

Our position

Fostering 5G in Europe



AmCham EU speaks for American companies committed to Europe on trade, investment and competitiveness issues. It aims to ensure a growth-orientated business and investment climate in Europe. AmCham EU facilitates the resolution of transatlantic issues that impact business and plays a role in creating better understanding of EU and U.S. positions on business matters. Aggregate U.S. investment in Europe totalled more than €3 trillion in 2019, directly supports more than 4.8 million jobs in Europe, and generates billions of euros annually in income, trade and research and development.

Executive Summary

- COVID-19 will have a lasting impact on our societies. While it incentivised us to build on the major innovations brought forward by our digital transformation, most importantly, COVID-19 offered the opportunity to rethink our economy to drive sustainability and digitisation. The speedy deployment of ubiquitous, reliable, secure and sustainable high capacity networks is critical for post-COVID-19 economic recovery and the realisation of a green digital Europe.
- The rollout of 5G, coupled with enhanced Wi-Fi capacity, constitutes a crucial element of ensuring this availability. Not only is it aimed to provide high speed broadband and improved connectivity to consumers and the general public, but also to meet enterprises' growing connectivity needs as they accelerate their digital transformation and transition to more circular and sustainable economic models.
- First and foremost, to foster 5G rollout, it is important that policymakers and regulators recognise that 5G is much more than the next generation of licenced radio spectrum; it is the next generation of end-to-end networking that will fundamentally transform mobile networks. This also means that in comparison to previous generations of connectivity, 5G networks will become critical infrastructures with extended capabilities and use cases, which entails a re-evaluation of security risks.
- In addition to the new capabilities in 5G radio spectrum, 5G networks are enabled by a number of other key networking technologies. These are not unique or limited to 5G but central to delivering the end-to-end transformation of mobile networks; most notably virtualisation, network slicing and automation. 5G is also fundamentally different from its previous generations because a converged core network enables multi-access networks with a broad mix of 5G access technologies as well as Wi-Fi and fixed line as well as virtualised and open radio access networks (Open RAN).
- Against this backdrop, it is important that policymakers also recognise the importance of adoption of cloud computing and cloud-based solutions in 5G networks, as they will lower capital costs, introduce new applications that drive digital transformation in national economies, and offer a more diverse and secure supply chain, while bringing the power of the cloud's AI and cybersecurity capabilities to these critical networks.
- Europe needs to create the right policy environment to enable trustworthy 5G that can live up to its full potential above and beyond, whilst still inclusive of, enhanced wireless broadband for consumers.
- There are several telecom policy issues impacting 5G and connected technologies. The right policy environment starts with spectrum as the sine non qua but also covers other important policy areas, notably around gigabit network and fibre deployment, security, maintaining the distinction between public and private networks and fostering an open and innovative ecosystem that enables entry of new players and collaboration across the value chain, including through the introduction of Open RAN.
- Across these policy areas, policymakers and regulators should pursue three core objectives:
 - Enable network deployment, including through regulatory tools, that lower the cost of deployment;
 - Ensure networks can be used to meet the needs of more heterogenous use cases (return on investment will come both from consumer business and from the ability to offer tailored and differentiated services including network as a service mainly focussed on enterprises); and

- Increase security to the entire supply chain to avoid security risks in products and solutions. This would include careful analysis, scrutiny and control of the supply chain from 'end-to-end' as well as the acquisition of technology from trusted suppliers.

The transformative nature of 5G

Europe is facing one of its deepest economic crises in its post-war history as a result of the COVID-19 health crisis. Technology and internet connectivity have played a pivotal role during this crisis by helping people access vital public services and enabling businesses to shift activities online and maintain a certain level of economic activity.

The impacts of COVID-19 will be long lasting: businesses and public services will need to adapt to new long-term realities to ensure the safety of consumers, citizens and employees. COVID-19 also offers an opportunity to rethink our economy to drive sustainability and digitisation. The crisis has in this respect illustrated just how critical the ubiquitous availability of reliable and secure high-capacity networks is. In its recent communication 'Shaping Europe's digital future', the European Commission stresses the need to invest in strategic capabilities that enable development of 5G (and 6G) networks. These policy goals build on the ambitions set out in the Gigabit Society goals¹ and Europe's Digital Decade 2030 targets², where gigabit connectivity is seen as key to tap into Europe's digital growth potential. Ensuring the rollout of 5G, coupled with enhanced Wi-Fi capacity, constitutes a crucial element of ensuring this availability, not just to ensure high speed broadband and improved connectivity to consumers and the general public but to meet enterprises' connectivity needs as they are accelerating their digital transformation strategies and transitioning to more circular and sustainable economic models. These innovations in the business-to-business (B2B) segment will flow back to society in the form of improved services such as e-health and e-mobility as well as reignited growth and job creation.

End-to-end transformation of mobile networks

To foster 5G rollout it is important that policymakers and regulators recognise that 5G is much more than the next generation of licenced radio spectrum. It is the next generation of end-to-end networking that will transform mobile networks end-to-end. It represents a complete overhaul of the core of the mobile network, shifting from old purpose-built network appliance hardware to a fully software-based, virtualised architecture. In order for 5G networks to enable digitisation of verticals, above and beyond providing enhanced mobile consumer broadband, the shift to 5G has to go beyond the radio access network and transform the network end-to-end, from the core network over the transport layer to the radio access network. It is precisely this new design which allows 5G to support the development of a host of new applications and innovations in every sector of the economy and society, ranging from more traditional industry sectors like automobiles or transport to entirely new ways of living like in smart cities, innovative health, smart workplaces or distance learning. Indeed, the European Commission cites 5G as 'one of the most critical building blocks of our digital economy and society in the next decade'.³

Main 5G use case classes

Critical	<ul style="list-style-type: none"> • Very low latency • Ultra-reliability • Radio access network (RAN) slicing • Multi access edge computing (MEC) 	Examples: <ul style="list-style-type: none"> • Industry (control, feedback, safety) • Training & simulation • eHealth (remote surgery) • Vehicles (feedback, safety)
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¹ Commission Communication 'Connectivity for a Competitive Digital Single Market - Towards a European Gigabit Society', COM/2016/0587 final.

² Commission Communication 'Europe's Digital Decade – Digital Targets 2030' https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12900-Europe%E2%80%99s-digital-decade-2030-digital-targets_en

³ <https://ec.europa.eu/digital-single-market/en/towards-5g>

Massive	<ul style="list-style-type: none"> • High density • Energy efficiency • MEC 	Examples: <ul style="list-style-type: none"> • Smart city, logistics, agriculture, (metering, tracking, monitoring)
Broadband	<ul style="list-style-type: none"> • High speed and throughput • RAN slicing • MEC 	Examples: <ul style="list-style-type: none"> • Entertainment & education (8K UHD, VR, AR) • Gaming

This also means that more than ever before and more than the 3G/4G networks they replace, 5G networks will become critical infrastructures subject to cyberthreats. As a result, a collective effort from industry and government is required to ensure a resilient, trustworthy, diverse and competitive supply chain for Europe's 5G networks.

5G has various performance attributes that make it a robust connectivity platform. Some of these include:

- Throughput – 5G has the potential to deliver speeds many times faster than today's 4G, with peak data rates possible of up to 10 Gbps, powering uses such as intelligent video, remote diagnostic and mobile command centres for live video and audio⁴;
- Latency – 5G promises significantly lower latency that will permit all kinds of applications including augmented and virtual reality, autonomous driving, computer vision, and robotics⁵;
- Data volume – the 5G standard is designed to support up to 10 TB/s/km², meaning a 5G network can carry a massive amount of data for a large number of simultaneous users, helpful in high-density areas such as airports, stadiums and urban areas⁶;
- Connected devices – 5G is capable of supporting up to 1 million devices per square kilometre, allowing cities to install smart streetlights, intelligent rail and smart parking solutions⁷;
- Energy efficiency – 5G has up to 90% fewer energy requirements for network operators than 4G when compared per bit. Complex functions could happen within the network, near the end user, meaning the end user's device will not need as much process capability and will consume less energy.⁸

Software-defined and virtualised networking

In addition to these new capabilities for licenced 5G radio, 5G networks are enabled by a number of other key networking technologies not unique or limited to 5G but central to deliver the end-to-end transformation of mobile network, most notably virtualisation, network slicing and automation. Virtualisation and software-defined networking are increasingly moving network functionality and applications to the cloud which in turn makes the network much more agile, improves innovation and new service delivery times and can help provide anytime, anywhere user access. Moreover, cloud-based solutions in 5G networks will lower capital costs, introduce new applications that drive digital transformation in national economies, and offer a more diverse and secure supply chain, while bringing the power of the cloud's AI and cybersecurity capabilities to these critical networks. Through software-defined network slices, service providers are able to dynamically allocate network resources between users and provide better service level quality assurances. This brings important new capabilities that can enable and grow new businesses and user models, including in the enterprise segment.

⁴ <https://5g.co.uk/guides/how-fast-is-5g/>

⁵ <https://www.etsi.org/technologies/5G>

⁶ <https://5g-ppp.eu/wp-content/uploads/2015/02/5G-Vision-Brochure-v1.pdf>

⁷ <https://www.mckinsey.com/industries/technology-media-and-telecommunications/our-insights/are-you-ready-for-5g>

⁸ <https://www.gsma.com/futurenetworks/wiki/energy-efficiency-2/>

Access-agnostic converged core

5G is also fundamentally different from its previous generations because a converged core network enables multi-access networks with a broad mix of 5G access technologies as well as Wi-Fi, fixed line as well as virtualised and open radio access networks (Open RAN). This opens up the ecosystem and can foster new and more specialised players to enter the market to serve more niche use cases for specific verticals (see use cases in annex). This evolution from hardware to software is challenging the status quo of single vendors supplying full-stack solutions by allowing for more competition in the supply chain and the radio access ecosystem through Open RAN.

Furthermore, enabling the development of enhanced Wi-Fi, by providing it with the right 6Ghz spectrum resources, will not only help improve the experience of connectivity but will be vital to 5G's success. Wi-Fi6 and Wi-Fi7 will provide the necessary mobile data offload and indoor coverage, helping reduce costs of 5G rollout for mobile operators - today, Wi-Fi supports the offload of roughly 55% of mobile 3G/4G data traffic and this is set to grow to about 70% with the introduction of 5G.⁹

Looking at 5G from this perspective it also becomes clear that there are several telecom policy issues impacting 5G and connected technologies. Europe needs to create the right policy environment to enable trustworthy 5G that can live up to its full potential whilst still inclusive of enhanced mobile broadband for consumers. This starts with spectrum as the sine qua non but also covers other important policy areas:

- Facilitating spectrum access and network deployment;
- Maintaining the distinction between public versus private networks;
- New 5G ecosystems and business models; and
- Enhanced security, from the edge to the network architecture and throughout the supply chain.

Across these policy areas, the following objectives should be considered:

- Enable network deployment, including through regulatory tools and incentives such as tax credits that lower the cost of deployment and help achieve sustainability objectives in the context of the twin green and digital transitions;
- Ensure networks can be used to meet the needs of more heterogeneous use cases (return on investment will come from both consumer and increasingly from business end-users, including from the ability to offer tailored and differentiated services including network as a service); and
- Increase security to the entire supply chain to avoid security risks in products and solutions. This would include careful analysis, scrutiny and control of the supply chain from 'end-to-end' as well as the acquisition of technology from trusted suppliers.

⁹ https://www.cisco.com/c/dam/m/en_us/network-intelligence/service-provider/digital-transformation/knowledge-network-webinars/pdfs/1213-business-services-ckn.pdf

5G use cases: index per segments

Industry			
 <p>Smart factory Connected machines to create a 'digital twin' to improve and automate production.</p>	 <p>Smart quality Smart cameras and sensors to monitor and control the quality of the production in real time.</p>	 <p>Factory automation Collaboration robots (cobots) controlled through computer vision and artificial intelligence (voice, chat).</p>	 <p>Asset tracking Track location and movement of assets and resources to improve processes and reduce costs.</p>
 <p>Remote assistance Real-time remote HD/UHD audio/video communication with contextual data sharing and augmented reality (AR) support.</p>	 <p>People safety Workforce monitoring to react immediately on critical events (man-down, low vital parameters, danger in environment data).</p>	 <p>Smart agriculture Monitor agriculture phases and improve quality, traceability, adulteration and waste.</p>	 <p>Extended enterprise Based on software-defined networking in a wide area network (SD-WAN) and fixed wireless access (FWA) capabilities to extend enterprise domain to remote branch offices.</p>
Healthcare		Smart cities and smart energy	
 <p>Telemedicine Extend cures from hospitals to the territory, monitoring and acting on diseases (heart deficit, etc).</p>	 <p>Asset tracking in hospitals Track location and movement of critical or life-saving assets, critical patients, and relevant processes resources.</p>	 <p>Smart surveillance Cloud managed video surveillance, scalable and easy to deploy, suitable for outdoor/indoor environment affected by cabling issues.</p>	 <p>Situation awareness Enhance smart city governance with geo-referenced and correlated data coming from a wide range of sources.</p>
Smart cities and smart energy			
 <p>Connected buses Next generation buses providing security and entertainment service for guests as well as enhanced bus maintenance and efficiency.</p>	 <p>Digital signage 5.0 User engagement and new experiences with a video and content management solution both indoor and outdoor.</p>	 <p>XR over 5G Rich extended reality (XR) experience, split-rendering over 5G, photorealistic mobile headset augmented by edge-computing.</p>	
Education and entertainment			
 <p>Training and support Collaborative training and remote assistance thanks to AR, virtual reality (VR), sharing and collaboration features.</p>		 <p>Massive signage Deliver edge-based transcoding, virtual caching, context & location aware services in crowded or specific scenarios.</p>	

Policy recommendations

5G is critical to the growth of the EU economy and policymakers can help ensure the EU advantage through sensible policies including spectrum access and network deployment, robust data privacy and cybersecurity policies. It is also critical that the EU establishes policy frameworks that are competitively and technologically neutral and avoid duplicative and inconsistent regulations to benefit consumers, competition and innovation.

Spectrum access and network deployment

Ensuring sufficient harmonised spectrum availability is essential for the successful roll-out of 5G. Considering 5G/4G/Wi-Fi/unicast LTE will work together, both licensed and unlicensed spectrum will be needed. Furthermore, considering the broad set of use cases for 5G, it includes spectrum in the low-band (below 3 GHz), mid-band (3-24 GHz) and high band (above 24 GHz) as different propagation characteristics of radio spectrum make the different bands useful for different purposes. For example, low band spectrum is better suited for wide area coverage such as wide area IoT, while high band spectrum will be particularly useful, among other things, for indoor and a wide range of business applications such as video and augmented and virtual reality (AR and VR).

In addition to making spectrum available, Europe also needs to urgently increase its gigabit connectivity and fibre footprint and bring such networks closer to the end user. Rather than replacing fixed network, 5G will actually require additional fixed network capacity as data throughput rises and additional cell sites are built. Moreover, with increased fixed-mobile convergence the distinction between the two will eventually become obsolete.

AmCham EU calls for the EU to promote investment-friendly mechanisms to make spectrum available. Recognising that regulators have to make choices in setting the parameters that determine the design of spectrum auctions, AmCham EU would encourage auction formats that incentivise operators to roll out networks quickly with ambitious coverage targets over inflating short-term revenues for the state. Lower auction prices reduce consumer prices and allow quicker deployment in markets, hence leading to an overall improvement in economic welfare for the Member States. Another key action potentially suited to European market dynamics would be the use by Member States of payment arrangements which support the investments required to guarantee optimal use of the radio spectrum. Some Member States currently foresee the payment of license fees in instalments, which has a positive impetus on the deployment of next-generation networks as long as care is taken to ensure such arrangements do not lead to speculation, spectrum price inflation or burdensome and lengthy litigation, eg, if a payment is missed, which could delay the deployment of spectrum for new wireless services.

Finally, simplified regulations around site access and planning permissions are essential. 80% of deployment costs comes from civil engineering work including planning and permission work with cumbersome and drawn-out processes adding significant unnecessary cost to deployment. The European Commission implementing act on small cell deployment under the European Electronic Communications Code ('the Code') needs to harmonise such requirements to ensure that deployments can proceed under reasonable terms and conditions that are both transparent and predictable.

Specifically, we call for:

- A faster implementation of the European Electronic Communications Code by national legislators and regulators in line with the objective to incentivise investments in very high capacity networks and to maximise the timely rollout of spectrum for 5G;
- Support the European Commission's digital ambitions for 2030 by building and maintaining international partnerships, facilitating broad stakeholder participation, accelerating investment and

innovation and enhancing digital skills and inclusion. See AmCham EU's position on the 2030 Digital Decade targets for further details¹⁰;

- Maximise EU funding to support the development, deployment and take up of digital technologies including 5G (eg, via the Recovery and Resilience Facility, Digital Europe Programme, Connecting Europe Facility² etc.);
- Release the 700Mhz, 3.4-3.8GHz and 26GHz bands as agreed by Member States, as well as progress on opening up the upper part of the 6GHz band for Wi-Fi and other unlicensed technologies to enable 5G as multi-access network technology. When it comes to Wi-Fi more specifically, the recent decision of the European Commission to open up the lower part of the 6 GHz band (5925-6425 MHz) is welcome, but with the rise of hybrid work and new innovations such as AR/VR to function properly, the upper part of the 6GHz band should become available for license-exempt use as well to respond to users' needs;
- Make spectrum available to address the connectivity needs of all end-users, including of vertical industries and business users. Regulators should balance different stakeholders' needs, seeking to optimise the efficient use of spectrum and enabling different deployment and business models, using both licensed and unlicensed spectrum;
- Support continued gigabit connectivity rollout as key for backhaul and in the last mile, focus on lowering cost of rollout, including addressing planning permits, cost of deployment and access and right of way issues (fixed and mobile) and enable/encourage new joint deployment and sharing models (mobile and fixed), as well as promoting investment-friendly spectrum allocation methods, such as payment of spectrum fees in instalments, provided care is taken to prevent speculation, price inflation or litigation, eg, if a payment is missed;
- Promote the adoption of open interfaced-based architectures for 5G. As stated above, many of the benefits of 5G networks come from greater reliance on software, network virtualisation and cloud computing than previous generations of wireless technology; and
- Review the Broadband Cost Reduction Directive so as to widen its scope to 5G and include sustainability targets, in order to further the roll-out of the Gigabit Society.

Public versus private networks

Not solely a 5G issue, as technology increasingly enables 'networks as a service' business models, we expect new opportunities and market offers in the enterprise segment in particular, including for 5G. It is important that European regulators are aware of and understand this development in order to ensure that the interpretation and application of the existing definitions and distinction between public and private electronic communication networks (ECN) and services (ECS) running on top do not hinder this market development. Enterprises are and should be free to choose the deployment model that best suits their needs, irrespective of whether this is a Do It Yourself (DIY) model or provided and managed by a provider of public electronic communications networks. Whilst it is clear that in a DIY model the network is private and thus unregulated, there is a risk that in the near future, as technologies and services develop further, networks or services offered as a managed service by a public ECN provider could be classified as public networks or publicly available services, despite such services being delivered to and used only by a closed groups of users. Whilst the provision of the connectivity itself in such situations might be considered a publicly available internet access service (IAS) and/or ECN, we believe that the operation and management of the enterprise network, as well as any added value services provided that are only used by a closed group of users (ie, employees of that

¹⁰ https://www.amchameu.eu/system/files/position_papers/digitalcompass_final.pdf

enterprise customer), should be considered private. This would maintain the current neutral position whereby regulators would leave it to the market to choose deployment models and prevent the risk that private networks and services running on these are subjected to the same European regulatory regime as publicly available ECS/ECN, whereas this is clearly not foreseen by the regulatory framework.

5G ecosystems and business models

As future 5G networks have the potential to serve a much broader set of use cases and customer segments, the ecosystem is also likely to evolve. The full innovation potential of 5G will be achieved through collaboration, partnerships and the emergence of new niche players across all levels of the value chain.

The development and use of global and open standards and modular component interoperability frameworks are instrumental to ensure an international scale, competition, supply chain sustainability and growth in 5G and access to SMEs. Standards should be defined following an open and inclusive market-driven approach.

In parallel, network operators are evolving their networks to take advantage of software defined networking (SDN) and network function virtualisation (NFV). This evolution in network design is necessary to enable network operators to scale their networks to meet ever increasing demand. This architecture allows industry to design networks using an interoperable, modular design. This model not only facilitates the rapid deployment of services and features, but also has the potential to lower barriers to entry for new suppliers and help foster a diverse and competitive supply chain. The EU can promote this modernised architecture by encouraging industry adoption of modular components and interoperable open standards; by introducing best practices that promote vendor diversity and ensures transparency; and by providing incentives for more research and development.

Regulation needs to provide sufficient room for experimentation. There will not be one business model but multiple business cases. The aim of regulation should be to not discriminate between business models but let the market develop so that different (enterprise) customers can choose what best meets their needs.

Security

The specific nature of 5G networks poses new cybersecurity risks from two perspectives. Architecturally, as 5G networks will be highly distributed with increased functionality at the edge and a significant increase in connected devices (13.1 billion mobile connected devices by 2023¹¹) the overall attack surface will increase, with potentially more entry points for attackers to use. Further, as 5G networks will underpin the economy to a much larger extent than previously, these networks will more than ever be critical infrastructures.

Innovative enhancements to network architecture, eg, more encryption, more defence at the edge, and greater potential to create secure enclaves or 'slices', will bring even stronger security. All of these tools will be leveraged as the network develops. However, at the same time it is important for the EU to ensure a trustworthy, resilient, diverse and competitive supply chain for communications network equipment and services, in particular as we will soon have 5G rollouts throughout Europe. There are concerns about the limited number of suppliers for 5G networking equipment leading to a market consolidation, lack of diversity and the potential for lock-in. It will be essential for 5G to be deployed based upon open, interoperable standards to avoid lock in; for multiple vendors to be utilised to provide market opportunities for all competitors; and for market transparency to ensure a level playing field for new entrants.

Many of these concerns were presented in the Prague proposals developed in 2019 for the Prague 5G Security Conference, and in the Commission Recommendation on 5G security, the follow-up EU-coordinated risk assessment of 5G cybersecurity, and finally the 5G security toolbox of risk mitigating measures presented in January 2020. Moving forward, the EU must continue to take steps to ensure a shared European approach to trustworthy, resilient, diverse and competitive supply chain for ICT; in particular as the rollout of 5G accelerates.

¹¹ Cisco Annual Internet Report 2020-2023: <https://www.cisco.com/c/en/us/solutions/executive-perspectives/annual-internet-report/air-highlights.html>

Conclusions

The COVID-19 pandemic and the climate crisis have both underlined the importance of ubiquitous, secure and high-quality connectivity. European policymakers and regulators therefore need to act urgently and decisively to implement and apply investment-conducive policies that promote network investments, including in 5G, to meet the needs of European citizens, enterprises and the public sector as they accelerate their digital transitions.

Annex: 5G Use Cases

Smart Warehousing

The 5G revolution will bring with it distributed edge computing. Whereas in today's Wi-Fi infrastructures devices must compete with other devices for shared usage of a network, with edge computing on private 5G networks, device traffic can be prioritised, thereby ensuring quality of service for critical applications. In the case of warehousing, voice headsets and vehicle-mounted computers can help direct workers to the right locations and quantities to be picked up while edge computing improves the communication links between devices, speeding up voice processing and improving information accuracy. Find out more [here](#) on how Honeywell is bringing the benefits of 5G to distribution centres.

Connected Work

With the workforce becoming increasingly mobile, more and more businesses are operating over mobile networks. The 5G smart office environment will make it possible to work anywhere through a smartphone thanks to a mobile virtual desktop infrastructure, mobile video conferencing and cloud-based virtual workspaces. By utilising 5G networks, people can work without using office PCs, wired telephones or LAN cables. The mobile virtual desktop infrastructure will replace office PCs. Even if you do not have a PC or a laptop, you can work by plugging your smartphone into a docking pad. Companies will enhance their work efficiency by providing mobile-based video conferencing solutions and cloud-based virtual workspace dedicated to teams. In a cloud-based virtual workspace dedicated to a team, workers can conduct business collaboration such as file sharing with their smartphones. Find out more [here](#) about how Cisco and Samsung are collaborating with SK Telecom to deliver these technologies.

Smart Agriculture

Connectivity underpins the feasibility of precision agriculture, and the lack of suitable connectivity solutions provides one of the largest barriers to on-farm adoption of technology. Cisco teamed up with the [5G RuralFirst project](#) team to develop autonomous tractors equipped with fertiliser sprays. The autonomous tractors equipped with forward-facing cameras transmit video data to a central analysis and control facility, which sends control data back to the tractors for the purpose of controlling spray nozzles on board. In this case, low latency communication is critical, in order to ensure that the fertiliser spray is released at precisely the right time. By deploying Mobile Edge Computing, a control and user separation architecture was built. This saved communication time by ensuring that data stayed local to the site. Automating the process resulted in more productive farming, reduced spending on fertiliser, and environmental advantage. [Learn more about this project.](#)

Accelerating the digital transformation with cloud

The integration of cloud, AI and IoT services is transforming service offerings for communications service providers and businesses by unlocking connected scenarios. The innovative combination will have several exciting applications for secure industrial automation solutions – from connected smart tools and machines to autonomous vehicles and robots. Read more about how the collaboration between Microsoft's Azure programme and Nokia's 5G ready wireless solutions can bring reliable connectivity and efficient coverage [here](#).

Next generation intelligent telecommunications

5G opens the doors for new enterprise IoT use cases. We are seeing telecom operators capitalize on new service opportunities enabled by 5G with market-ready IoT platforms. These platforms reduce the complexity of 5G for solution builders. Microsoft and an extensive ecosystem of industry-leading partners have enabled transformational business outcomes for the likes of Vodafone, Telstra, du, Telia and Deutsche Telekom. See [here](#) to learn more about how telecom operators are being enabled to deliver IoT solutions with 5G.

Private 5G networks

In close cooperation with NTT Ltd., a global IT services company, Cologne/Bonn Airport is building a completely private 5G mobile network on an area of 1,000 hectares, which will be one of the largest private 5G networks in Europe. The aim of the joint research and cooperation project is to promote technological innovations such as intelligent baggage and border controls and to significantly improve the operational efficiency of the airport. To meet all these requirements, NTT worked with Metaswitch (a Microsoft Company) for the core network and Airspan for the Access network, the instrument manufacturer Viavi and Cisco Systems. See [here](#) to learn more how this project enables airports, airlines and handling personnel on the ground, as well as third-party companies, to work together more easily and effectively.