



FREEMOVE ALLIANCE

GUIDING GLOBAL BUSINESSES TO HARNESS 5G WORLDWIDE





INTRODUCTION

Communication is indispensable to any organisation. But for businesses operating throughout the world and supporting a dynamic and highly mobile workforce, reliable and flexible connectivity partnerships can be the difference between success and failure.

Since 2003 The FreeMove Alliance has worked to harness the combined strengths and expertise of its members and associated partners to support the growth ambitions of some of the world's most recognised and respected global businesses.

Today we stand on the threshold of perhaps the most significant leap forward for mobile technology of this millennium – the introduction of 5G. Its capability and breadth of applications have the potential to change not only how we live our lives, but how businesses, cities and governments function, while also offering sustainability benefits over previous cellular technology standards. At this transformational time, the members of The FreeMove Alliance are perfectly placed to work together to help coordinate cross-border 5G solutions tailored to customers' individual needs, enable access to the extensive 5G footprint of the Alliance member and partner network, and underwrite quality of service to multinational corporations.

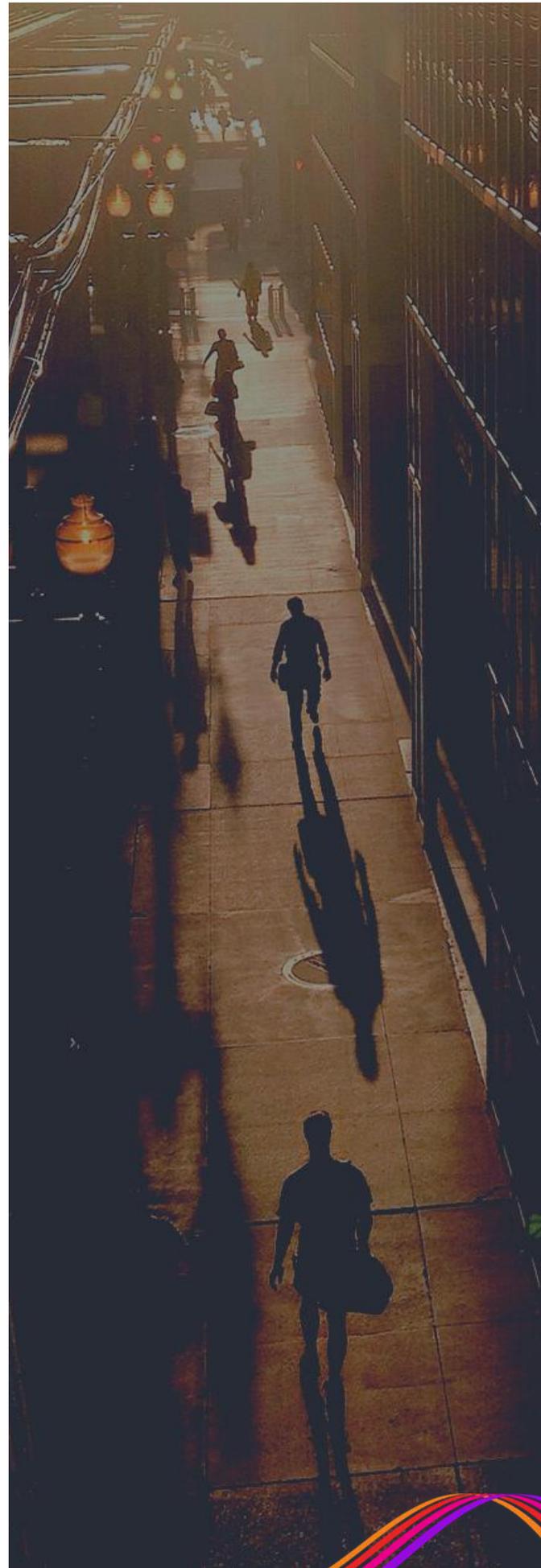
This paper is designed provide a global view of our members' 5G activities, examine developments in the technology to date, and explore the benefits it promises in the future. It is based on an in-depth audit of the markets of Austria, Croatia, Czech Republic, Germany, Greece, Hungary, Netherlands, Poland, Serbia, Slovakia, USA, Belgium, France, Spain, Romania, Italy, Denmark, Finland, Lithuania, Norway, Sweden, Switzerland, Luxembourg, and Turkey. It examines the many and varied applications of the technology for both consumers and Enterprises, and the opportunities it presents to enhance collaboration among mobile workforces.



5G – A SIMPLE DESCRIPTION FOR A COMPLEX DEVELOPMENT

It is important first to explain that the term '5G' has become shorthand for the current wave of network enhancements, when in fact it comprises two separate technical solutions, one current, and one future. The vast majority of what is referred to today as 5G, both within the industry and in the media, is overlaid onto existing 4G networks. Whilst it offers significant speed and capacity upgrades, they are typically over relatively short distances from masts. Therefore, consumers of 5G are usually operating on a combination of 4G and 5G signal.

Within the next two years this will be replaced by the widespread introduction of standalone 5G, an end-to-end solution comprising purpose-built 5G antennas, frequency, and transmission. It is this secondary iteration of the technology which is being tested on a localised basis within company and campus networks, with specific commercial applications which are discussed later in this paper.



COVERAGE

5G coverage is advancing at pace. The countries surveyed as part of this research have a diverse range of characteristics which influence how they are approaching their 5G rollout, such as population density, topography, the status of the existing 4G network, relative proportions of urban and rural populations, as well as the make-up of their economies and the regulatory environment for mobile operators.

There is considerable variation in 5G rollout across markets. In most cases there are clear and well-defined plans in place which will allow MNCs to make informed decisions both on their mobile communications strategies, and on the associated implications for their wider digital transformation programmes.

Each member of The FreeMove Alliance is advancing their 5G rollouts at pace across their respective footprints. To deliver the quickest benefits to the greatest number of businesses and consumers, the first phase of development is focused on urban areas where user densities are highest.

For MNCs it is important to assess in which areas of the countries 5G coverage will be required. FreeMove's Global Account Managers, supported by our Local Account Managers, can help inform this process ensuring cross-border solutions are fit for purpose.

We would welcome the opportunity to discuss your needs with you in more detail, and outline how FreeMove's unique capability is helping businesses like yours to flourish.

Contact us below and we will connect you to a Global Account Manager from our FreeMove team.

CONTACT US

EXAMPLES OF HOW FREEMOVE ALLIANCE MEMBERS AND PARTNERS ARE USING 5G TO TRANSFORM BUSINESS

Throughout the world there are countless examples of how 5G is changing the way businesses will operate in the future. From agriculture to manufacturing, members of The FreeMove Alliance are involved in groundbreaking partnerships which will improve quality and efficiency, reduce cost, and trigger further innovation. FreeMove members and their partners are collaborating with some of the world's leading Enterprises, including OSRAM, BMW, Schneider Electric, Boliden, and ABB.

DEUTSCHE TELEKOM DEVELOPS NEW USE CASES, INCLUDING THROUGH ITS CAMPUS NETWORKS

Through its public-private campus networking initiatives, Deutsche Telekom (DT) has entered partnerships with Germany's OSRAM lighting company, car parts maker ZF Group, and with the RWTH research institute at Aachen University. The overall aim of the campus networks is to support DT's enterprise customers, as well as its partners and local educational establishments, in developing new technologies, and co-creating solutions for industry digitalization.

In collaboration with Nokia, DT has also trialed 5G applications in the Port of Hamburg, to enhance environmental monitoring, traffic control, and maintenance support. The trial has demonstrated how operators of public networks can serve the industrial space with 5G slices and LTE proto-slices, segmented from their core network setups. Network slicing enables tailored network capability to be dedicated to clients for specific commercial applications, and ensures that they have reliable access to it. If you'd like to know more about the opportunities offered to businesses through network slicing, then you can find further information [here](#).

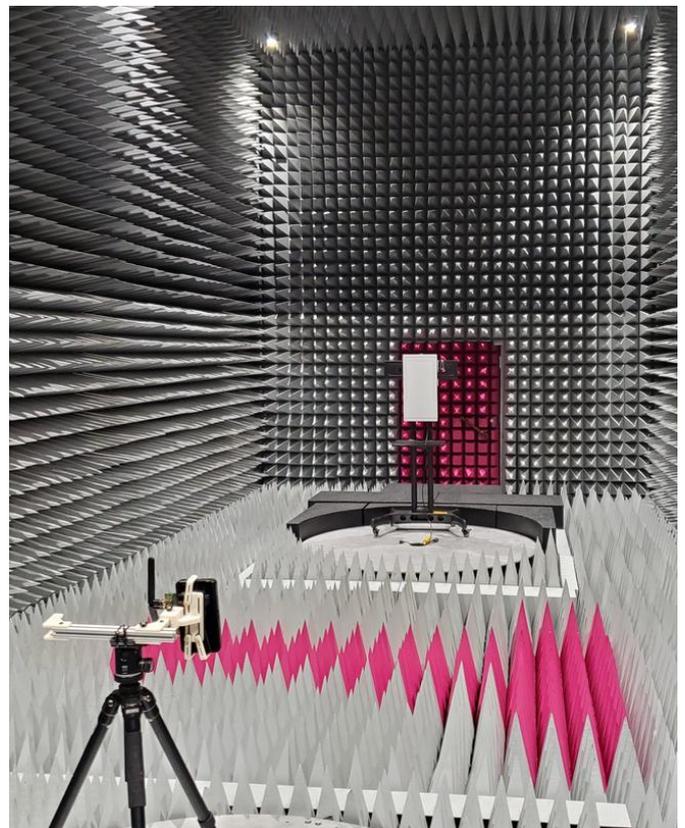


The campus networking initiatives are also helping DT to partner with Ericsson in jointly supporting their industrial enterprise customers. These include a dual-slice solution for BMW Group's Leipzig plant, comprising a private mobile communications network that is exclusively available to the facility. The ambition of the partnership is that several areas of production will eventually be controlled and monitored via this network. As well as the private campus network, the public network will transmit the same signal strength, ensuring flawless connectivity even for terminal devices that are not permitted to transmit in the private network, such as customers' or suppliers' smartphones.



T-MOBILE US OPENS ITS LAB NETWORK TO BUSINESSES FOR 5G TRIALS

In the USA a number of trials are underway of private LTE networks, network slicing, and a variety of mobile edge computing use cases, involving a range of sector leaders from banking and web-scaling to logistics and energy. Furthermore, T-Mobile US has launched a network of four labs to which it has issued an open invitation for businesses to attend and carry out 5G trials. The Atlanta site extends to 500 acres and enables trials of autonomous vehicles, drones, and next-generation robotics.



ORANGE AND SCHNEIDER ELECTRIC PIONEER INDUSTRIAL 5G IN FRANCE

In France, Orange has partnered with Schneider Electric to develop the country's first factory to trial industrial 5G. By deploying an indoor private virtualized network on experimental frequencies, the initiative will enable the convergence of Information and Operational Technologies (IT/OT) at the company's Le Vaudreuil factory. Five indoor 5G antennas have been installed within the factory covering almost 2,000 m² of production space and providing download speeds of over 1 Gbps. This will allow users of 5G enabled laptops to exploit their devices' embedded capability, wherever the user is located.

The 5G-enabled trials will also support two exciting use cases. The first will allow maintenance teams to connect smartphones to 5G using Schneider Electric's custom EcoStruxure augmented reality application. This enhances operational efficiency with augmented reality, allowing the superimposing of real-time data and virtual objects onto a cabinet, machine, or entire plant. It will help reduce machine downtime and streamline maintenance operations.



The second use case involves a mobile telepresence robot operating on 5G, and which will eventually enable remote visits to the Le Vaudreuil site. The performance of 5G allows extremely high-quality video to be used with minimal lag time in the virtual interactions between the visitor and the Schneider Electric guide that accompanies the robot throughout the Le Vaudreuil site. The initiative will help minimize travel time and costs and, most importantly, reduce the carbon footprint while providing end users with a unique experience.

TELIA SWEDEN AND BOLIDEN USE 5G TO REIMAGINE THE FUTURE OF MINING

In Sweden Telia are building and operating a dedicated local 5G-ready mobile network for mining company Boliden at Aitik, the world's most efficient open-pit copper mine located in the north of the country. The network will monitor and control the mining machinery, with the aim of enhancing productivity, improving the working environment, and increasing operational safety.

Telia will deliver a complete solution to Boliden with both radio network and core network, and will provide continuous management and development of the solution. The partnership will enable Boliden to accelerate its wider digital ambitions and embrace entirely new technologies. 5G technology will also connect and automate Boliden's different systems helping to identify process improvements, as well as support proactive maintenance of equipment to minimize risk for accidents and mitigate disruptions to production.



TIM APPLY 5G TECHNOLOGY TO HELP REINVENT MANUFACTURING

TIM is exploiting the potential of 5G to help shape Industry 4.0. by entering into a two-year partnership with Italian automation specialist Comau. Together they will explore the potential of IoT-based solutions within global manufacturing organisations, while also helping reduce waste and generate valuable data for real-time analysis. The partners aim to support the digital transformation of production processes by harnessing the power of 5G, Edge cloud, data analysis, robotics, and AI.

One of the first outputs of the partnership is the launch of 'Industrial IoT powered by Comau'. This revolutionary technology allows both on-site and remote monitoring and diagnostics of industrial production machinery, highlighting maintenance and assistance requirements using preventative and predictive systems. This is enabled thanks to TIM's ultrabroadband connectivity, Edge cloud and Industrial IoT services, and the digital technologies of Comau's in.Grid platform, supported by their factory automation and robotics expertise.

SWISSCOM HARNESSSES 5G TO STANDARDISE THE CONTROL OF INDUSTRIAL ROBOTICS

The global evolution of industrial robots has left a patchwork of different technology standards which are often unable to communicate effectively with each other. This directly compromises speed and flexibility when adapting production processes. Swisscom is working alongside ABB and Ericsson to overcome this using a 5G solution.



It will ensure that, in the future, machinery can be used anywhere in the world that a customer needs it, and integrate smoothly into any 5G-enabled production ecosystem.

At the World Economic Forum (WEF) in Davos the three partners demonstrated the potential of 5G in the field of autonomous machines. Visitors were invited to write on a tablet, which was then mirrored by two industrial robots 1.5km apart. The low latency of 5G allowed this to happen virtually in real time. The application of this technology will enable machines to be wireless and move autonomously, as well as allowing vastly more flexible configuration to support the needs of production.

EXAMPLES OF HOW 5G INNOVATION IS BRINGING NEW DIGITAL EXPERIENCES TO THE CONSUMER MARKET

Across the surveyed markets the creativity, breadth and reach of B2C applications of 5G were extraordinary.

TIM USES 5G TO EXPLORE THE POTENTIAL OF SMART CITIES

TIM has been a pioneer in the application of 5G to create Smart Cities of the future. It was the first to deliver a 5G antenna in Italy on millimeter waves, the first to provide full 5G coverage of the Republic of San Marino, and, in collaboration with the Municipality of Turin, the first to launch a networked drone fleet to monitoring the territory, city rivers, artistic monuments and municipal parks.

A key focus is mobility. TIM's Smart Roads project will use 5G to connect sensors placed on pedestrian crossings, communicating pedestrians' presence to nearby vehicles. Other tools, such as the Urban Georeferenced Alert, can share real-time information on road works and traffic queues, promoting smoother and safer traffic flows. These tools will also aid the introduction of self-driving cars, which will rely on 5G capability for fast and resilient data flow.

TIM envisage a host of other transformational benefits, including lamp posts which self-report faults and optimize energy usage based on needs, and recycling bins which will communicate when they need to be emptied. Traffic lights will work dynamically with the variable vehicle flow, ensuring an optimal balance based on the current road conditions. City monuments will also feature digital information and imagery delivered through augmented reality.

TELIA SWEDEN APPLY 5G TO TRANSFORM THE GAMING EXPERIENCE

5G technology is transforming mobile gaming. Sweden has become one of the major global hubs for gaming, with most Swedes under the age of 45 playing at least once a week. With cloud gaming in sharp growth, and in partnership with Microsoft, Telia Sweden is committed to using 5G to help deliver ground-breaking cloud gaming experiences. The partnership represents a look at the future of gaming where cloud computing resources and the speed, capacity, and low latency of 5G are converging to redefine gaming experiences to mobile devices, without the need for dedicated gaming hardware.

and municipal parks.



ORANGE TAKES SPORTS AND ENTERTAINMENT TO THE NEXT LEVEL WITH 5G

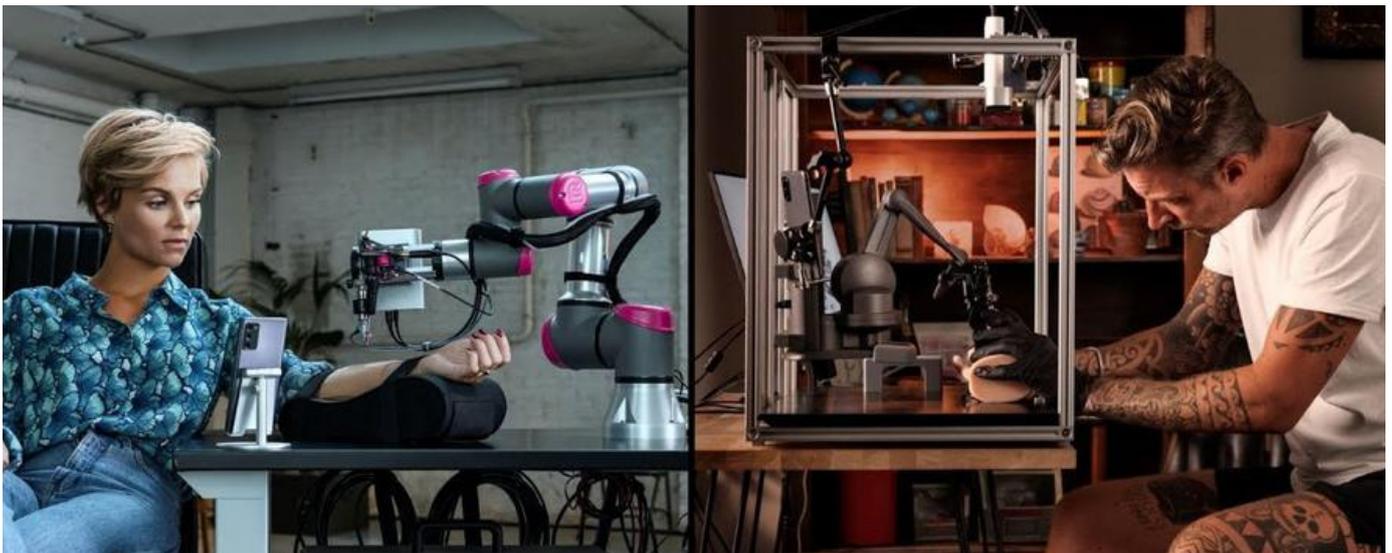
To enhance the spectator experience at sporting events Orange has been working with Vogo, a provider of audio and video solutions, to ensure fans don't miss play-by-play action, whether they are at home or in the stadium. Using a smartphone and a 5G network, members of the audience can perform an instant rewind of key moments in the match, shot from the angle of their choice. For example, Orange's 5G Lab, an innovation platform, and Vogo were able to test live broadcasting via an experimental 5G network provided by Orange at the 2020 Roland Garros tennis tournament in association with French public service France Televisions, and the French Tennis Federation.

Orange will be exploring further 5G use cases and showcasing its technology in its capacity as Premium Partner and Official Supplier to the 2024 Paris Olympics and Paralympics. The high-speed broadband networks installed in all venues will ensure that viewers around the world can share in the excitement of this great sporting event.



5G HELPS T-MOBILE EXPLORE REMOTELY APPLIED TATTOO DESIGN

Perhaps one of the most intriguing examples presented is in the Netherlands, where T-Mobile have demonstrated the extraordinary capabilities of 5G by enabling a tattoo artist to remotely operate a robotic arm for applying a design to a customer. This is one of several similar iterations of this application of 5G, which includes the performance of medical procedures by surgeons operating remotely.



5G enhancements to voice and data services

Whilst the principal focus of 5G has been on the creation and exploitation of new opportunities, it also promises major benefits to core voice and data services. Research carried out for this paper explored the implications of this, and although there were variances reported in the perceived level of importance across each market, there were several consistent themes.

In addition to greatly enhanced capacity, reduced latency, higher data speeds, lower overall power consumption and increased network reliability, 5G will also offer users several other direct and indirect benefits.

The 5G network will be vastly more secure than its predecessors, becoming a safer place for the transmission of data, and specifically the latest generation of fintech consumer propositions built for mobile devices. And with the proliferation of new and highly specific use cases for 5G, network slicing will become increasingly important in enhancing the breadth and application of available data services.



CONCLUSION

Such is the global confidence in the transformational potential of 5G, and the commitment to its rollout, that its progress has been virtually unaffected by the unexpected events of recent months. All over the world 5G's burgeoning infrastructure is coming to life, with the capability now available in most of the world's major cities. Already it is becoming clear that it is re-writing the rules of how, where, and why customers and businesses use mobile technology.

The FreeMove Alliance members and partners have been championing the opportunities enabled by 5G since the technology was in its infancy. We are committed to ensuring the delivery to customers of its full commercial and operational benefits, and are exploring innovative and valuable use cases which will transform not just industries, cities, and governments, but the way day-to-day lives are lived.

The introduction of 5G has increased the portfolio of opportunities The FreeMove Alliance and its members and partners can enable, either directly, or locally. And because the pace of 5G rollout will vary across regions, and take some time to reach 100% coverage, our role in helping co-ordinate the delivery of services to MNCs to allow them to benefit from 5G in the cities and regions where they do business, is vital. As an organisation comprising many of the world's most respected mobile operators, as well as offering local experts in each market working hand-in-glove with Global Account Managers, we can help ensure a uniformity of the benefits of 5G, helping businesses to seize new opportunities, and to prosper.

5G



Would you like to discuss your needs with us in more detail, to write the next chapter of your business together?

CONTACT US

www.freemove.com

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