



Your 5G advantage

Our 5G expertise

The future is exciting.

Ready?



**vodafone
business**

Will the real 5G please stand up?

5G will change the way we live and work, but not as soon as, or in the way most expect. It will be an evolution, not an overnight sensation. And, although the next-generation network's much heralded speed is essential, ultimately, its significance lies in the opportunity for new business models.

Speed, however, is the star of current conversation. Yes, the increase will be impactful. Just as importantly, 5G will create more efficient networks and bring significantly lower latency. No one can imagine what the combination will enable or all the use cases to come. What we know for sure is that businesses of all sizes stand to benefit. Transportation, healthcare, agriculture, retail, finance, education, manufacturing — you name it — will all transform in unimaginable ways with 5G as the catalyst.

5G will be to businesses what 4G was to consumers, eventually altering operations as much as the previous generation network reshaped user behaviour. We could not have envisioned the extent of these still emerging 4G applications, yet we'll never order food or transport, consume content or communicate in the same way again.

At the outset, as organisations continue to digitise and increase their reliance on data, 5G will significantly improve data flow. In

the longer term, say over the next 10 years, 5G will accelerate the IoT through greater density resulting in improved services. In fact, this next wave of connectivity will touch objects the most — infrastructure, equipment and buildings, for example.

With its full impact not being fully realised for a decade, why all the 5G frenzy now?

The rollout is already happening, therefore companies must start to prepare. Businesses of all types should begin thinking in the context of 5G and ask questions about how they might leverage its power over the next few years.

Having a clearer understanding about what to expect from 5G — and what not to expect — will give you a head start and help frame the possibilities. This eBook looks at the 5G landscape to help you break through the hype and uncover its real promise.



5G will have more of an effect on things than people — objects, infrastructure, equipment and buildings, for example.

What's so different about 5G?

Hindsight will show 5G as a quantum shift. Most users won't notice a change at first, but, at its height, the next generation of networks will connect everyone and every "thing" on a massive scale.

In fact, we're at a crossroads. The next wave of digital transformation requires the next wave of connectivity. Devices and applications are advancing beyond what 4G LTE can enable. Today's machine learning, AI, virtual and augmented reality, and tomorrow's robots and autonomous vehicles all require different types of connectivity characteristics. 5G will be the difference in how innovative capabilities and new technologies come to fruition.

In more technical terms, 5G allows for network slicing — dividing a single connection into separate slices to, for example, give different traffic types a different priority. It will facilitate multi-access edge computing (MEC) to bring processing power closer to the user for latency-sensitive applications.

New antennae, known as "massive multiple-input multiple output" (MIMO), will connect to huge numbers of devices. Moreover, massive MIMO is capable of beamforming, i.e. locking in on a user connection for much greater reliability. (See [glossary](#) for more details on these terms.)

In enterprises, education and public service, as examples, these differences will help digitise more applications and further automate processes to support a new level of productivity and create enhanced customer, student and citizen experiences.

In other cases, for industry, manufacturing, agriculture, transport, government and healthcare, reduced time between action and response will make devices, machines and sensors more reactive allowing for bi-directional communication and real-time remote control.

Simply put, once 5G is fully deployed it will offer:



Higher speeds

The peak rate will reach and exceed 1Gbps.



Lower latency

A round trip will decrease from 20ms to 10ms — with potential to be even lower.



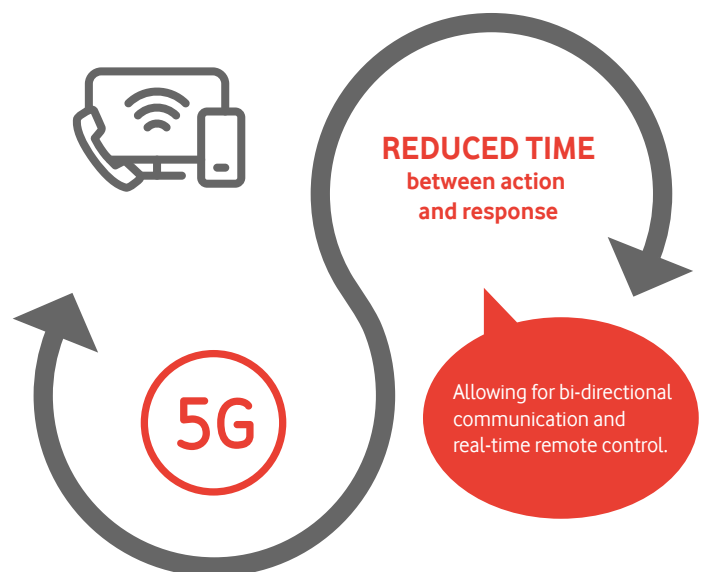
More efficiency and reliability

Networks will manage traffic better, resulting in increased capacity and consistency.



Higher density IoT

Tens of billions of connected things will be supported in the future.



What to expect from 5G

Manufacturers are already experimenting with things like predictive maintenance and adaptive control. 5G will be a boon to these efforts and make the environment truly wireless. Today's Wi-Fi, the current default connectivity mechanism for buildings, campuses and other sites, is not always convenient, reliable or compatible with the environment.

5G will provide the opportunity to rethink how individual sites connect to the corporate fixed network. Fixed networks will not go away any time soon but with high bandwidth, high reliability connectivity that can prioritise different traffic types available in the air, 5G could herald a revolution in how we access the corporate fixed network.

Private networks, enabled by 5G's capabilities and coverage characteristics, will overcome other deficiencies. In a factory, for example, machines, tools, parts and people will become perfectly synced raising production and facilitating mass customisation for a better customer experience.

Early on, the possibilities of 5G seem endless. In cities, 5G will soon enhance traffic management through sensors detecting congestion, combined with smarter lights and road signs to ultimately ease traffic flow.

In emergencies, for inspections or mapping purposes, 5G-enabled drones will quickly go where humans cannot and capture much more information.

In healthcare, always-on, ultra-reliable connectivity with high-network priority could support real-time remote patient monitoring — even for critical conditions like epilepsy, stroke and heart disease.

Remote surgery in healthcare, untethered robots in warehouses, enormous operator-free cranes in construction and safe, autonomous vehicles on roads are certainties in the more distant 5G world.

Further futuristic applications are practically inconceivable to us today, but the possibilities are vast.



When to expect what

The migration to 5G will be an evolution. Some of the features of 5G will be implemented on upgraded 4G networks in a process referred to as 4G Evolution (Evo). 4G Evo will act as the bridge to 5G, making this the first time in history that one mobile network has needed the previous one to be born.

In fact, some of the previously mentioned 5G technologies like Massive MiMo, network slicing and MEC can be deployed now using 4G Evo.

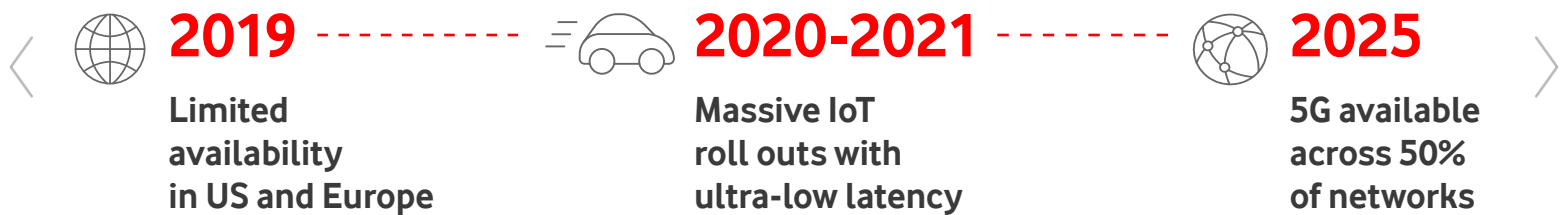
At the start of 2019, 5G was available to a degree in the U.S. and some European countries. Those deployments, however, mostly deliver on marginally perceptible higher speed. 5G-ready devices are in development and could come to market by year's end.

Major change is still several years away. Pervasiveness even further. But governments around the world are heavily investing in the technology and see 5G as a means of growing their economies.

By 2020-2021, 5G's more sophisticated capabilities will appear. The ultra-low latency and reliability that supports massive IoT will start to roll out then. By 2025, we should see about 50 percent network coverage according to [the GSMA](#).

Before ubiquity, broader market collaboration is needed as it's clear the growth of 5G depends on an ecosystem of suppliers. The complexity of the next-generation network requires telecom operators, hardware manufacturers, system integrators, governments and start-ups to collaborate.

As 5G reinvents business, from the biggest industries to small enterprises, and advances from large cities to small towns, "digital arenas" will be an offshoot. A concept wherein multiple companies bring specialist capabilities and work together on research and development. Expect to see a surge in public/private partnerships. Harnessing and analysing critical 5G data will become commonplace outside of the technology sectors.



What not to expect from 5G

Even though the real benefits of 5G are well-documented, it's easy to get caught up in 5G buzz. [Gartner puts 5G](#) as rising to the top of "peak of inflated expectations" in its hype cycle of emerging technologies. The firm expects this fervour to peak in the next few years. Until it gets beyond the later stages, not all the talk should be believed.

For one, the purported rate of 5G speed is misunderstood. As already mentioned, 5G will absolutely increase network speed, but not by 100 to 1,000x as the hype would have us believe. Nor, as pointed out, will change from 5G happen suddenly.

Misconceptions also exist around latency. In terms of transmission delay, many incorrectly believe that 5G New Radio is needed to

produce low latency. That's true for ultra-low latency that will eventually arrive. However, low latency can be reduced by more than half with 4G Evo combined with MEC.

It's also misleading to believe that 5G can transform on its own. 5G will bring other technologies together and drive new use cases, but it's the underpinning of transformation, not transformative in and of itself.

Most importantly, it's a mistake to have a wait and see attitude about 5G. Despite the unknowns, there are plenty of certainties to prepare for now.



Get ready for 5G by asking these 10 questions

Smart companies are priming for 5G today. The leaders are strategising their next waves of transformation on the back of this next wave of connectivity.

Opportunity looks different for each industry and individual organisation, but all should be talking about 5G. It's essential to ask questions like:

1. What's exaggerated versus what's real for our business?
2. How can 5G fundamentally change the way we operate?
3. Are we already behind? If so, what's the best way to catch up?
4. How do we ensure our business is optimised for the 5G journey?
5. Do we need to reconsider our business model to thrive?
6. How should our products and services evolve to take advantage of 5G?
7. Which already tested 5G use cases apply to our business?
8. What's on our 5G wish list?
9. Which organisations and companies are going to be fundamental parts of the 5G ecosystem?
10. Who do we need to partner with?

Along with this inward assessment, be sure to invest time in understanding what 5G will bring to the macro environment. Pay attention to how the infrastructure is progressing.

Smart companies are preparing for 5G today. The leaders are already thinking about how to drive their next wave of transformation with the next wave of connectivity.

In theory, 5G will change “everything” — an idea which can be quite intimidating. Instead consider 5G's fundamentals: It's about greater bandwidth, higher speeds, lower latency and better quality of service. Focus conversations now about how these capabilities will redefine your business.



5G ushers in a new era in connectivity.



5G ushers in a new era in connectivity. Whilst 5G is the next generation of mobile communications, its impact will extend beyond pure mobile usage into areas traditionally regarded as fixed connectivity and into new applications for IoT connections. Vodafone has played an integral role in the rise of mobile technology over the past 30+ years and will continue to do so in the 5G world.

Our expertise, gleaned from decades leading this evolution, means we bring context and authenticity to 5G. We can help you understand where 5G builds on current 4G systems, what's genuinely new about it and advise businesses of any size, sector or location about what it means to their specific environments.

Vodafone recommends a phased, market-driven approach with a realistic timetable to induce commercial 5G services, but we urge you to start now. We know the right questions to ask and can help envision and realise potential use cases enabled by 5G in the future or 4G Evolution today.

**Let's work together
and explore the possibilities.**

Visit: vodafone.com/business/why-vodafone/5G-for-business

Glossary

Latency – Latency is the roundtrip time it takes for a packet to go to and from the application server, measured in milliseconds.

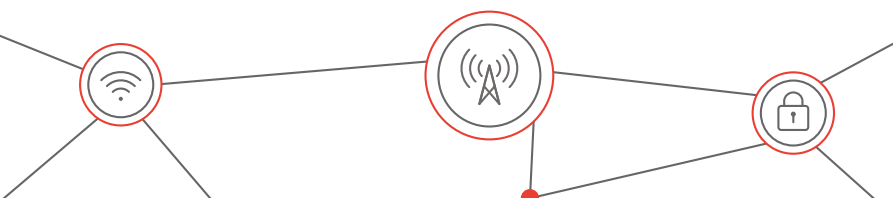
4G Evo – The existing 4G LTE technology that serves as the bridge to 5G.

5G NR – “New Radio” cellular technology that is being developed as part of the 5G network works more efficiently in larger spectrum allocations than 4G Evo.

Massive Multiple Input Multiple Output (MIMO) – MIMO is a technology used to multiply the capacity of a wireless connection without requiring more spectrum. Massive MIMO changes the way the signal is radiated, providing multiple beams of signal, where each beam is assigned to a unique user or a group of users, allowing more effective communication, providing higher site capacity and less interference.

Network Slicing – A way of dividing a single connection into separate slices for traffic with different priority characteristics. Operators will offer specific services to different customers with virtual/logical network slices over the same physical network, giving them the guaranteed bandwidth or low latency. Network slicing is expected to play a critical role in 5G networks because of the multitude of use cases and new services which will each have different functionality and performance requirements.

Multi-access Edge Computing (MEC) – Putting processing power on the edge of the network rather than deep inside the internet for latency sensitive applications. MEC reduces average end-to-end latency by >60%.



About Vodafone

Vodafone Group is one of the world's largest telecommunications companies and provides a range of services including voice, messaging, data and fixed communications. Vodafone Group has mobile operations in 25 countries, partners with mobile networks in 44 more, and fixed broadband operations in 19 markets. As of 31 December 2018, Vodafone Group had approximately 700 million mobile customers and 21 million fixed broadband customers, including all of the customers in Vodafone's joint ventures and associates. For more information, please visit: www.vodafone.com

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