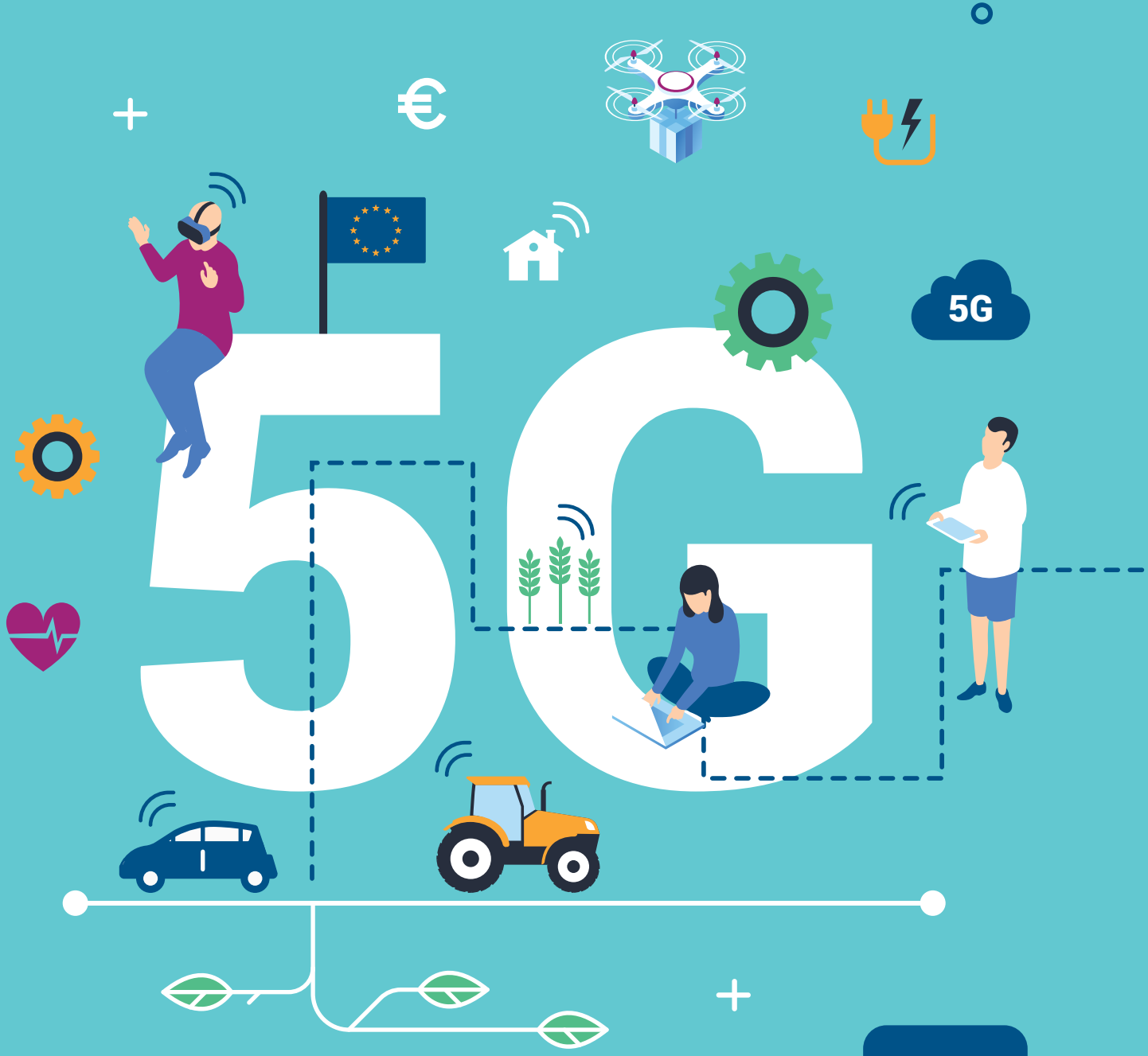
5G and us:
A European story



European Telecommunications Network Operators' Association

Published by:
ETNO
European Telecommunications Network Operators' Association
info@etno.eu
Tel: +32 (0)2 219 3242
www.etno.eu
Media & Inquiries: daia@etno.eu
Policy contact: palovirta@etno.eu

Graphic design:
Aupluriel
www.aupluriel.be

WHAT IS 5G?

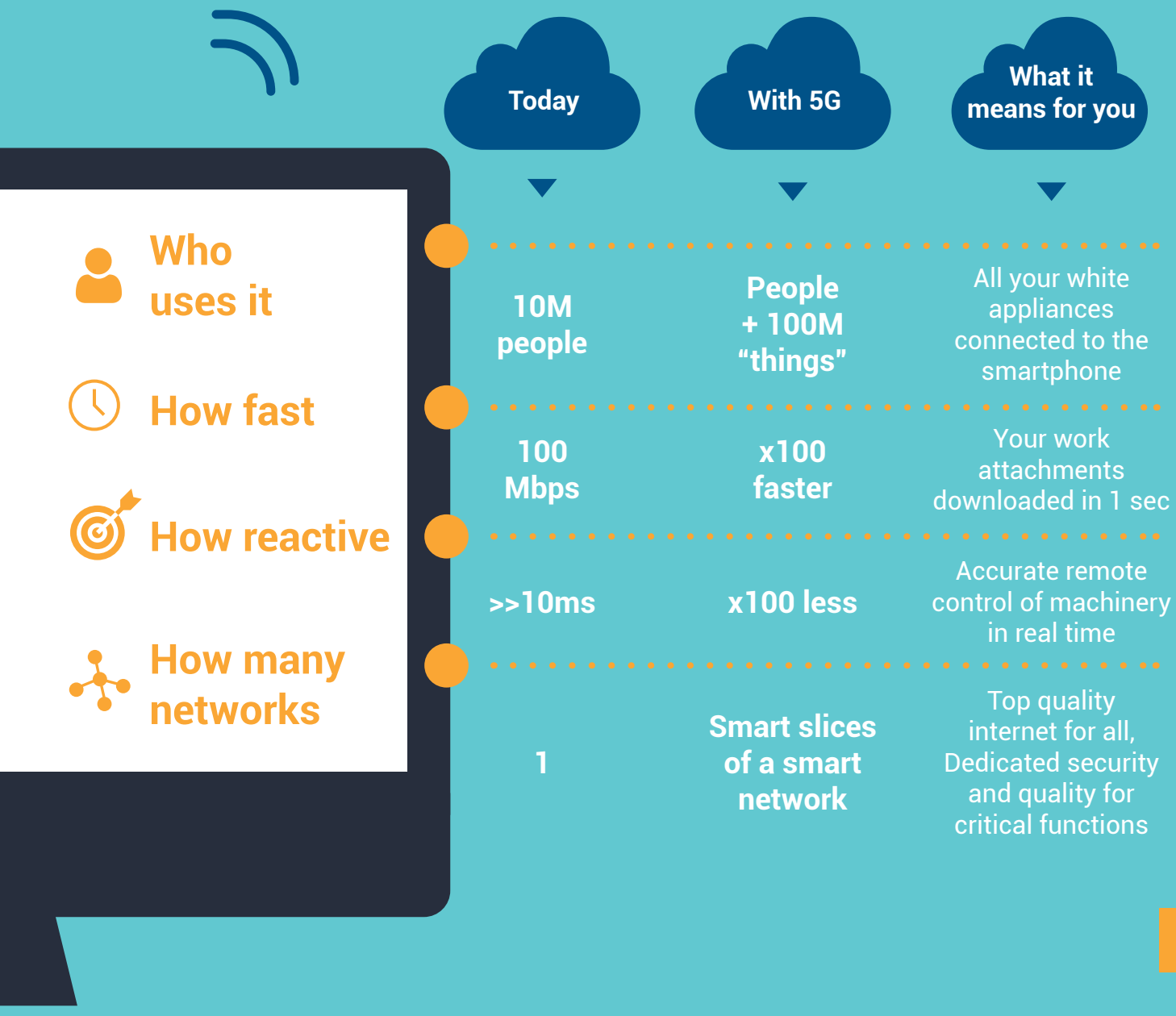
5G is a new agile multi-service network, which will allow the emergence of new uses and a significant improvement in the customer experience. It is **the next generation of mobile technology that has superior network performance capabilities** compared to previous generations – not only higher speeds, but also faster network response times (known as ultra-low latency), and efficient connection for billions of devices, from equipment on the production line of a factory to irrigation sensors used in agriculture or security cameras ensuring protection of a home. 5G will utilise spectrum across a broader range of spectrum bands compared to earlier generations – from sub 1 GHz up to 100 GHz – to allow these new features.

Beyond high speeds and low latency, a key feature of 5G is network slicing – the ability to support and enable many tailor-made virtual networks over one physical network to deliver optimal user experience. In practical terms this means that whether it is a reduced time delay needed to make sure that a connected car reacts to a situation on the road, or an extremely high reliability vital for a connected medical device, the network can be adapted to handle each use case.

But it is not just the technical parameters that make 5G innovative. We also see a new approach to how networks are built and conceived. Because of the ability to support applications and services that require different technical qualities, telecom operators are closely engaging with other industries in considering, designing and planning the network. This collaborative approach is necessary to ensure that the development of 5G and its use in combination with previous generations of mobile technology can deliver the right type of connectivity for the needs of a modern society.

5G is therefore expected to be more than just a new generation of technology, but rather a key component and enabler for innovation in many areas including medicine, manufacturing, transportation and agriculture, with positive effects for the society at large.

5G is expected to be a key component and enabler for innovation in many areas including medicine, manufacturing and transportation, with positive effects for the society at large.



WHY DOES IT MATTER? WHAT WILL BE THE BENEFITS TO CITIZENS AND SOCIETY?

Whereas in the past internet connectivity was a 'nice to have', today it is 'necessary for everything' as it plays an essential role in how people and businesses communicate, interact and work. 5G, in combination with fibre and other communications technologies, will be the key infrastructure for the digital age – a way to ensure that people, communities, industry, governments are connected in a world where data volumes are growing, putting a strain on existing networks.

A drone allowing for a monitoring of conditions in a remote or dangerous setting, a fire brigade supported by virtual blueprints before tackling a fire, students going on a virtual tour of a museum located in a different country as part of their school curriculum, a municipality monitoring the level of snowfall on main roads before sending cleaning crews to location – these are only some of the examples where 5G will benefit Europeans in the future. While the impact of the new networks will also be felt through a better and more personalised internet experience on mobile phones and personal computers, the transformational change for citizens will come from the digitalization in delivery of every day services that matter to consumers – from healthcare and education to entertainment.

Another way 5G can be transformative is through enabling new technologies. Its ability to support **artificial intelligence, robotics, internet of things, remote control and virtual reality** will allow for value-

▶ **5G** will be the key infrastructure for the digital age.

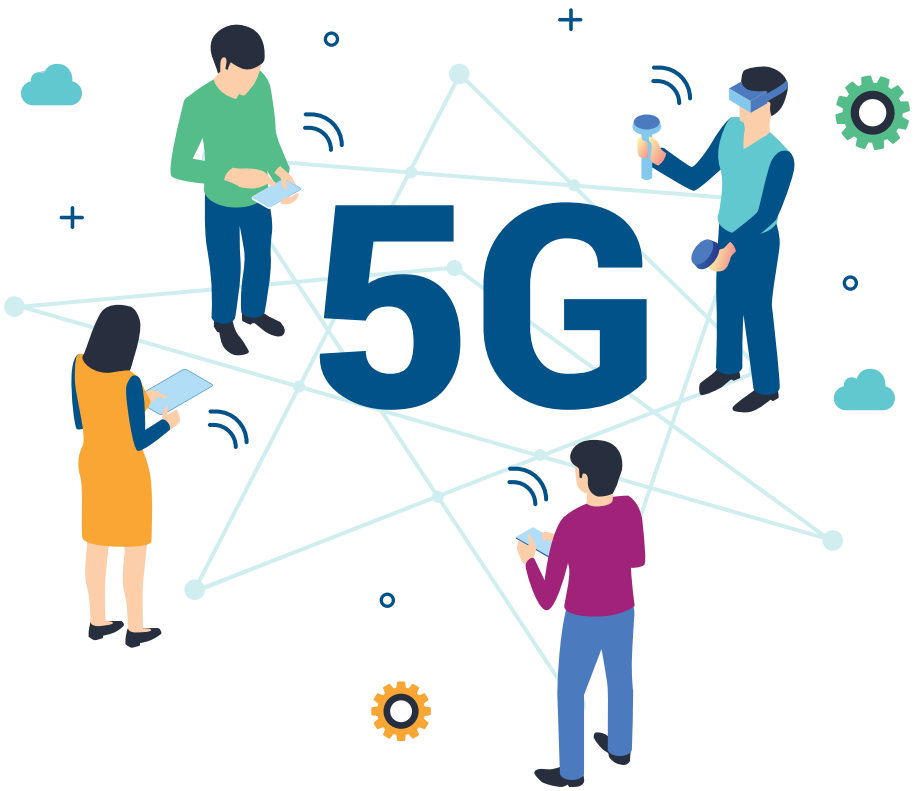
creating innovation we cannot yet imagine in a wide range of industries and economic sectors. As 5G is by design more flexible, allowing to adjust to different industry and use case needs than previous generations of technology, it can also increase opportunities for cross-sector innovation.

For European businesses, 5G will usher in industry applications that boost productivity – the so-called industry 4.0. The benefits will stem from the possibility to increase safety of workers in hazardous environments by relying on remote-controlled devices instead, more efficient operations, potentially reducing use of raw materials and improved ability to deliver products and services to new markets and customers.

New generation of connectivity will contribute to EU efforts to address climate change and move toward a more competitive and environmentally sustainable European economy, boosting EU leadership on a global stage in line with ambitions of the European Green Deal. As outlined in a GeSI-Deloitte report, by promoting uptake of 5G and other enabling ICT technologies, carbon emissions can be significantly reduced, reaching a reduction of 1.34 Gt by 2030, against a business-as-usual scenario[1].

And while these innovations will be introduced only gradually over the next few years as 5G networks are rolled out and its features become available, they are examples of the services that are expected to be developed throughout Europe.

[1] GeSI-Deloitte, Digital with Purpose Report, September 2019



Smart city in Portugal, powered by 5G

The city of Aveiro is going through a major digital overhaul. The medium-sized city located on the west-coast of Portugal has embarked on an ambitious mission to take a big step towards 5G adoption. This will further bring IoT infrastructure and technology closer to its citizens, workforce and university.

State-of-the-art tech, such as machine learning and artificial intelligence algorithms will be at the heart of new innovative urban mobility services, environment and energy, to name a few. The STEAM project brings together 34 ICT companies to the region, representing over 1,300 employees, as well as 300 students who will benefit from the Tech Lab and a dedicated educational program.

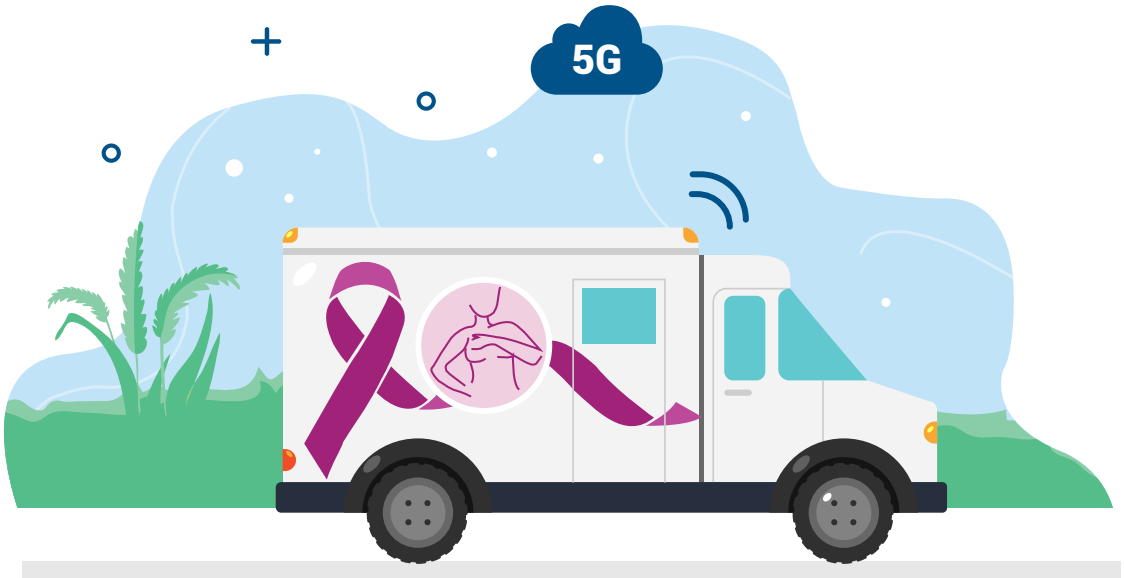
More info: https://www.uia-initiative.eu/en/uia-cities/aveiro

Remote mammography exams in Sweden

There are about 700,000 mammography examinations performed in Sweden each year. Often, there is a long distance to be travelled for doing the screenings. As a consequence, one in five women misses the crucial mammography appointments. The main reason why mammography is done only in hospitals is that the processed images of examinations are too heavy to be transmitted over a regular mobile network. Existing digital infrastructure is not ready for this.

Here is where 5G can make a difference: a mammography wagon brings testing facilities to the local environment of citizens by physically coming closer to their premises. The examination pictures are then transmitted over the 5G network, shortening the travel and waiting time for many citizens who otherwise could not take the test.

More info: https://www.telia.se/privat/om/5g/mammografi-pa-vag



Ambulance connected to 5G tech

Healthcare emergencies cannot cope with delays. Every second alters the chance to survive, so does the availability of surgeons. An innovative solution can help: a connected ambulance in the UK is proving that tech can literally save lives.

A paramedic sitting in the ambulance roaming the streets of Birmingham is equipped with a virtual reality headset which broadcasts video footage to the right clinician or surgeon in real time. The latency between what both see is close to zero, allowing the patient to receive critical care thanks to the 5G dedicated network. Moreover, the clinician can remotely direct the paramedic to perform any necessary scans through a joystick that sends the right signals to a robotic glove worn by the paramedic. In addition, there is a camera in the ambulance which transmits a high definition view of the inside of the ambulance, paramedic and patient.

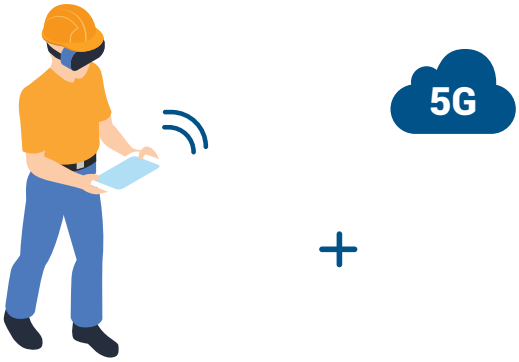
Together with live feeds of the patient's ultrasound scan, the clinician is able to recognise vital signs and view medical records in real time via the VR headset, providing a truly immersive experience.

More info: https://newsroom.bt.com/uhb-and-bt-demonstrate-uks-first-remote-diagnostic-procedure-using-a-5g-connected-ambulance/

Building a new school in 5G era

During the design phase of the project for a new school, 5G can enable the architecture agency to run realistic design models in a virtual environment. By doing so, everyone involved from start to finish can work together in the same space and agree on a common vision. With 5G capabilities, these 'digital twin' models could be shared with City Council, parents and other stakeholders, to ensure appropriate consultation in the community and give stakeholders a whole new understanding of how the school would look.

During the construction phase, 5G will enable a series of other technologies which will increase efficiency and quality control of the site, as well as safety of its workers: from artificial intelligence applications, automated manufacturing, remotely controlled cranes or collaboration robots doing the heavy lifting, these all play their part for a seamless experience in a multitude of new ways.



Smart helmets for smart safety, Italy

The port area of Bari, Italy, has embraced a new technological development which has an immediate direct impact on the safety of workers who perform dangerous tasks, on a daily basis. Thanks to smart helmets connected to high speed and low latency network 5G network, it is now possible to provide remote assistance to workers engaged in the assembly and disassembly of a ship's engine.

The 3D indicators that overlap with the image of the engine, in Augmented Reality, provide an invaluable guidance during performance of assembly tasks, resulting in greater speed, effectiveness and quality of maintenance and staff training activities.

More info: https://www.telecomitalia.com/en/press-archive/market/2018/2018-05-25-PR-BariMatera5G.html

WHEN WILL WE HAVE 5G?

Under current market conditions, the US, Japan, South Korea and China will have the fastest migration to 5G, going from early adaption to lead technology in the period to 2025. China, the single largest 5G market, will have nearly half a billion users by 2025. Despite its strategic objective to have uninterrupted 5G coverage in all urban areas and all major terrestrial paths by 2025, Europe will lag behind with around 30% of adoption at that time[2].

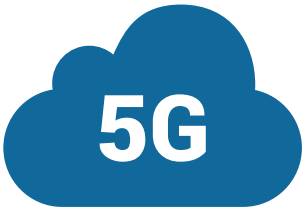
5G deployment is already happening in Europe: reports shows that European telecom operators have already launched 20 5G networks in 9 European countries in 2019, while 80 networks are expected to be in operation by the end of 2020[3]. The roll-out will continue in the years ahead in a gradual manner – from about 1% of all mobile subscriptions expected in 2020 to a level of 55% by 2025[4]. Importantly, 5G will be used in combination with other communications technologies and standards, ensuring that users' needs for connectivity are met with the technology best suited to provide it, even where 5G is not yet available.

As 5G is deployed, the everyday user will notice faster speeds and lower latencies (faster network response times), even if not all the features of 5G will be available at once. Users will also benefit from more connected devices, which will increasingly communicate not just with people but with other devices. As the further iterations of 5G standards are released over the next two years and 5G is more comprehensively rolled out, new society-wide services – from smart cities and connected autonomous vehicles – are expected to become available.

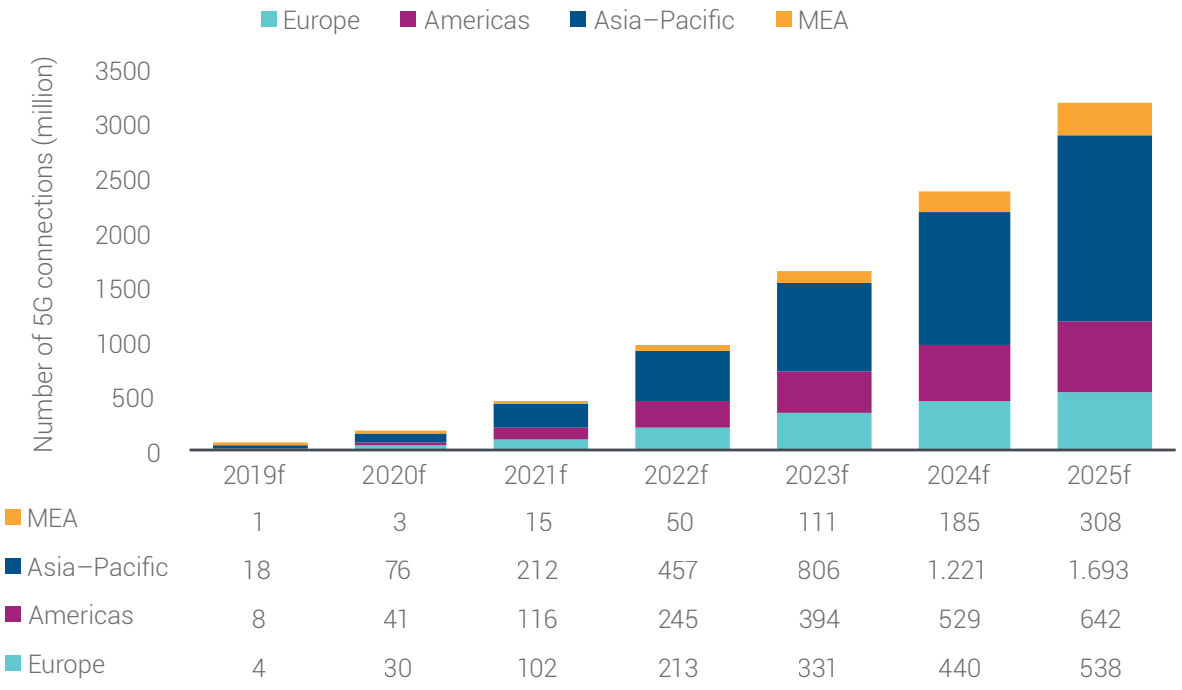
[2] Global Mobile Trends 2020, GSMA Intelligence, 7 Nov 2019.

[3] ETNO-Analysys Mason, The State of Digital Communications 2020.

[4] Ericsson Mobility Report, November 2019.



Forecast for the number of 5G connections 2018–2025



	2019f	2020f	2021f	2022f	2023f	2024f	2025f
MEA	1	3	15	50	111	185	308
Asia–Pacific	18	76	212	457	806	1.221	1.693
Americas	8	41	116	245	394	529	642
Europe	4	30	102	213	331	440	538

Source: ETNO State of Digital Communications 2020 (Analysys Mason, 2019)

▶ The roll-out will continue in the years ahead in a gradual manner – from about 1% of all mobile subscriptions expected in 2020 to a level of **55% by 2025.**

WHAT ABOUT THE CONCERNS?

5G builds on several decades of scientific and industrial knowledge, experience and collaboration and is an improvement compared to previous generations of mobile technology. The 5G-related standards[5] are a result of collaborative work by the standardisation bodies and market representatives from across the globe, with an extensive review as part of the process.

When it comes to **health and safety**, there are legitimate concerns from citizens. It is therefore fundamental to inform the public about the scientific consensus in relation to this topic. 5G technology is covered by existing international and national exposure guidelines and regulations for radio-frequency electromagnetic fields, based on scientific research spanning many decades. These guidelines, rigorously implemented by telecom operators, apply to 5G as they do to existing 2G, 3G and 4G technologies and other radio frequencies such as radio and TV transmissions. The International Commission on Non-Ionizing Radiation Protection (ICNIRP), the independent non-profit organization linked to the World Health Organization that provides scientific advice and guidance on the health and environmental effects of non-ionizing radiation, has recently updated exposure limit guidelines. These incorporate recent scientific studies and essentially confirm that the limits used at the moment are protective for current commercial applications. Adjustments for frequencies above 6GHz currently used for other purposes but to be used for 5G in the future, will be duly implemented by the operators.

Telecoms networks and services in Europe are already today subject to high standards and strict regulations when it comes to **security and privacy** of personal data. In addition, 5G provides even further opportunities to increase security and privacy compared to previous generations of mobile technologies, including through the use of network slicing, authentication, mechanisms to protect user identities and encryption. At the same time, use of technology and connectivity in the economy is expanding, the cybersecurity threat landscape is also evolving. In this context, a system-wide consideration of security, beyond networks and technical factors, is necessary for continued assessment and response to emerging security challenges. EU coordinated risk assessment of the cybersecurity of 5G networks ongoing since 2019 is part of such approach.

European telecom operators are keenly aware of the need to optimize the **environmental impact** of their networks and operations; increased efforts in this area are bringing concrete results. ETNO members already increased the use of renewable energy by 18% and reduced the use of non-renewable energy sources by 9% in just one year (2017-2018). By the end of 2019, 50% of energy used by ETNO companies came from renewable sources.[6] Telecom operators have ambitious environmental objectives and programmes in place, aimed at improving energy efficiency, increasing the use of renewable energy and reducing carbon footprint. These efforts extend also to how 5G is being conceived and rolled out. More energy efficient equipment per unit of data transferred compared to previous generations, new features allowing improvements in energy efficiency of operating networks such as putting base station into a 'sleep mode' as well as replacement of older generations of hardware and software will contribute to meeting the industry's environmental objectives. Beyond that, connectivity is also a crucial enabler for European economy to reach its sustainability and climate objectives.

A constant dialogue between public sector, industry and all relevant stakeholders will continue to be the cornerstone of ensuring that 5G meets the societal expectations and empowers the communities it serves, in order to address any arising concerns.

[5] The 3rd Generation Partnership Project (3GPP) is a standards organization which develops protocols for mobile telephony, including specifications relevant for 5G.

[6] ETNO-Analysys Mason, The State of Digital Communications, 2020.

WHAT WILL IT TAKE FOR EUROPE TO SUCCEED IN 5G?

Digital networks and 5G will be a primary enabler of Europe's economy that delivers for all, creates new opportunities of inclusive growth and societal improvement across European regions and all sectors of society. Majority of the investment in 5G will inevitably come from the private sector. But its successful roll-out is still a shared responsibility between telecom operators, policymakers and the whole digital eco-system. Governments have a crucial role in setting a strong industrial policy in support of digital communications and ensuring an investment-conducive regulatory framework. Other industries as direct beneficiaries of capabilities that 5G provides will be the hubs of stimulating the demand for the new networks.

A handful of European countries already have commercial 5G networks up and running. However, the roll-out in some non-European countries has been more intense. Europe's 5G ambition is coming up against a few roadblocks. Some of them are related to availability and affordability of necessary radio spectrum, others relate to practical deployment issues, such as lengthy permitting procedures and access to sites. Without addressing these, the ability of the telecom operators to invest in widespread 5G networks will be limited, with implications both for the speed and the extent of the deployment.

Beyond regulation, more than ever, governments need to embrace the possibilities offered by digital communications. We know that digitalization and digital solutions can help to overcome many of society's challenges. Digital solutions for schools, hospitals, nursing homes, social services and traffic systems can improve public services, cut costs and boost our response to challenges like climate change. Cooperation of the public sector with telecom operators in developing 5G use cases for the public sector should be a priority.

Governments have a crucial role in setting a strong industrial policy to support investments.

PROPOSED EU POLICY MEASURES

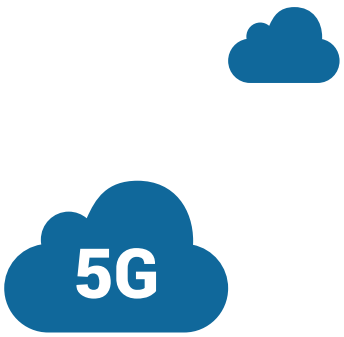
From the industry perspective, EU action in the following policy areas would be instrumental in ensuring **5G success:**

01 Timely and well-designed spectrum auctions:

EU Member States should adopt spectrum assignment conditions that incentivise timely network infrastructure roll-out at a reasonable cost. Guidance from the European Commission, such as on best practices on spectrum auctions could support and guide Member States in designing auctions that incentivise investment. In the longer-term, an effective spectrum peer-review process that includes the input of industry, is necessary to promote real coordination on spectrum policy and best practices on awards.

02 Reducing cost of network deployment:

Introduce new measures at EU level to streamline procedures for local permits to reduce the cost of deployment, both in terms of price and length of procedures. While the provisions of the Broadband Cost Reduction Directive (BCRD) partially address this issue and progress is being made to speed up deployment of small cells for 5G, further measures are urgently needed in a context of an increasing operational complexity. In particular, the BCRD provisions should be reviewed and reinforced regarding fibre-readiness of buildings and permit granting. Rights of way and antenna sites on public ground should ideally become free of charge.



03 Support for network sharing:

5G roll-out can be facilitated by allowing flexibility for market players that decide to enter voluntary network sharing agreements. This can be beneficial not only in view of the substantial investment required for 5G roll-out, but also objectives of promoting innovation and more environmentally friendly solutions. Full recognition of the pro-competitive aspects of network sharing and more clarity on a new block exemption regulation for joint agreements regarding investment in digital infrastructure, such as telecommunication networks and cloud structures including edge cloud technology, would provide more support for such approach.

04 Fact-based 5G security framework:

Promote an informed, fact-based and proportionate implementation of an EU-wide 5G security framework involving contribution of industry. Further action should include measures in relation to equipment testing and certification, taking into account existing international standards and schemes, the ongoing work on the development of open and interoperable interfaces in the form of ORAN technology as well as national best practices.

05 Research on health and safety:

Continue supporting independent, scientific research as well as ensuring proactive and fact-based communication by authorities on legitimate health and safety-related questions on EMF, aimed at promoting and objective and harmonized approach on the issue.

06 Demand-side targets and sustainability:

As the European Commission considers policy options to accelerate Europe's Gigabit connectivity, strong demand-side targets to ensure a pervasive and transformational adoption of new connectivity technologies, including policy targets for digitalising traditional industrial sectors, should form part of its approach. Demand-side policies are also essential to activate enabling potential of 5G in reducing the carbon footprint of Europe's industrial sector[8].

[8] GeSI-Deloitte, Digital with Purpose Report, September 2019.

European Telecommunications
Network Operators' Association

info@etno.eu

Tel: +32 (0)2 219 3242

www.etno.eu

#5GAndUs

@ETNOAssociation

Subscribe to our weekly digital newsletter