI data<sup>42</sup>, Spain's position in the ranking of Internet service use is above the EU average at a global level, in 11th place by 2020. It occupies this position with a score of 60.8 in Internet use, although it has remained in the same position in the ranking since 2018.

<sup>41</sup>The map does not include investments in Autonomous Communities where there is a strong extension of networks based on prior notifications to 2105. An example is the deployment in Catalonia which is based on the state aid notification of Xarxa Oberta, the internal network of the Generalitat (Catalan Government) and uses the surplus capacity for wholesale services to local operators.

<sup>42</sup><https://ec.europa.eu/digital-single-market/en/desi>



It is particularly interesting to analyse the uses of broadband in Spain: above the EU average in news consultation, in music and video game services and in social networks, but below the European average in uses more related to productive activities such as banking services (60% vs 66%) or internet purchases (64% vs 71%).

These data are consistent with those derived from the ONTSI ePyme Study<sup>43</sup>, which estimates that in the case of Spanish micro-companies (less than 10 employees), which represent 95.6% of the Spanish business fabric, 23.7% do not have an internet connection. In addition, 16.9% do not have a fixed broadband contract and, in terms of mobile technology, 25.1% do not use mobile broadband. If we look at the uses of this connectivity, only 11.6% carry out digital marketing, 5.8% sell over the Internet and 10.4% use cloud infrastructures.

**In short, Spain has achieved very high levels of ultra-fast broadband network coverage in urban areas, although there is still room for improvement in terms of the adoption of these technologies and their use in production environments.** This boost to adoption is particularly necessary for micro-SMEs (0-9 employees), which represent more than 95.6% of our business fabric<sup>44</sup>.

Fixed networks have experienced a succession of generations similar to that of mobile networks. Fixed connectivity has evolved from the narrowband era (64 Kbps per subscriber), through the broadband era (2 Mbit/s per subscriber) and the high-speed broadband era (30 Mbit/s per subscriber), to the very high-speed broadband era (100 Mbit/s per subscriber).

The evolution of networks has accompanied the demand for higher user speeds for applications<sup>45</sup>:

- ✔ E-mail and basic web browsing: Minimum of 1-5 Mbps.
- ✔ Transmission of HD content: Minimum of 15-25 Mbps.
- ✔ Transmission of 4K content and competitive online games: Minimum of 40-100 Mbps.

In these terms, the European Union has set the goal of moving towards the Gigabit Society<sup>46</sup> with objectives that go beyond that of extending very high-capacity connectivity to the entire population. This goal requires that all European households, rural or urban, have access to an internet connection offering download speeds of at least 100 Mbps, upgradeable to Gigabit speed by 2025. It also states that all major socio-economic drivers, such as schools, hospitals, and businesses, should have Gigabit connections that allow equally fast uploads and downloads.



## 2.7. Towards the Gigabit Society

<sup>43</sup><https://www.ontsi.red.es/sites/ontsi/files/2020-10/ePyme2019.pdf>

<sup>44</sup>Report "Portrait of SMEs, CCD as at 1 January 2019" <http://www.ipyme.org/Publicaciones/Retrato-PYME-DIR-EC-1-January-2019.pdf>

<sup>45</sup>e <https://broadbandnow.com/guides/how-much-internet-speed-do-i-need>

<sup>46</sup>This objective is outlined in the European Commission's communications "Towards the Gigabit Society". ([https://ec.europa.eu/commission/presscorner/detail/es/IP\\_16\\_3008](https://ec.europa.eu/commission/presscorner/detail/es/IP_16_3008)) and "Shaping Europe's digital future" ([https://ec.europa.eu/info/publications/communication-shaping-europes-digital-future\\_es](https://ec.europa.eu/info/publications/communication-shaping-europes-digital-future_es))

## 2.8. Spain and cross-border digital infrastructures

### Underwater cables

**95% of the world's communications and internet traffic circulates through underwater cables.** According to TeleGeography<sup>47</sup>, there are 406 underwater cables in service around the world. However, this figure is constantly on the move, as new cables come frequently into operation. In the same way, others in poor condition or too old are removed from service. Some of these cables are short (such as the CeltixConnect, which is only 131 km long and links Ireland to the United Kingdom), while others are very long (such as the America Asia cable, which is over 20 000 km long). The total number of cables in operation is more than 1.2 billion kilometres.

**Based on data from the Submarine Cable Map, Spain currently has 25 underwater cables in service with moorings in 33 Spanish cities.** By 2023, it is expected that there will be 26 cables in service and 34 in the cities with moorings, with the entry into operation of the 2Africa cable with moorings in Barcelona.

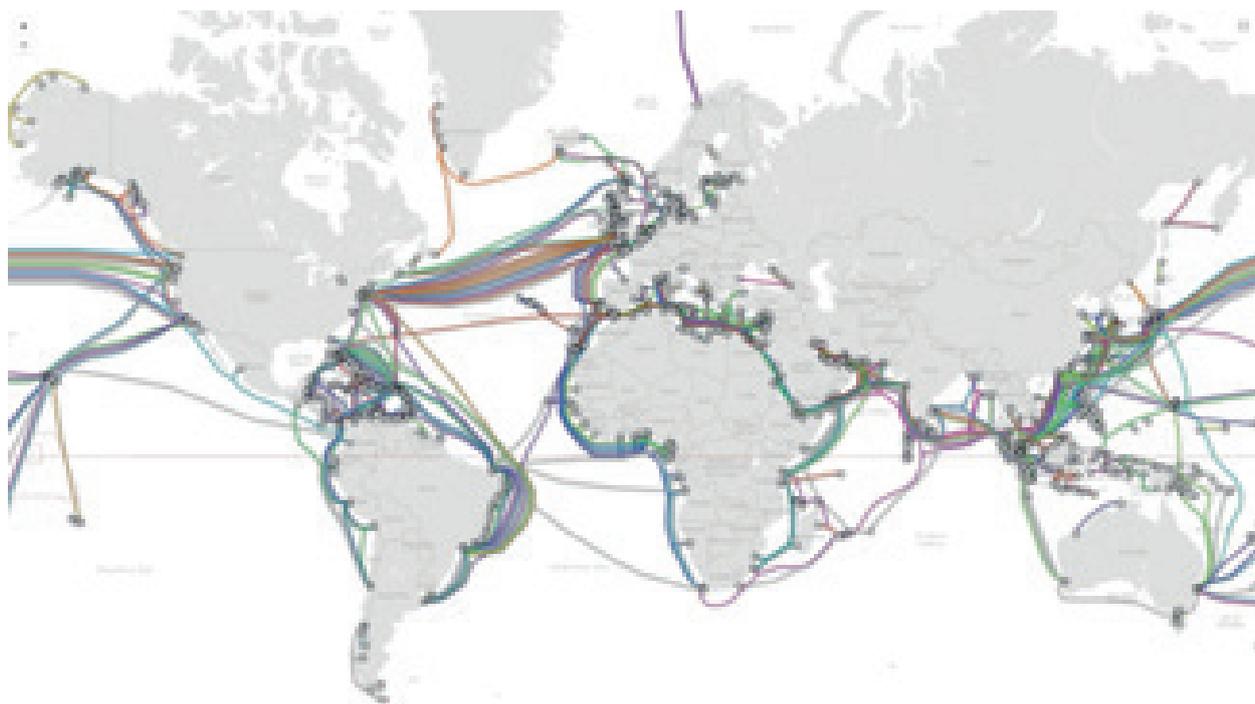


Chart 13. World map underwater cables

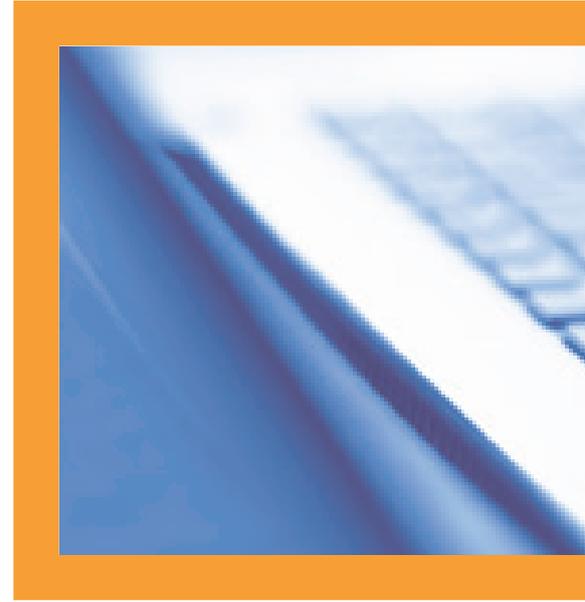
<sup>47</sup>TeleGeography is a research and consulting firm in the telecommunications market, and is also responsible for the Submarine Cable Map portal. It is an interactive map with all the submarine cables that are deployed around the world, and at the moment, it has become the main reference in the sector and source of the most up-to-date information on this type of communication infrastructure.



## Data processing centres

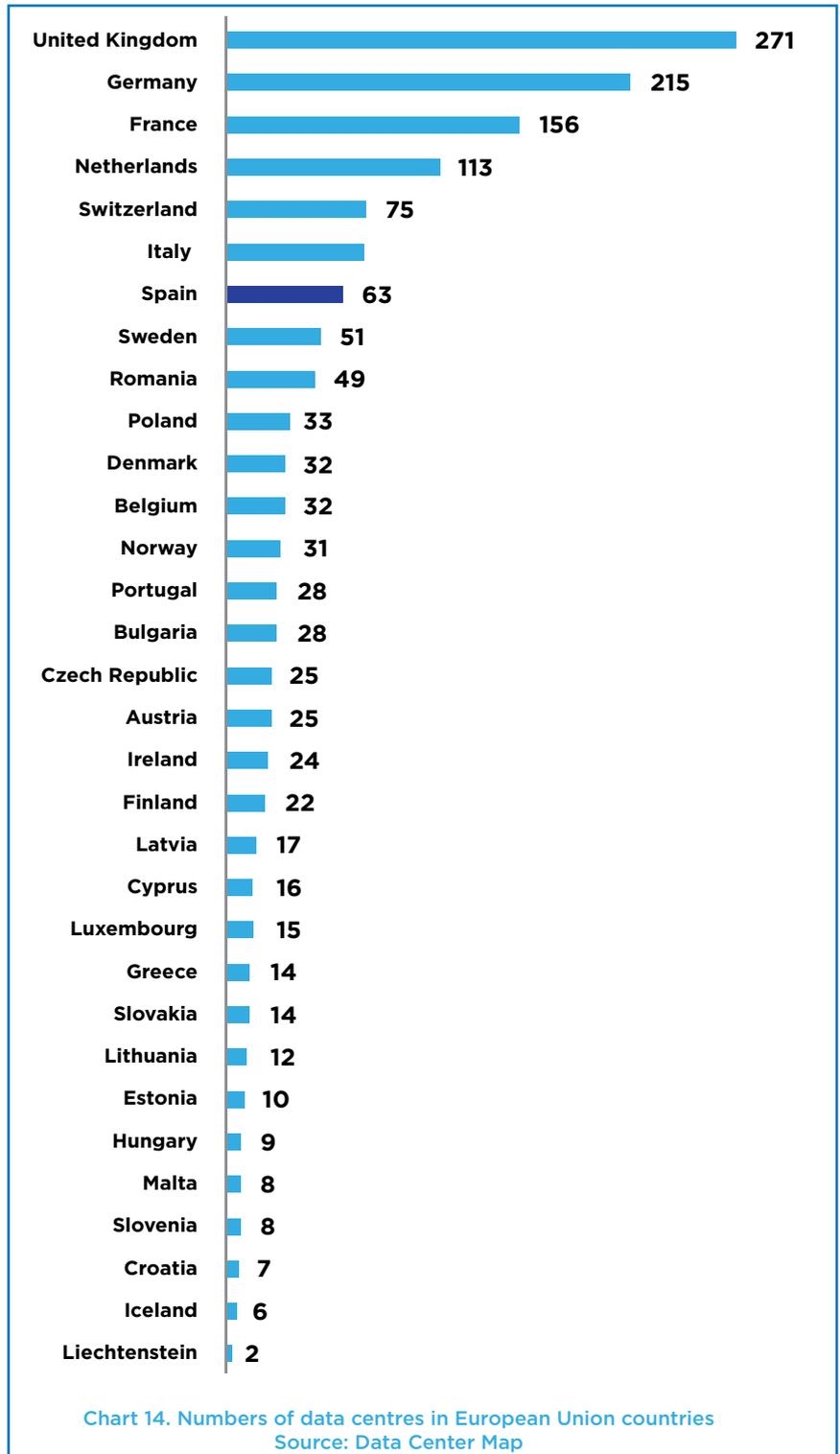
The capacity to store and process digital data, and the facilities that house it - the data centres - are becoming another key and core aspect of the infrastructure in the digital economy. This is reflected in the growing number of colocation data centre facilities, which are those that provide space, power, cooling and connectivity for company servers, storage and network equipment.

According to Data Center Map<sup>48</sup>, there are currently 4626 data centres in 124 countries. Although most of these centres (80%) are in developed countries (40% located in the United States, with 1785 centres), there is a growing pace of implementation in countries such as India (with 149 centres currently, 3%), and China, with 85 centres and 2%.



<sup>48</sup>Data Center Map is a web service that since 2007 has been developing a database with the collection of suppliers and customers in the data center industry. The website focuses on the detection of IP collocation and transit centers, but also incorporates other data centers that offer services such as wholesale space, dedicated servers, remote hands, internet traffic exchange, among others. Without being exhaustive, it is currently one of the most complete repositories, being used as a reference by international organizations such as the OECD or the G20 in the preparation of reports and sector studies. See <https://www.datacentermap.com/>

Extracting data from the EU countries from this database, Spain would be in seventh place in terms of the number of this type of facility. Our country is in the European ranking behind the United Kingdom (273), Germany (210), France (155), the Netherlands (113), Switzerland (75) and Italy (74)

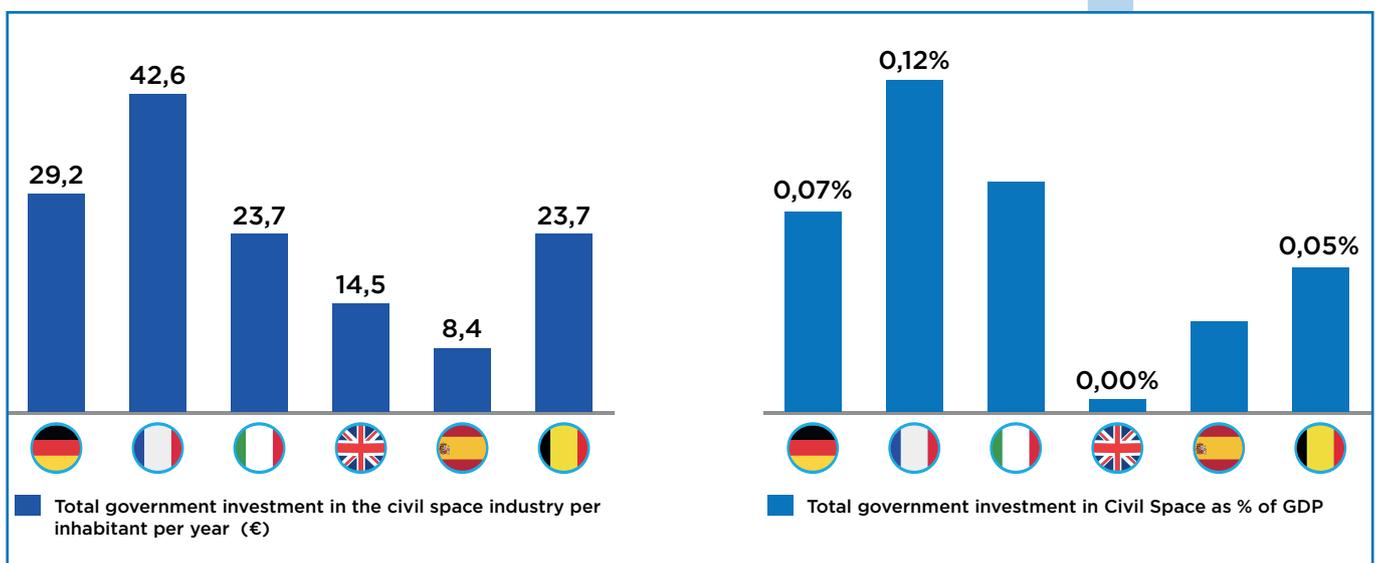


At present, the European space industry is characterised by a high degree of fragmentation, which is particularly relevant in countries with a smaller contribution to ESA.

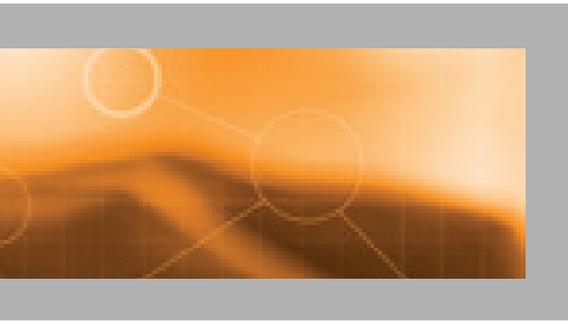
## 2.9. The satellite sector in Spain

**The six largest contributors to the agency (France, Germany, Italy, United Kingdom, Spain, and Belgium) account for 90% of space industry jobs. Spain ranks fifth in investment.**

In figures for 2019, the turnover of the sector in Spain reached 863 million euros, of which 81% corresponds to exports, with 11% dedicated to innovation and representing 0.5% of the industrial GDP.



As shown in the table above, Spain is the country that invests the least public funds per inhabitant/year (8.4 euros) and per percentage of GDP (0.032%).



In the ecosystem of satellite communications in Spain we can distinguish, broadly speaking, two agents:

**1. Satellite operators.** Spain has two satellite operators, HISPA-SAT and HISDESAT. They have generated a return to our industry valued at more than 1,000 million euros and guarantee national sovereignty in civil and military government communications services provided through this type of infrastructure.

**2. Manufacturing industry.** The positioning of Spanish industry is very relevant; in the last twenty years it has tripled both turnover and direct employment. The technological layer acquired by our companies over the last 10 years has meant that they have gone from merely supplying equipment to integrating complete systems and leading missions. It is expected to reach 11.4 billion euros by 2022, and the commercial market is expected to grow by 16%<sup>[1]</sup>.



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<sup>[1]</sup>Reference: Spanish Space Industry Sectorial Agenda 2019



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134:23

Business  
Business  
concept  
Solution



03

Diagnosis

## 3.1. Strengths

Spain has solid pillars on which to build the new connectivity policy and must therefore take advantage of this to strengthen its advanced international position in digital connectivity and infrastructure:

- ✔ **Organisations prepared for broadband deployment.** The different players in the telecom industry have accumulated extensive experience in the deployment of fibre optic networks and layouts and other physical and digital network infrastructures, creating organisations that are well prepared to deal with investments quickly, even in areas where the terrain is difficult.
- ✔ **Investment-friendly regulations.** The Spanish regulatory framework in the telecom field has enabled and facilitated investments by operators in broadband networks. The regulation of common telecom infrastructures and the incorporation into the Law of coordination mechanisms between the different levels of public administration have boosted the large deployment of broadband networks in Spain.
- ✔ **Large supplier ecosystem.** Operators have created a highly specialised supplier ecosystem around network deployment. The main equipment manufacturers are based and present in Spain and the service contractors cover the various aspects related to the extension of the telecom network.
- ✔ **A bridge between continental markets of global connectivity.** Spain has interconnection points with four continents directly. This fact, together with the very high connectivity and security capacities of the networks in Spain, its capillarity and agility in expansion, its capacity to generate electrical energy free of emissions and from renewable sources, and the privileged geographical positioning of the Iberian Peninsula, make Spain a firm candidate to become the digital gateway to Europe, Africa and America, thus attracting the large suppliers of data infrastructures and global interconnection to settle in the national territory.



## 3.2. Weaknesses

**Despite its strengths, there are still certain barriers that may hinder the proper design of public policies for the improvement of connectivity and digital infrastructures:**

- ⊕ **Progressive increase in cost network deployments in under covered areas.** Coverage of areas that do not have adequate broadband availability is costly - often due to the terrain - and unprofitable, not only in terms of initial investment. The lack of commercial attractiveness of less populated areas has been compensated by public support programs, but the models used so far may be insufficient to mobilise investment from operators in the remaining areas that are still insufficiently connected.
- ⊕ **Little commercial attraction of the less connected areas.** The incentive programs used so far are beginning to show signs of running out of steam and may be insufficient to mobilise investment by operators in residual areas not yet connected.
- ⊕ **Incomplete information for public decision-making.** There are many new sources of information that should be incorporated into the decision-making process when formulating public policy. At the same time, information systems are not sufficiently developed to make full use of the information available and need further development. Therefore, to identify areas with deficient coverage, focus and prioritise public aid and facilitate private investment by operators, it is necessary to add and process new information in public information systems, as well as to incorporate Big Data and Artificial Intelligence technologies to meet the needs for efficient policies and improve the information provided on connectivity for citizens and businesses.
- ⊕ **Weakness in the demand for digital services.** Low operating revenues due to low population density and low adoption by the population make it unprofitable to deploy networks and



provide services in certain rural areas.

**Therefore, this Plan must be a commitment to maintaining Spain's advantageous position in terms of digital connectivity and infrastructure.** To this end, it will be necessary to build a new model of aid and incentives as an evolution of the historical aid programs for improving connectivity. These programs have been a success for Spain and a reference model at international level but are beginning to show signs of exhaustion. It is therefore necessary to refocus public policies and instruments as to definitively close the residential and business digital gaps, accelerate the deployment of ultra-fast networks, and attract new global players to Spain in terms of creating data infrastructures and transcontinental interconnection and its ecosystem.

**The exploration of new models of public-private collaboration, the design of new measures to improve connectivity and the weaknesses of the system itself will introduce risks into The Digital Connectivity and Infrastructures Plan equation:**

❖ **Lack of profitability and commercial interest of private agents.**

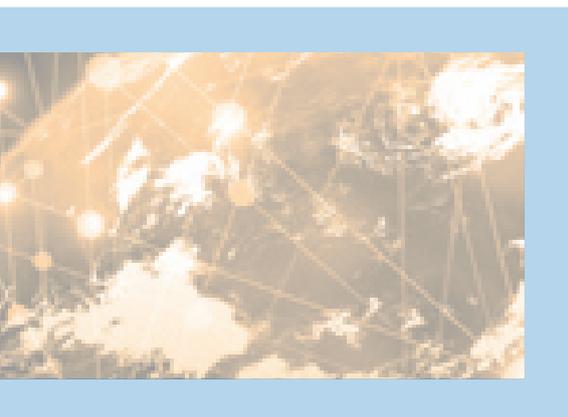
Although operators have always responded to calls for aid, and although the volume of public resources needed to make the areas commercially interesting could be very high, there is no guarantee that new public aid will make the areas not yet sufficiently covered attractive. For this reason, to achieve the objectives defined in the Plan, in addition to investment it will be necessary to explore new models of public-private partnership.

❖ **Administrative and bureaucratic obstacles.** The refocusing of public aid on the empty Spain and the gaps in coverage and the business segment will make it necessary to strengthen coordination with the Autonomous Communities and local bodies to reduce deployment times by eliminating administrative barriers, simplifying the obtaining of permits, speeding up the granting of building, use and passage licences, etc. in accor-

## 3.3. Threats



## 3.4. Opportunities



dance with current national, regional, and municipal legislation.

- ❖ **Insufficient information systems and bureaucracy in budget management.** Current information on white areas is insufficient. It is necessary to go down to a higher level of granularity and accuracy. These developments in information systems will require collaboration between different actors and a sufficient period of maturation. Likewise, the regulations and budgetary management systems at both European and national level may slow down the implementation of the Plan's actions.

- ❖ **The push from other countries to attract data infrastructures.** Spain is emerging as a pole of attraction for data infrastructure in terms of centres and interconnection between underwater cable moorings. But we must not lose sight of the fact that Spanish cities are in clear competition with other European cities such as Lisbon or Marseilles in the global race to attract investment and talent in hyper scalable data centres and cloud business.

**These risks will be mitigated through dialogue and joint work with all the agents involved in The Digital Connectivity and Infrastructures Plan.** The governance of the Plan is designed to generate flows of information and collaboration with all interested agents, both public and private. The organization will be supported by working groups where management proposals and investment decisions will be shared with all of them to guarantee efficiency and effectiveness and make the disbursement of resources more fluid.

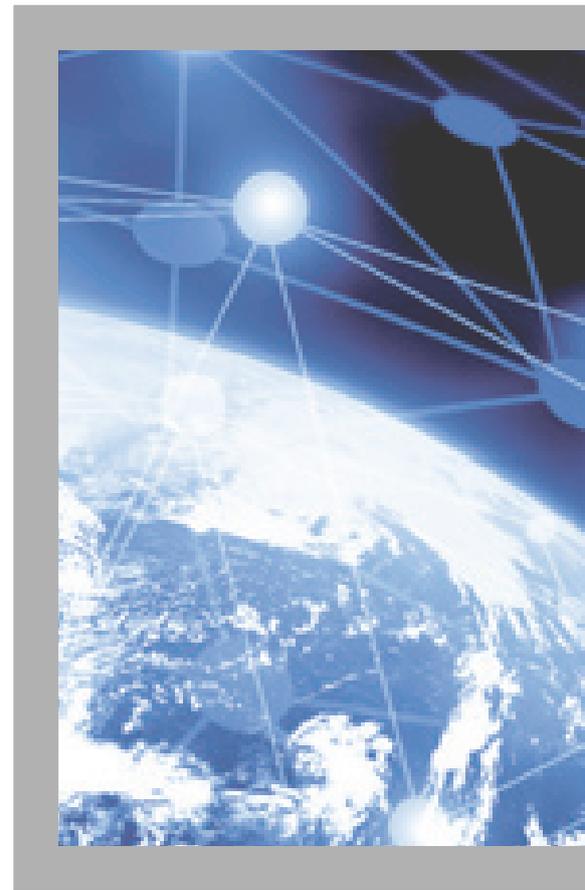
The need for new connectivity capacity is growing, so in addition to closing the gaps, it is necessary for networks to evolve to meet future requirements, so that the latest generation networks are not a bottleneck for the digital transformation process of Spanish society and economy:

- ❖ **Completing the deployment of residential broadband.** There is a growing awareness of the need for broadband connectivity with sufficient quality whether fixed or mobile, having become practically an essential commodity for families, comparable to water or electricity supply. The General Secretariat for the Demographic Challenge, the Autonomous Communities and the Autonomous Regions can collaborate to detect disconnected areas and contribute to surgical actions to eliminate these identified white areas.

- ❖ **Addressing the specific connectivity needs of the business sector.** Until now, public support for broadband unbundling has prioritised investment in the residential segment. Now is the time to boost investment in business connectivity in order to reactivate the economy and reach a level of digital transformation of the productive sector that really has an impact on the economic growth model. To this end, it is urgent to complete deployments with characteristics appropriate to each activity (from ultra-connectivity for Industry 4.0, to the wireless con-

nectivity required for sensor-driven devices in agricultural and livestock areas, as well as coverage of the territory) in areas of high business concentration where there is still no connectivity or digital infrastructure with the necessary characteristics.

- ✔ To turn Spain into an international reference platform for digital infrastructures. Attracting investment in digital infrastructures is essential to exploit Spain's great potential as a cross-border infrastructure hub in southern Europe.
- ✔ To contribute to the ecological transition and sustainability thanks to the use of more sustainable technologies. Digitisation must be firmly committed to climate objectives. The use of more sustainable technologies in the equipment of digital infrastructures (for example, through the use of energy-neutral technology or the increase in the use of renewable energies) is a basic contribution to this transition, which will in turn be added to the environmental improvements that the use of digital services can bring about: reduction of physical travel, dematerialisation of the economy, improvements in energy efficiency provided by home automation within buildings and homes, etc. Likewise, within the framework of the National Integrated Energy and Climate Plan, the energy transition process involves increasing the electrification of the various sectors of the economy. One of the fundamental pillars of the energy transition is the digitalisation of the electricity networks, as a key factor contributing to the deployment and penetration of renewable energies, the promotion of electrical mobility or the encouragement of self-consumption and distributed generation.



Internal Analysis		External analysis	
<b>WEAKNESSES</b>	<ul style="list-style-type: none"> <li>✔ Progressive increase in cost of deployments in less connected areas</li> <li>✔ Low commercial attractiveness of less connected areas</li> <li>✔ Incomplete information for public decision-making</li> <li>✔ Weak demand for digital services</li> </ul> 	<b>THREATS</b>	<ul style="list-style-type: none"> <li>✔ Lack of profitability and commercial interest of private agents</li> <li>✔ Administrative and bureaucratic obstacles</li> <li>✔ Insufficient information systems and bureaucracy in budget management</li> <li>✔ Push from other countries in attracting data infrastructure</li> </ul> 
<b>STRENGTHS</b>	<ul style="list-style-type: none"> <li>✔ Organisations ready for broadband deployment</li> <li>✔ ment-friendly regulations</li> <li>✔ Wide supplier ecosystem</li> <li>✔ Bridge between continental markets of global connectivity</li> </ul> 	<b>OPPORTUNITIES</b>	<ul style="list-style-type: none"> <li>✔ Completing residential broadband deployment</li> <li>✔ Addressing the connectivity needs of businesses</li> <li>✔ Turning Spain into an international benchmark platform for digital infrastructure</li> <li>✔ Contributing to ecological transition and sustainability</li> </ul> 

Chart 15: SWOT Analysis



# 04

Vision and  
objectives

The **Digital Connectivity and Infrastructures Plan** aims to lay the foundations so that in the next decade the telecommunications infrastructures in Spain will have the availability, capacity, and resilience to favour social and economic development in any geographical area and in the conditions necessary for universal and inclusive access.

**The Plan will act as an element of social cohesion and sustainability.** It will facilitate the population's access to essential public services at a distance, both to socio-health and educational services, as well as to other essential services, and will make it possible to eliminate digital divides that may be caused by the lack of broadband connectivity for social, economic, territorial or gender reasons.

**The Plan will contribute to achieving sustainable and robust economic growth.** The availability of adequate connectivity for the different economic activities and ultra-connectivity in the case of traction projects will be the necessary basis for the digital transformation of productive activities and thus enhance the increase in their productivity and competitiveness.

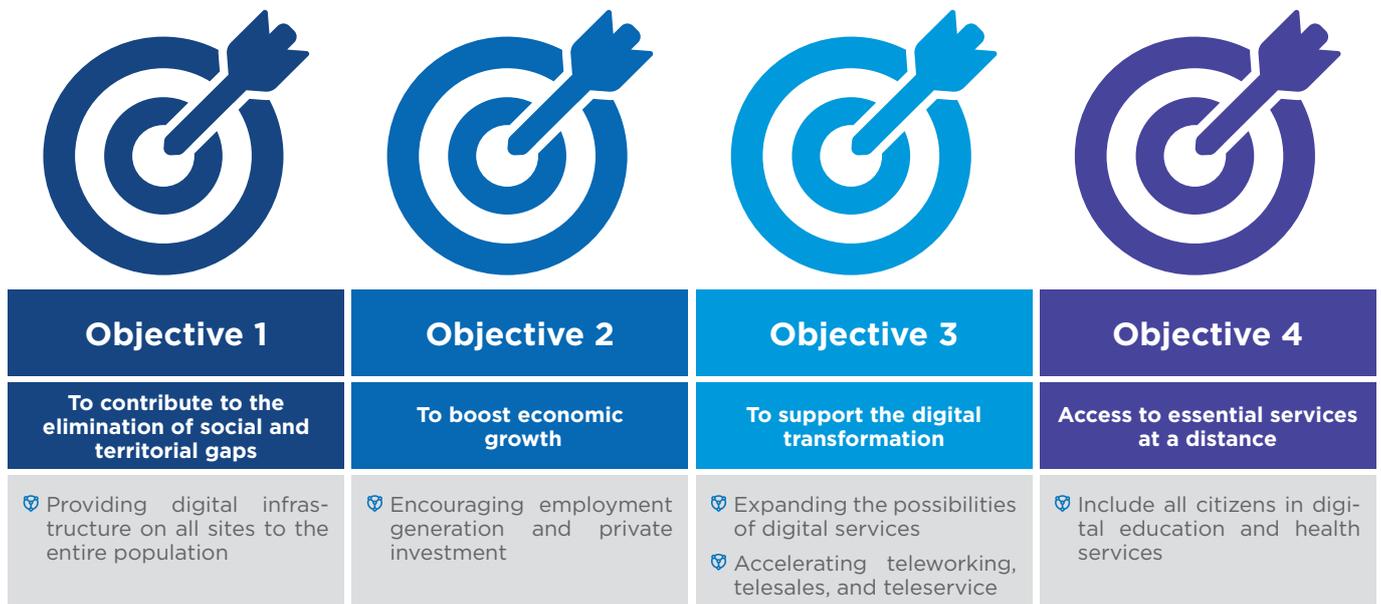


Chart 16: Objectives of the Connectivity Plan



Therefore, the main objectives of the Plan are aimed at promoting social and territorial structuring, increasing productivity and economic growth, and developing activity and improving the competitiveness of the Spanish economy through the digital transformation.

The sum of these objectives will also lead to an improvement in the well-being of citizens, as described below:

### **Objective 1: To contribute to the elimination of territorial and social gaps**

Private and public initiatives in recent years in Spain have made efforts to generate fixed capillary and quality networks (NGA), mainly FTTH<sup>49</sup>. This has enabled a large part of the population to have the necessary connectivity to access digital services in activities such as teleworking, tele-education, e-government, or remote financial services.

However, this reality coexists with some shortcomings for a relevant part of Spanish society that lives or works in sparsely populated areas where these NGA networks have not yet reached. Currently, 46.4% of the rural population in Spain has access to optical fibre. This puts us well ahead not only of the European average, but also of countries such as Germany, France and Italy or the United Kingdom. However, there is still 50% of the rural population that does not yet have access to 100 Mbps networks.

Moreover, a high proportion of people in vulnerable groups do not have sufficient income to buy broadband and equipment capable of supporting the most advanced digital services.

No less importance should be attached to the gender gap in the technological field, a gap that has been widening in recent years and which may deepen the occupational segregation of women in a key sector for undertaking the transformation of the productive model. It is necessary to support the elimination of this digital gender gap in large cities, but it will be particularly important to have an impact in the rural area, as the data shown in the reports are particularly worrying in this case.

Adequate connectivity that is accessible to all regardless of geographic location or social or gender status can significantly contribute to breaking down these social and territorial imbalances.

🔗 In this sense, The Digital Connectivity and Infrastructures Plan aims to tackle these social imbalances in a forceful way, putting all available means at their disposal and facilitating the affordability of these services by the most vulnerable groups, either from a social point of view or to promote the economic sustainability of self-employed workers and micro-SMEs in their digital transformation.

<sup>49</sup>FTTH or Fiber To The Home. This is the most capillary version of optical fibre networks as they bring the access of a new generation network to the end user's home.



## Objective 2: Boosting economic growth

Public investment in improving connectivity will accelerate economic growth through a variety of channels:

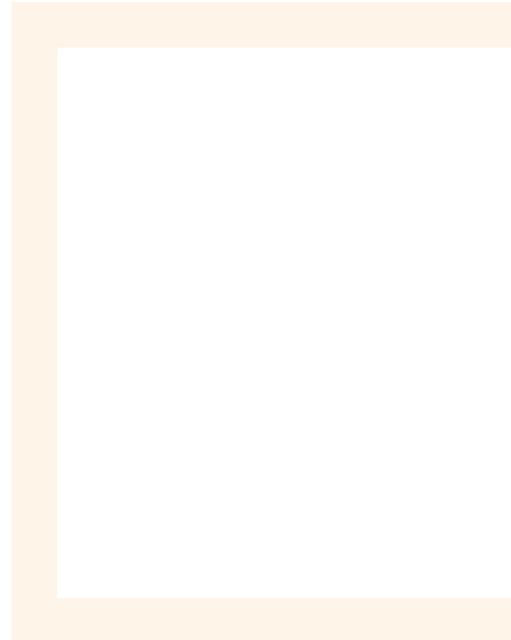
- ✔ **Directly**, because the very development of digital infrastructures will mobilise a significant volume of public and private investment. It is estimated that The Digital Connectivity and Infrastructures Plan, together with the Strategy for the Promotion of 5G Technology, will mobilise private investment of 24,000 million euros. It will also have a positive impact on employment generation: the European Commission maintains that 80% of the costs of deploying broadband networks correspond to civil works, one of the most employment-intensive economic activities and that it will spread its effects throughout the territory.
- ✔ **Indirectly**, since the extension of state-of-the-art networks (NGA) improves the competitiveness of the economy and increases digital activity. World Bank studies show that an increase of 10 points in broadband penetration represents an increase of 1.21% in GDP. It is estimated that the measures in the Plan for Connectivity and Digital Infrastructures will help increase the number of users benefiting from digital services by 30% and that 30% of SMEs will benefit from the measures.

## Objective 3: Supporting the digital transformation of economic activities

Public support for connectivity will complement the programmes to promote digitisation and will place particular emphasis on the key projects defined in the Digital Strategy 2025.

- ✔ The extension of digital networks and infrastructures is the essential vehicle for making digitisation possible. Furthermore, they expand the possibilities for companies of all sectors and sizes that offer digital services such as the cloud, Artificial Intelligence, big data, etc., accelerating the implementation of new relationship models such as teleworking, telesales or telecare.

In addition, support to the sector will be further increased with a view to the future development of connectivity services, especially in the field of cross-border infrastructures (Digital Connectivity Hub) and Cloud and Satellite IPCEIs (Important Projects of Common European Interest).





#### **Objective 4: Public access to essential services at a distance**

The Demographic Challenge requires facilitating access to essential services throughout the territory, thus helping to fix the population. The situation of social distancing and the need to make intensive use of tools such as tele-education or tele-working has meant that the objective of social and territorial cohesion achieved through generalised access to essential public services has become an urgently needed measure.

- Part of the population could benefit greatly from the use of digital services (chronic disease management, eBanking services, eGovernment services, etc.), but this is prevented by a lack of knowledge and financial resources. It is necessary to help these people to benefit from digital technologies.
- Remote access to essential public services is a necessity in the most remote and depopulated areas of the country and a way of fixing the population in the territory. In order not to leave anyone behind, it is necessary to support the deployment of higher bandwidth networks, both fixed and wireless, also in rural areas. Only in this way will all citizens, regardless of their location, be able to access services that are more demanding than simple web browsing, such as education or digital health platforms.

**Therefore, the Plan for Connectivity and Digital Infrastructures will give priority to meeting the new connectivity needs of essential public services, so that citizens can enjoy the benefits of services such as distance education and health.**





05

Action lines  
and goals

**The Digital Connectivity and Infrastructures Plan evolves the traditional programs for supporting the deployment of digital and telecom networks and infrastructures by introducing a new, more complete and comprehensive model that simultaneously addresses the challenges of connectivity from different angles, in order to obtain rapid and conclusive results.**

**Public investments in connectivity will not be limited to the re-enforcement of telecommunication networks.** They will be complemented by initiatives and programs aimed at strengthening and ensuring that users take advantage of them, with measures to facilitate access by citizens and businesses to programs that enhance their digital capabilities.

**The objective of massively gaining connectivity coexists with that of selectively gaining connectivity.** To this end, a policy that focuses on supporting initiatives linked to strategic centres and with a high social and economic impact, while at the same time dealing with the development of less populated territories, is being pursued.

The actions of the Plan will be carried out in collaboration with all the necessary agents:

- ⊕ Specifically, with the Ministries co-responsible for the policies involved (especially those of Ecological Transition and Demographic Challenge, Agriculture or Industry and Trade), as well as the territorial administrations at all levels, from the Autonomous Communities to the Local Authorities. To this end, special attention will be paid to the coordination and governance mechanisms necessary to have the collaboration of all the agents involved in forums such as the Consultative Council on Digital Transformation or the corresponding Sectoral Conference.
- ⊕ For the implementation of the measures of the Plan, a special effort will be made to maximize the collaboration of all companies and all available technologies, so that in each case the appropriate technological tools are applied, without initial restrictions, from the satellite, through the mobile networks to the optical fibre.
- ⊕ And to encourage the active participation of the greatest possible number of interested agents in this collective effort, the Plan contains measures to ensure that agents have complete, up-to-date and quality information for decision-making.



The Plan develops measures grouped into five lines of action, three vertical and two transversal lines:

### **1. Vertical axis of Broadband extension to favour territorial structuring**

- ⊕ Measure 1: Connectivity for all.
- ⊕ Measure 2: Strengthening connectivity in reference centres and essential services.
- ⊕ Measure 3: Improvement of connectivity in urban centres.
- ⊕ Measure 4: Connectivity vouchers for vulnerable groups
- ⊕ Measure 5: Extension of broadband coverage in mobility of 30 Mbps

### **2. Vertical axis of Connectivity for business**

- ⊕ Measure 6: Actions to strengthen connectivity in industrial parks and logistics centres.
- ⊕ Measure 7: Gigabit actions to strengthen connectivity associated with sectoral digitization projects.
- ⊕ Measure 8: Connectivity vouchers for small and medium enterprises.



### 3. Vertical axis Spain Data hub

- ⊕ **Measure 9:** Favourable energy scheme for Cross-Border Digital Infrastructures.
- ⊕ **Measure 10:** Improving the connectivity of cross-border digital infrastructure.
- ⊕ **Measure 11:** Participation in IPCEI projects of Cross-border Digital Infrastructures: Cloud and satellites.

### 4. Transversal axis of Regulatory reforms and Information Systems

- ⊕ **Measure 12:** New General Law on Telecommunications and adaptation of the set of connectivity instruments.
- ⊕ **Measure 13:** Renewal of public information systems.

### 5. Transversal axis of infrastructure improvement

- ⊕ **Measure 14:** Improvement of telecommunications infrastructure in buildings
- ⊕ **Measure 15:** Support for energy efficiency





**Chart 17: Action Lines**

As a result of the development of the “The Digital Infrastructures and Connectivity plan for society, economy and the territories”, the following goals are expected to be achieved in 2025 in each of the strategic axes.



Main point	Associated goal
<b>Broadband extension to favour territorial structuring</b>	100% of the population with 100 Mbps coverage in 2025
	100% 30 Mbps mobile broadband coverage by 2023
<b>Business Connectivity</b>	100% of industrial parks with scalable connection to Gigabit in 2025
<b>Spain Data Hub</b>	30% increase in current installed IT power by 2025 due to new and expansion of existing digital infrastructure
<b>Regulatory Reform and Information Systems</b>	Approval of new General Telecommunications Law in 2021
	Operational Connectivity Map, providing complete and friendly information to know the availability of the broadband connectivity services in each area of the Spanish territory

### Measure 1: Connectivity for all

The aim of this measure is to deepen the coverage of ultra-fast broadband access networks in areas where there is a lack of it, to reach 100% of the population with 100 Mbps coverage.

To this end, regulatory policies will be developed to facilitate the deployment of networks in less densely populated areas, public support programs for the deployment of networks will be defined, and the use of existing infrastructures - telecom, electricity transport or other passive infrastructures - will be promoted, using any available technologies capable of facilitating the fulfilment of the defined objective, including radio access or satellite technologies.

Funding will also be promoted for deployment projects that eliminate existing bottlenecks in areas adjacent to localities with available NGA coverage, but with problems related to non-existent or insufficient transmission or backhaul networks.

## 5.1. Vertical axis: Broadband extension to favour territorial structuring





## Measure 2: Strengthening connectivity in reference centres and essential services

Connectivity, understood in a broad sense, allows access to essential education, health services and trade in goods and services from any area and particularly from rural areas by telematic means. Over the past few years, it has become clear that fibre deployments to the home in low population areas are not sufficiently effective and are not sufficient in themselves to meet the needs of vulnerable populations who, for lack of means or digital skills, are unable to access the digital world on their own.

To guarantee access to essential services for these groups, complementary measures are needed to provide sufficient and appropriate connectivity resources, both for reference centres at local, regional or provincial level (educational, socio-health, etc.), and to provide the most vulnerable groups with the necessary means to access them.

**Actions will be carried out to strengthen the connectivity and equipment of centres that allow access to essential, care and social services such as hospitals, health centres, training centres and other reference centres in each geographical area.** In coordination with the **networks of telecentres and digital training centres in Spain, as well as** with other programs belonging to the government's global action on digitalisation, these projects will be encouraged to be accompanied by aid for training and equipment to enable users to make the most of the advantages of digitalisation.

## Measure 3: Improving connectivity in urban centres

In some urban centres, especially those with culturally rich buildings, the protection and preservation of historical heritage must be reconciled with the social and economic interest in speeding up the deployment of telecommunications networks. The existence of obsolete lines can generate the paradox that there are areas without NGA connectivity in the middle of already connected cities, which prevents access to high-capacity networks in those areas.

These centres are also often commercial areas and centres of tertiary sector activity, such as traditional commerce, which risk becoming disconnected and unable to survive in an environment of digital competition.

**Support will be given to initiatives that help to find balanced solutions between the obligation to facilitate the deployment of broadband networks and the minimisation of the urban impact,** through public intervention using instruments that enable private initiative to find incentives to also connect these islands in the heart connected cities.

## Measure 4: Connectivity vouchers for vulnerable groups

The Connected Schools Program, as well as the reinforcement of the Re- dIRIS-NOVA<sup>50</sup>, cover the objective of providing connectivity to educational centres, respectively, in the cycle of compulsory education and in university education.

However, the need to generalise distance education for health reasons has highlighted the risk of exclusion of certain families with school-age children and, therefore, the need to meet the connectivity needs of students in their homes, both in terms of coverage and financial accessibility.

**To alleviate this situation, the Educa en Digital program developed as part of the Digital Spain 2025 strategy will be complemented with digital vouchers that will facilitate connectivity on a temporary basis for schoolchildren or students in the university environment in those cases where it is necessary.** The digital voucher will cover a broadband connection package with the most appropriate technology in each case.

Depending on social and geographical circumstances, the voucher may include additional support for the purchase of the necessary equipment for tele-training designed in collaboration with other public bodies.

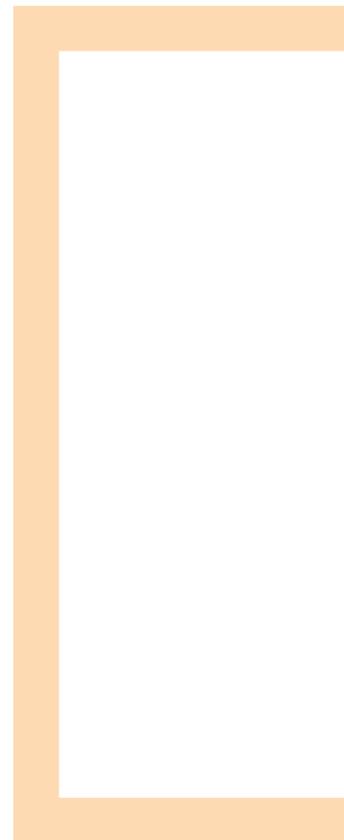
In addition, another model of vouchers will be identified that can guarantee access and connectivity for other vulnerable groups of users or consumers beyond the educational sphere.

## Measure 5: Extension of 30 Mbps mobile broadband coverage

The plan to provide coverage to enable access to broadband services at speeds of 30 Mbps or higher implemented by operators holding concessions of goods in the public domain in the 800 Mhz band (Plan 800), has not only facilitated the extension of broadband coverage in rural areas. Its technological nature, based on 4G LTE, has also enabled an extension of coverage of this technology in a high percentage of population entities with less than 5,000 inhabitants. It is estimated, however, that there are still around 800,000 inhabitants with insufficient 30 Mbps mobile broadband coverage.

On a transitional basis, while the objective of 100% speed coverage at 100 Mbps is being achieved, the extension of 30 Mbps coverage by wireless means (4G, satellite, etc.) will be promoted so that the population of these territories can have a broadband service as soon as possible.

Within The Digital Connectivity and Infrastructures Plan, actions will be taken to improve this coverage in those areas with deficiencies in the characteristics of connectivity that prevent normal access to broadband services.



<sup>50</sup>RedIRIS-NOVA is RedIRIS' high-capacity optical network, which connects the regional networks of all the autonomous communities and the main research centres in Spain with the rest of the international academic networks and in particular the Portuguese academic and research networks FCCN and the European GÉANT research network.

## 5.2. Vertical axis: Connectivity for business

### **Measure 6: Actions to strengthen connectivity in industrial parks and logistics centres**

Among the points with room for improvement in the deployment of network infrastructure are some industrial and logistics centres. It is estimated that there are more than six thousand such areas in Spain<sup>51</sup>. These are points with a high business concentration, where a significant number of them do not have adequate broadband connectivity, even though some of them are very close to urban areas covered by networks with NGA access.

The same applies to areas in the territory, sometimes in rural environments, which because of the activity they carry out may require access to networks with higher speeds and special characteristics.

**To this end, funding will be provided to improve the digital infrastructure in these industrial and logistical areas according to their needs and in collaboration with the relevant agents, both in the public and private spheres.**

The deployment of network infrastructure will be promoted in those industrial parks and logistics centres that still have problems with access to broadband. Collaboration with the Autonomous Regions will be essential for the detection of these areas, as well as for identifying emerging areas of business concentration in order to be able to plan future network deployments and anticipate the need for new digital infrastructures.

### **Measure 7: Gigabit actions to strengthen connectivity linked to sectoral digitisation projects**

Extending 1 Gigabit connectivity to the socio-economic drivers is one of the major objectives of telecom policy in Europe. The European Commission has set a deadline of 2025 for this objective to be achieved.

**Therefore, within the measures designed, special attention will be paid to ultra-connectivity in the country's socio-economic engines and areas of high capacity demand (technology islands):** industry, data centres, agro-industry, research centres, transport nodes, logistics centres or data-intensive companies, with the aim that connections to very high capacity networks and services will help to improve their competitiveness and that of their environment.

In the capture and identification of projects in the economical engines, collaboration with the sectoral public entities responsible for the digitisation programs will be essential. Joint communication campaigns will be launched with all of them to publicise the possibilities of financing pilot projects with very high capacity technologies (VHC).

<sup>51</sup>Information from the Spanish Coordinator of Industrial Estates, CEPE

This measure will also target data centres located in Spain, especially those in disadvantaged areas where they can serve as a driving force for economic activity.

## **The impact of connectivity on the driving sectors of the economy**

**Connectivity is the engine of digitisation. In the midst of the digital transformation, the most relevant sectors of the Spanish economy are adapting their organisations and technologies to take advantage of the digital economy.**

### **⊕ The case of the retail trade**

In recent years, the proportion of digital purchases to total purchases has grown exponentially. This change in consumer habits has had a very severe impact on the sales of the more traditional trade, which bases its business model exclusively on presence through commercial stores.

The capacity of small businesses to react to the digitalisation of demand is very limited. They are companies with little capacity to deal with investments and difficulties with the skills required by digitalisation, especially for small businesses in rural areas and for street commerce.

At the other extreme, companies in the sector that have been able to react and adapt to demand trends are registering a notable growth in their sales, even reaching international markets.

The reinforcement of connectivity in the retail sector is essential both to close the digital divide of small businesses, which still exploit premises without traditional digital connections, and to support the struggle for leadership of companies with digital organisations, which make large databases profitable using the latest artificial intelligence technologies.

### **⊕ The case of digital agro-industry**

**Precision agriculture brings the benefits of data capture and processing technologies to farms.** Relevant raw information is uploaded to the cloud through mobility applications, sensors and drones, where algorithms and artificial intelligence assist farmers in their decision making.

Farms are often located in areas not yet reached by broadband and need significant investment to develop the infrastructure to enable rural entrepreneurs to take advantage of the benefits introduced by precision farming.





In addition, the comprehensive digitalisation of the agri-food industry, which processes rural products, will improve the link between the consumer and the producer by reinforcing product traceability, food safety and quality and consumer information, as well as measuring and controlling environmental impacts.

#### ⊕ **The case of the tourism industry**

The evolution of the tourism industry in recent years at a global level has been marked by the irruption in the market of large operators and digital tourism intermediary platforms (online travel agencies, meta-search engines, holiday accommodation rental platforms, etc.), which has forced the more traditional companies and tour operators to adapt to the new digital environment and its new rules of the game.

The general guidelines for the development of a Sustainable Tourism Strategy for Spain 2030, establish among its lines of action “to deploy a digital strategy for the tourism sector”, proposing to promote the full use of technological capacities and accelerate the digital transformation of the sector, with the aim of narrowing the digital divide, especially among tourism SMEs, in order to adapt to the demands of the connected tourist.

The tourism sector considers it essential to promote investment in technological solutions that improve the tourist’s experience during their travels (during their stay in the accommodation, in the activities at the destination, in the catering, in transport, etc.). For the tourism SME, improving processes and daily operations, having access to valuable information about clients and the market, having faster networks and infrastructures and obtaining greater economic and sustainable profitability are, in short, the main motivations of the sector.

#### **Measure 8: Connectivity vouchers for small and medium enterprises**

In parallel to what is happening with citizens, it is necessary to encourage the increased adoption of digital solutions by businesses, particularly in the field of small and medium-sized enterprises, which are the most behind in the digital transformation process.

**To this end, a program will be activated to provide digital connectivity vouchers to finance investments and expenses derived from connectivity for small and medium enterprises participating in public programs to promote their digitalisation.** These vouchers will have a limited duration and will aim to enable companies to reap the productivity gains offered by new technologies.

At a time when digitalisation is becoming particularly important for the continuity of business activity, the connectivity voucher will help companies that are lagging behind to take advantage of the benefits that digitalisation puts within their reach, such as the option of teleworking and maintaining open communication with clients and suppliers in a context of global digital competition.

### Measure 9: Favourable Energy Plan for Green Cross-border Digital Infrastructures

The high energy consumption of digital networks and infrastructures makes these facilities ideal candidates for actions to promote the adoption of energy efficiency measures and the evolution towards carbon neutral technologies. Therefore, measures will be developed to encourage the use of this type of energy. The use of instruments aimed at promoting the use of renewable energies among digital infrastructures with high energy consumption will be promoted through support programs, including “Bilateral Renewable Energy Contracts” (PPA, Power Purchase Agreement), “Energy Performance Contracts” (EPC) and self-consumption of renewable energy.

**Furthermore, in collaboration with the competent territorial authorities, work will be done to develop an appropriate legal and administrative framework for the consideration of high-impact digital infrastructures of and economic interest as projects of public interest.** In this way, it is intended to achieve their inclusion in the instruments of land use planning and energy and urban planning with the necessary provisions, either by their constructive considerations or electricity consumption or communication and interconnection needs.

The adoption of this measure will generate an increase in predictability, and will favour the reduction of information search and bureaucratic costs for investors, while guaranteeing energy, hydrological and environmental sustainability<sup>52</sup>.

### Measure 10: Improving the connectivity of Cross-border Digital Infrastructures

**The participation of Spanish companies in consortia of companies will be promoted and supported in order to participate in the financing program for transnational interconnections of data infrastructures and submarine cable of the Connecting Europe Facility (CEF-2).**

In the context of CEF-2, measures will be designed to promote the interconnection of data infrastructures in the field of computing. In line with the cross-border nature of CEF-2, collaborative frameworks will be developed to pool capacities and strengths with other Member States, in order to attract in- and infrastructures together. In particular, synergies in this area are particularly favourable among the countries of the Iberian Peninsula, as stated in the Joint Declaration of the 31<sup>st</sup> Spanish-Portuguese Summit held on 10 October 2020<sup>53</sup>.

In addition, it is necessary to promote the incorporation of Spain into alternative global interconnection routes, promoting Spanish participation in international consortiums that derive in the mooring in Spain of new submarine cables.

### Measure 11: Participation in IPCEI Cross-border Digital Infrastructure projects: Cloud and satellites

The Spanish cross-border digital infrastructure industry will be promoted during the years 2021 to 2025 through various calls for aid. The aim of the aid will be to support investment and development in testing equipment and new technologies, services and materials in the field of Cross-border Digital Infrastructures. The aim is to promote innovation and entrepreneurship and to enable the establishment of an industrial and maintenance base of faci-

## 5.3. Vertical axis: Spain data Hub



<sup>52</sup>The concentration and development of data centres can create a problem of resource sustainability. <https://data-economy.com/amsterdam-presses-pause-button-on-the-building-of-new-data-centres-in-the-city>

<sup>53</sup>See: [https://www.lamoncloa.gob.es/presidente/actividades/Documents/2020/Declaracio%CC%8In\\_XXXI\\_Cumbre\\_Hispano\\_portuguesa.pdf](https://www.lamoncloa.gob.es/presidente/actividades/Documents/2020/Declaracio%CC%8In_XXXI_Cumbre_Hispano_portuguesa.pdf)

lities linked to Data Infrastructures, establishing a basis for cooperation with other Member States from a strong and reinforced position.

Thematic focuses of interest will be identified for the development of Data Infrastructure infrastructures and services, such as: energy efficiency, cogeneration and district heating solutions<sup>54</sup>, edge computing, prefabricated data centres, cyber security, etc.

**Spain will promote the development of and participation in various Important Projects of Common European Interest (IPCEI) which will be implemented in the period 2021-2027, among others:**

- ⊕ **Cloud Industrial Alliance.** The aim is to promote the development of a competitive, secure, reliable and sustainable end-to-end data processing supply, distributed in the EU, suitable for adapting to a multi-vendor environment. Implementation of the European Commission's European Cloud Federation initiative.
- ⊕ **Satellite system for secure communications.** A system of secure multi-orbital connectivity, which would complete the EU's space peace, guaranteeing its digital and technological sovereignty in terms of connectivity.

## 5.4. Transversal axis: Regulatory reforms and Information Systems

**Measure 12: New General Law on Telecommunications**  
A new General Law on Telecommunications will be developed, transposing Directive 2018/1972 of the European Code of Electronic Communications, and promoting its regulatory development.

As noted, the main objective of the Connectivity and Digital Infrastructure Plan is to ensure that no person, business, or territory in Spain without access to adequate connectivity. The current law already contains a precise mechanism for coordination between the different levels of public administration, which respects the distribution of competences and has favoured investments that have placed Spain in the leading positions in the countries with the greatest availability of fibre networks in the world. In addition, the adaptation of the authorisation mechanisms for telecommunications network installation projects at territorial level to the principles of good regulation has also contributed to this collective success. However, it is necessary to continue developing these instruments provided for in the Act so that they can deploy all their positive effects.

In addition, in the framework of the European Commission Recommendation on Connectivity C(2020) 6270, collaboration will be undertaken with Member States to develop a common approach in the form of a toolkit, containing best practices in the deployment of very high capacity and 5G fixed and mobile networks. Selected practices from Spain will be sent in December 2020, leading to the European Commission proposing a toolkit in March 2021. Measures applicable to Spain will be adopted before the end of 2022.

<sup>54</sup>The Stockholm Data Parks Initiative obliges the data centers to be installed on campuses where the heat generated must be reused". "The digital boiler-The Butte-aux-Cailles swimming pool (Paris 13th arrondissement) is heated at 30% by six digital boilers (computer servers) made by the Grenoble company Stimergy".

### Measure 13: Renewal of public information systems

Public entities that regulate and supervise digital and connectivity infrastructures accumulate a large amount of information. However, available to the public and geo-referenced information on digital infrastructures and coverage levels in Spain is insufficient and not very detailed.

Deficiencies in public information systems have important consequences in the industry, including the following:

- ⊕ Insufficient information is a barrier to a more efficient functioning of the market, since the availability of accessible, relevant, and up-to-date information would contribute to reducing transaction costs (information search costs), both for promoters of investment projects and for end users in the exercise of their rights protected by sectoral legislation.
- ⊕ The absence of a public inventory of third-party fibre networks makes it difficult to optimise costs in digital infrastructure deployments, duplicating existing facilities. From an environmental perspective these duplications also lead to serious inefficiencies.
- ⊕ The level of broadband coverage in the residential segment has grown substantially in recent years. However, it is necessary to complement this effort with consideration of other segments such as public service centres or industrial estates. At present, there is no detailed information on this type of segment to guide the allocation of public resources.
- ⊕ The absence of an advanced system architecture to store connectivity information limits the use of new technologies such as digital mapping or artificial intelligence and generates an inefficient administrative burden.

**Resources will be allocated to finance the necessary technological “leap” in public information systems that takes advantage of available technologies to improve the information offered to relevant agents (companies or citizens) using web technologies, cartography, artificial intelligence, or mobility.**

**A geographic information system (GIS) will be created as an inventory of relevant information.** Given that there are currently many infrastructures that can be used to increase coverage in areas with insufficient connectivity, to facilitate the deployment of telecommunications networks, both administrative procedures and available infrastructures will be identified in this GIS, with the aim of making this information available to interested agents and thus reducing the costs of searching for information.



In this regard, in addition to the networks deployed by telecommunications operators, those deployed by transport or energy infrastructure operators, such as ADIF (Administrador de Infraestructuras Ferroviarias, the Spanish state-owned Railway Infrastructure Management Company) and Red Eléctrica Española (partly state-owned and public limited Spanish corporation which operates the national electricity grid in Spain), can be considered especially relevant due to their location and deployment in low population density areas.

**Support will be given to the implementation of platforms to support massive, immediate, and differentiated dispatches of warnings to the population in emergency or major disaster situations.** The COVID-19 health crisis has highlighted the importance of managing mass notifications to citizens who discriminate by geographical area. The technology already exists, but public support is needed to make this service of public interest fully available.

**Finally, a new Single Information Point will be set up at the disposal of the future investor specialising in digital infrastructures.** In coordination with existing public services specialised in attracting foreign investment, the Single Point will provide the necessary information and assistance to manage all the administrative procedures required by the different local, regional regulations. Particularly, information will be gathered on all the administrative procedures required by the different applicable regulations. The information corresponding to the possible aid lines available or the tenders in progress will also be included. In addition, tools will be provided (guides, specialised consultants, etc.) to guide and accompany the future investor throughout the process of requesting information or carrying out administrative procedures.

## 5.5. Cross-cutting theme: Improving infrastructure

### Action 14: Strengthening connectivity in buildings

One of the aspects that probably explains the differential success of the Spanish case in the rapid deployment of NGA networks is the availability of common infrastructures for telecommunications in buildings. However, this advantage does not unfold in full when buildings are outside the scope of existing regulations (for example, they are pre-normative buildings) or can be diluted if that such infrastructures are inadequately maintained.

Adopting promotional measures for these cases will increase the efficiency of deployments, both in economic terms and in terms of reducing construction times, thus making it easier for digital services to reach users and at the same time contributing to the achievement of town planning objectives such as reducing the visual impact of telecom networks.



**Therefore, the improvement of the equipment that allows to house the telecom infrastructures in buildings and the possibilities of deployment of the NGA networks in a sustainable and respectful way with the urbanistic aspects will be favoured.**

Reinforcing this differential advantage of network deployment in Spain will contribute to generating a positive and immediate impact on employment at local level as a result of the knock-on effect on telecom installation companies.

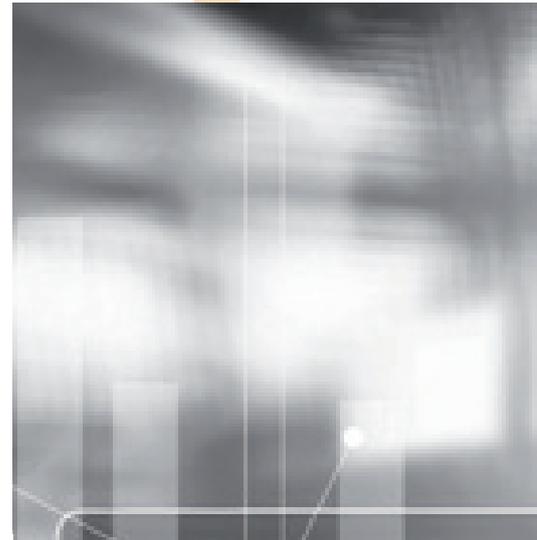
**The development of IoT nodes<sup>55</sup>** of the buildings will be promoted. These components, conceived as a communications infrastructure capable of collecting useful information from a distributed network of sensors and storing the data considered to be of interest, will be particularly valuable in making this information available to cities (smart city platform).

### **Measure 15: Support for energy efficiency**

The contribution of The Digital Connectivity and Infrastructures Plan to the ecological transition and energy efficiency is twofold. On the one hand, the digitisation of buildings and devices can lead to significant energy savings. Thus, the regulations on common telecom infrastructures already foresee home automation actions to favour these processes and the IDAE (Instituto para la Diversificación y Ahorro de la Energía - Institute for Diversification and Saving of Energy) recognizes the potential of home automation for energy efficiency<sup>56</sup>.

On the other hand, the high energy consumption of digital networks and infrastructures makes these installations ideal candidates for actions to promote the adoption of energy efficiency measures and the evolution towards carbon-neutral technologies.

**To this end, aid will be designed to improve the energy efficiency of these infrastructures.** To help this environmental transition, environmental considerations will be incorporated into the granting of other types of aid, such as aid for the installation or renovation of these infrastructures.



<sup>55</sup>Internet of the Things

<sup>56</sup><https://www.idae.es/tecnologias/eficiencia-energetica/edificacion/domotica>



06

Budget

The financial resources of The Digital Connectivity and Infrastructures Plan will come mainly from the European Union's Recovery and Resilience Fund, which considers the connectivity and digitisation of society and economy as one of the two priorities for the reconstruction of Europe in the next 5 years.

The public resources to be mobilised for the Plan for Connectivity and Digital Infrastructures amount to **2.32 billion over five years**. In conjunction with the 5G Technology Promotion Strategy, approximately four billion is expected to be mobilised by the private sector over the five years of the Plan's implementation.



# 07

## Governance

**The Digital Connectivity and Infrastructures Plan is an initiative of the Ministry of Economic Affairs and Digital Transformation, with the State Secretariat for Telecommunications and Digital Infrastructures being the body responsible for implementing and coordinating the measures included in it.**

The State Secretariat will be supported by the Advisory Council for Digital Transformation and the Sectoral Conference, as well as by specific working groups that will be created, within the framework of which actions will be coordinated:

- ✔ **Information exchange.** Relevant information to promote connectivity in the different sectors will circulate from the points where it is generated to the administrative decision-making nucleus.
- ✔ **Communication of opportunities.** It will coordinate initiatives, events, and communication campaigns to publicise the possibilities offered by the Plan for Connectivity and Digital Infrastructures to users of digital services.
- ✔ **Sectorial advice.** A specialised council for the selection of projects and actions related to calls for public aid, with the aim of achieving a greater multiplier effect in each sector.
- ✔ **Evaluation of results.** A results report will be presented periodically. This report will contain a scoreboard combining a series of short and long-term indicators to guide decisions and adjust policies in the light of the results obtained. An area-specific sectoral report will also be drawn up to make the most of the information provided to the public bodies represented.

To this end, a Working Group for the Promotion of Connectivity will be set up within the Advisory Council for Digital Transformation, which will depend on the Council's Standing Committee on Telecommunications, Digital Infrastructures, Digital Connectivity, and the Audiovisual Sector.

The Working Group will be chaired by the State Secretariat for Telecommunications and Digital Infrastructures. Among other entities, the companies and associations that signed the "Agreement for the Connectivity of People and Companies", reached between operators and the Administration during the COVID-19 health crisis, will be called upon to form part of this group and the most relevant sectorial agents will be invited to participate.

Coordination for the purposes of this Plan with other ministries, such as the Ministry of Industry, Trade and Tourism, the Ministry of Agriculture, Fisheries and Food, and the Ministry of Ecological Transition and Demographic Challenge and the Ministry of Labour and Social Economy, as well as with the Autonomous Communities and Local Entities, will be carried out in accordance with the mechanisms established in the "Digital Spain 2025" strategy.

