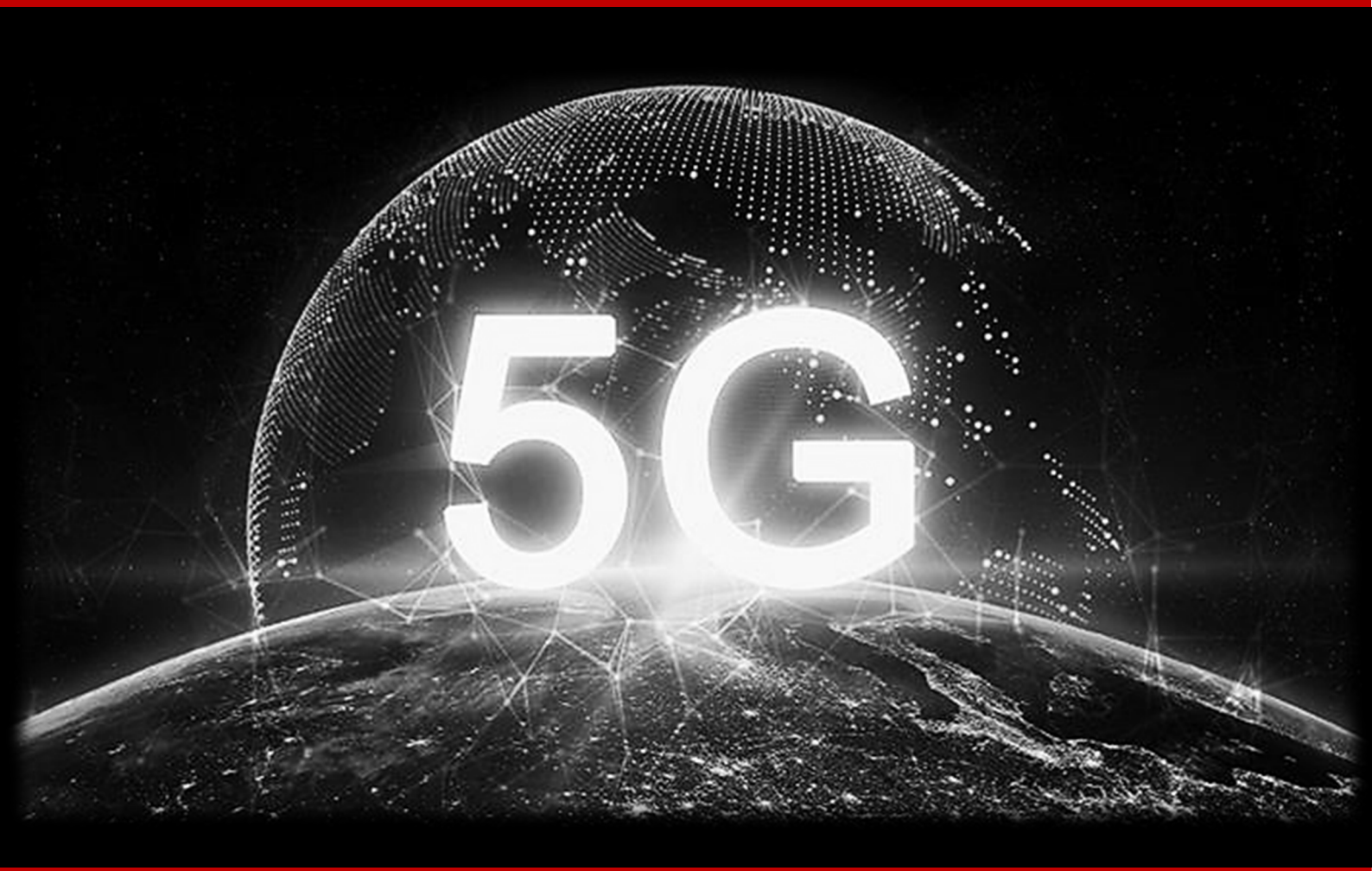
MOBILECORP

5G ACTION PLAN FOR AUSTRALIAN BUSINESS 2023



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5G enables Industry 4.0

The true power of 5G is that it is arriving at the same time as other technologies are maturing.

These include software-defined networking, the internet of things, cloud computing, machine learning, artificial intelligence and edge computing.

It's the unique convergence of technologies that makes 5G far more revolutionary than any earlier shift in mobile technology.

Fourth industrial revolution

All industrial revolutions have coincided with major technological revolutions, beginning with the steam engine, followed by electricity, the computer. 5G is being heralded as the enabler of the fourth industrial revolution – the connectivity revolution.

> *With every G, we've had faster speeds. 5G will certainly bring that, but will bring so much more.*
>
> *It'll be at the core of enabling services that require low latency, no network slicing, and the ability to have different qualities of service depending on what you're trying to enable. 5G is truly revolutionary."*
>
> *Ana Tavares Lattibeaudiere, Head of North America GSMA*

5G is more than just a pipe

There has been a lot of hype about 5G. In fact, there's been so much rhetoric we were getting 5G-jaded before the product even arrived.

However, just because 5G is to realise its full potential, does not mean the anticipation is misplaced.

Unlike 4G/LTE, 5G will be more than just a pipe. It represents a purpose-built technology, designed and engineered to facilitate connected devices as well as automation systems.

5G has the capacity to deliver an unprecedented level of connectivity, between humans, between humans and machines, and machines to machines.

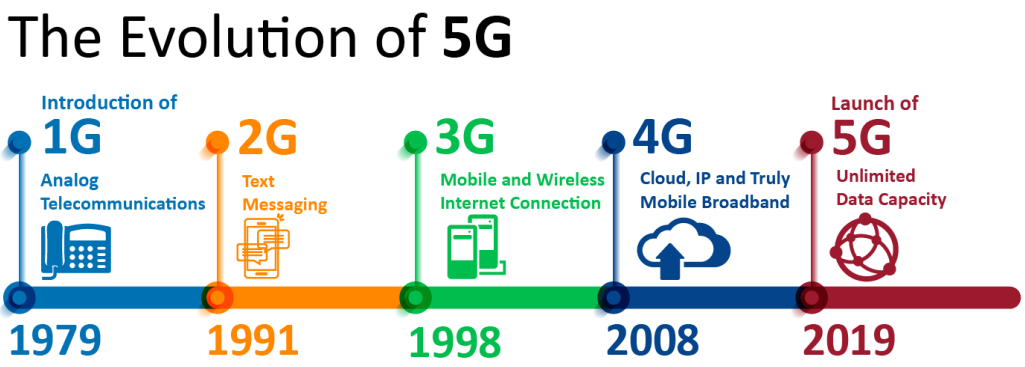
> *It's not just another G. It's so powerful, the best way to think about it is as a whole new technology.*
>
> *Tami Erwin, Verizon EVP and Group CEO of Verizon Business*

Intelligent connectivity is the promise

Intelligent connectivity is the promise of 5G.

Big data, machine learning, artificial intelligence, and edge computing are poised to deliver unimaginable capabilities and 5G is the enabler for all these technologies.

> *As 5G rolls out, so possibilities become reality. And by connecting everyone to everything, across every industry, these opportunities are without limits.*
>
> MWC Barcelona 2020



Current State of 5G in Australia

Telstra and Optus both periodically claim they have the fastest 5G network in Australia but for business that claim is really missing the point. Far more important, is network reach. So where is 5G at in Australia entering 2023?

What is needed to deliver 5G?

For 5G to realise its potential, there are three elements required to build out the 5G network. They are:

1. **Spectrum**
2. A **physical network**
3. **Devices** for consumers to use

Some spectrum has been sold, the rollout of the physical network is well advanced, and every major phone manufacturer now has a 5G model available.

First comes Spectrum

The first 5G spectrum auction in Australia happened back in December 2018.

The results were dominated by Telstra, a joint venture between Vodafone and TPG – now known as TPG Telecom, and Optus,

All three leading telecommunications carriers have been vying for 5G dominance by accumulating as much spectrum as the government will allow, and by accelerating the physical rollout of their networks.

Millimetre wave spectrum true gamechanger

Late in 2021, the federal government auctioned off the first slice of valuable "millimetre wave" spectrum. The auction covered bands from 25.1 Ghz to 27.5 Ghz in 29 specified geographic areas, covering the most heavily populated regions of Australia.

The leap to the much higher frequencies of mmWave is expected to set off an explosion of innovation in the Internet of Things, smart city technology, automated vehicles, and ultra-fast fixed wireless broadband.

However, the millimetre wave spectrum has a much shorter range than the lower frequency bands meaning mobile network operators must install antennas and equipment at many more sites to achieve the same coverage.

Unlike the large sole-purpose towers used in macro-cell 4G networks, 5G makes use of "small cell" technology which can fit on smaller sites such as utility poles and the outside of buildings.

While its range is lower and it cannot penetrate walls currently, millimetre wave spectrum allows higher speeds and lower latency than the lower bands, and can support much more traffic.

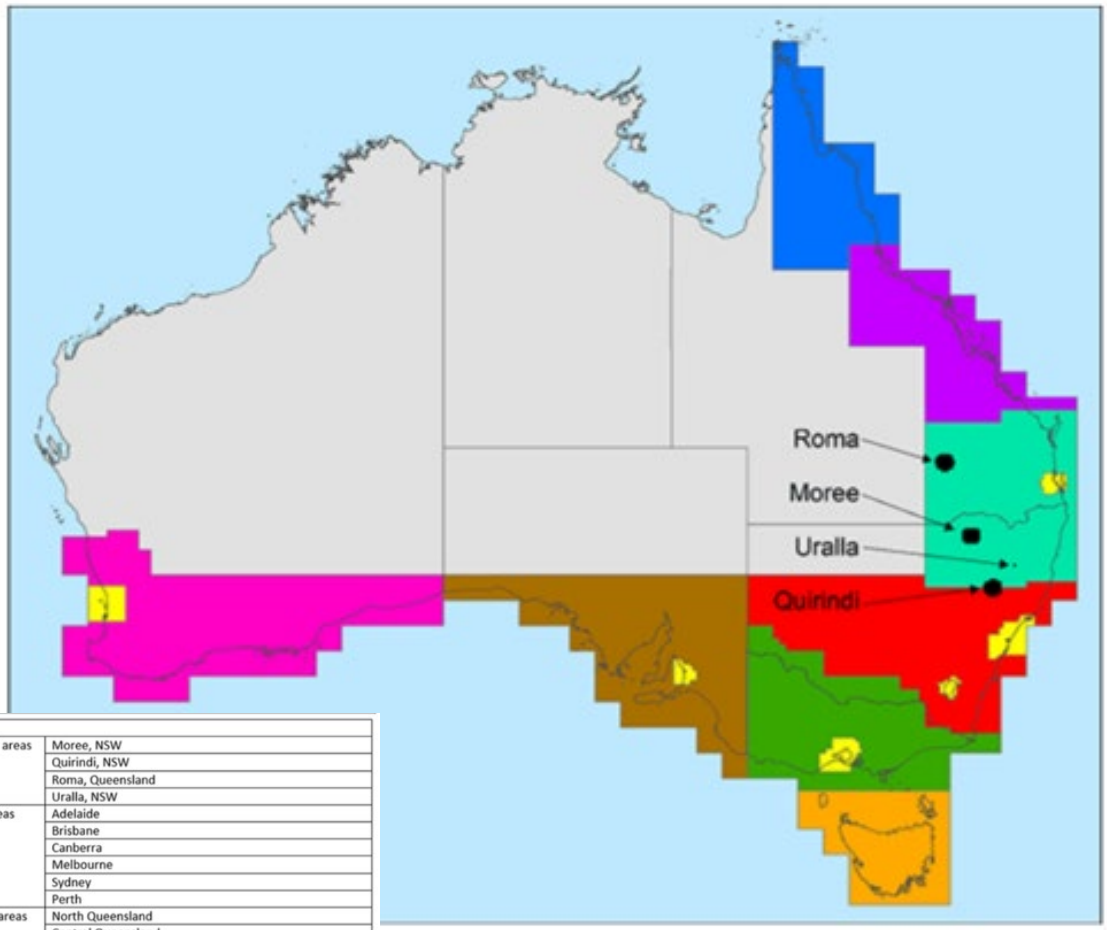
Race for 5G network dominance

Telstra and Optus are vying for dominance in the 5G market. Both claim to be in the lead and both have invested heavily in new network infrastructure and rollout. On the ground, this means installing or upgrading new base stations.

The two rivals are delivering regular announcements about the reach of their 5G capabilities. Telstra is recognised as have the wider reach while Optus claims faster speeds. In reality, every site is different and will need to be assessed to determine signal strength and viability.

Vodafone and TPG were forced to halt investment in the space while they waited to learn if their merger would be allowed to proceed. The joint venture was given the go ahead by the Federal court in early February 2020. Now known as TPG Telecom the joint venture is still playing catch up.

During the Covid-19 pandemic, Telstra and Optus both accelerated their rollout schedules.



KEY:		
Black	Exercised areas	Moree, NSW
		Quirindi, NSW
		Roma, Queensland
		Uralla, NSW
Yellow	Metro areas	Adelaide
		Brisbane
		Canberra
		Melbourne
		Sydney
		Perth
Blue	Regional areas	North Queensland
Purple		Central Queensland
Turquoise		Regional Northern NSW / Southern Queensland
Red		Regional Southern / Western NSW
Green		Regional Victoria
Orange		Tasmania
Brown		Regional South Australia
Pink		Regional Western Australia

5G devices no longer a barrier

One of the biggest barriers to 5G adoption initially was the slowness of Apple to produce a 5G-compatible iPhone. This resolved with the iPhone 12 launch in October 2020. Samsung, Huawei and Oppo had launched 5G compatible devices a full 18 months earlier. Now in 2023 most consumers have 5G compatible devise and we will see the availability of more lower cost 5G devices as Qualcomm introduces lower cost 5G chips.

Telecommunications Carriers pushing global 5G standards

Six major carriers from around the globe have formed the 5G Future Forum, a group that will collaborate on global 5G interoperability to accelerate adoption of the new technology.

The founding members are US carrier Verizon, Canada's Rogers, Europe's Vodafone, Australia's Telstra, Latin America's América Móvil, and South Korea's KT — each a heavy hitter, if not the heaviest, in its respective market.

The 5G Future Forum is focused on advancing 5G-enabling technologies, notably including mobile-edge computing to radically reduce network latency and improve data performance.

> *5G is a key enabler of the next global industrial revolution, where technology will transform how we live and work. It's critical that technology partners around the world unite to create the most seamless global experience for our customers.*
>
> *Hans Vestberg, Verizon CEO*

Telstra's Group Executive for Networks and IT, Nikos Katinakis, welcomed the initiative which recognises Telstra's 5G leadership on the global stage.

> *Telecommunications companies are in the driver's seat when it comes to creating opportunities for their customers to take advantage of the world of possibilities enabled by 5G.*
>
> *We are proud to stand alongside these global 5G leaders, combining our experience and capabilities, as well as 5G leadership, to develop initiatives to bring mobile-edge computing to life.*

Globally the major mobile providers are developing connectivity based on the eight currencies of 5G, being:

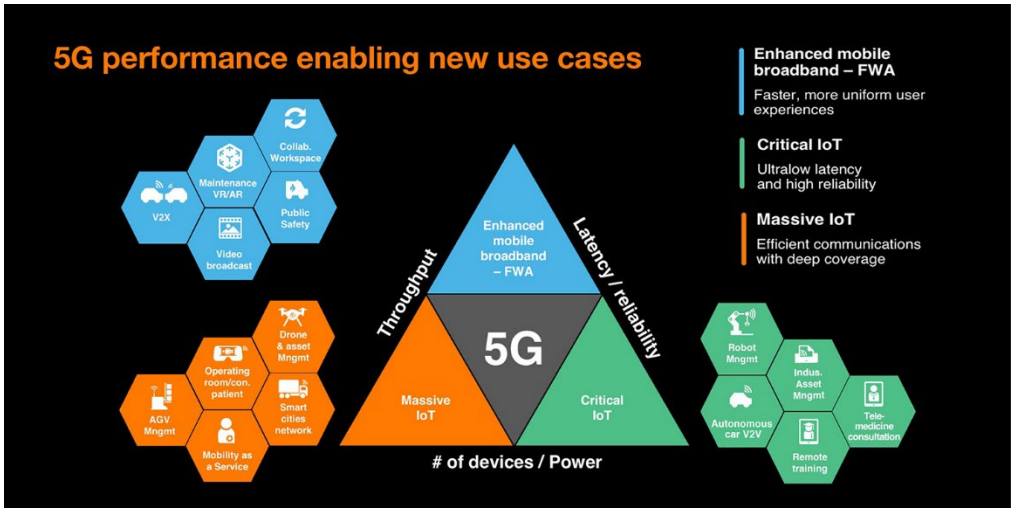
- high peak data rate
- robust mobile data throughput
- super low latency
- capacity
- high speed
- service deployment
- energy efficiency
- network reliability

Evaluating 5G for Business

How to translate the potential of 5G into real commercial opportunities, is the question that Australian business need to evaluate.

There has been a lot of rhetoric about the game-changing capabilities of 5G, but leaders are struggling with how best to harness the potential to create a real competitive advantage. When evaluating the potential of 5G we need to bear in mind:

- 5G networks are **highly scalable** and can solve various existing pain points across multiple industries, as well as address completely new use cases and applications otherwise not possible with existing networks.
- 5G is about agility being able to move to meet the market demand by **enabling new services to be launched in a matter of days**, not months or even years, as is the case with today's existing networks.
- 5G is about extending the capabilities of macro-cells and small cells beyond connectivity, and transforming them into intelligent computing hubs capable of **bringing smart services close to the end user.**
- 5G is more than just an access technology. It should be seen as **a transformation tool** capable of supporting flexible implementation scenarios across licensed and unlicensed spectrum and across public and private networks.
- 5G is about **accelerating many other technologies** and business models, helping them achieve their full potential and capturing brand new business opportunities. These are the assets the industry should focus on to unlock new business opportunities across the entire value chain.



5G is all about business

5G is all about the enterprise.

The consumer case for 5G is a little underwhelming. Beyond more speed and streaming video or gaming, the mobile network providers haven't made much of a case for 5G.

Unsurprisingly, consumers have not shown much interest in 5G and have no appetite for paying more for it either.

5G has not proven to be a compelling reason to upgrade devices and consumers just assume their new phones will have access. Generally, consumers and business are stretching out smartphone purchases, questioning the price for premium products, and looking toward cheaper devices.

> *There's nothing new in 5G for consumers. It's just faster speeds, perhaps. Carriers must consider enterprise business models carefully. What 4G did for consumers - introduced all of these social media applications, remote working capabilities... 5G can do the same for enterprises.*
>
> *Dimitris Mavrakis, Research Director, ABI Research*

Where to start with Enterprise 5G

> *"To know what you know, and what you do not know, that is true knowledge."*
>
> *Confucius*

Even the mobile network providers themselves have admitted they don't know what all the 5G use cases will yet be.

In the midst of its 5G build, Telstra group executive of product and innovation, Christian von Reventlow, said 5G would inspire as-yet "unforeseen innovation" that Telstra would be able to monetise.

> *So, like in 3G, the iPhone appeared. And nobody had predicted the iPhone when they rolled out the 3G network. They probably predicted other uses.*
>
> *When 4G came, I don't think anyone had predicted that YouTube and Netflix would dominate the world. I think there will be new things appearing which we don't expect today, beyond what we are talking about today.*

Focus on bandwidth, low latency

The first-generation 5G networks are focused on extending business continuity to existing LTE networks, with the main outcomes being faster speeds, higher bandwidth and low latency. This is where the first business use cases will also begin.

First, we will see high bandwidth use cases, followed by low latency and then data-driven intelligent connectivity solutions.

SHORT-TERM: HIGH BANDWIDTH

- Wearables
- Smart CCTV
- VR/AR gaming
- Sensor monitoring
- In-store digital signage
- In vehicle entertainment
- Cloud-based management
- Drones for inspection
- AR/VR remote training videos
- Connected consumer electronics

MEDIUM-TERM: LOW LATENCY

- Smart cities
- Remote health monitoring
- Precision farming
- Smart roads/transport
- Virtual tourism
- Wireless smart grid/meters
- VR for telemedicine
- AR for financial data visualisation
- AR/VR for operations support
- Smart hotels

LONG-TERM: ADVANCED CONNECTIVITY

- Remote surgery
- Remote control of factory robots
- Connected robotics
- Remote controlled drones for logistics
- AR/VR for in store shopping experience
- Self-driving cars
- Automated factories/warehouse

First Australian Business Use Cases

5G will enable a range of maturing technologies. The lower latency and faster speeds will push the boundaries for use cases that require close to real time performance.

First technologies enabled by 5G

The first technologies to be enabled by 5G are predicted to be:

1. Internet of Things
2. Video
3. Gaming
4. Location Tracking
5. Data Analytics
6. Mobile Cloud / Edge Computing

1. Internet of Things (IoT) and 5G

The mass amount of information being created by the IoT has the power to revolutionise everything from manufacturing to healthcare to the layout and functioning of smart cities - allowing them to work more efficiently and profitably.

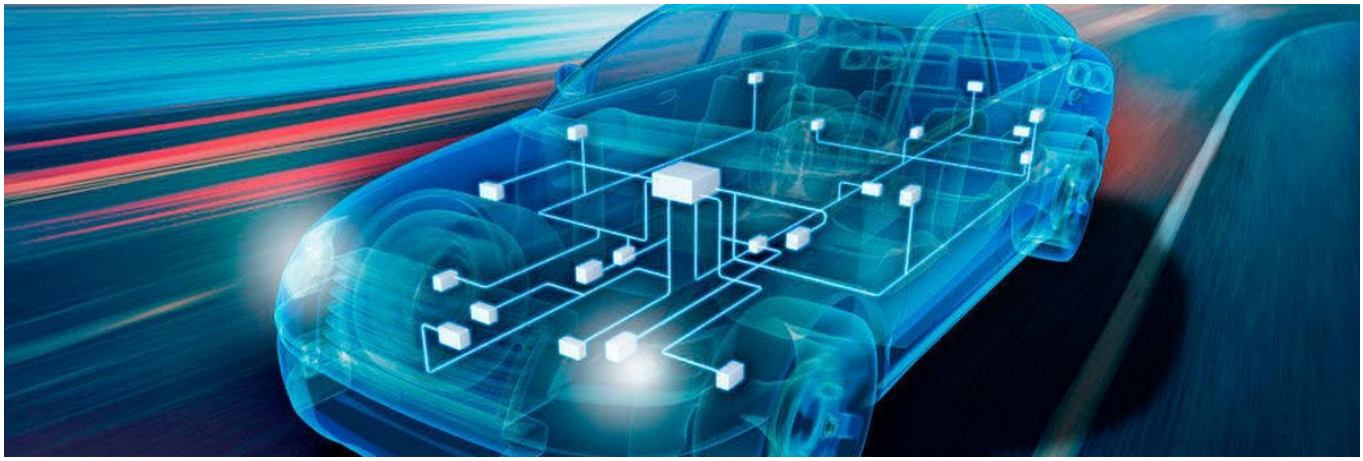
Smart cameras first, vehicles second

Research consultancy, Gartner, predicts that outdoor surveillance cameras will be the first mass market 5G IOT solution.

Then as the focus on security cameras declines, Gartner predicts we will see the rise of vehicles as the fastest growing IoT 5G use case – not autonomous vehicles, but 'connected cars'.

> *By 2023, the automotive industry will become the largest market opportunity for 5G IoT solution representing over half of the 5G endpoint opportunity.*
>
> *Gartner*

Within the automotive sector, embedded connected-car modules will be a major use case for 5G. Gartner predicts the share of 5G-connected cars actively connected to a 5G service will grow to 94% by 2028. By then it is expected that 5G technology will be used for Cellular V2X communications that enable messages to be sent and received within vehicles, and between vehicles, infrastructure, pedestrians, cyclists and more.



IOT endpoints to explode

There are expected to be more than 30.9B IoT devices worldwide by 2025.

*(*Source: Business Insider, IoT Analytics, Gartner, Intel, Statista*)*

According to the latest research, the number of IoT-connected devices globally reached 11.7 billion in 2020. Note that this is higher than the number of mobile devices in use in the world.

The number of cellular IoT connections is expected to reach 3.5B in 2023.

*(*Source: Ericsson*)*

The ongoing large-scale deployment in China is the main factor behind the almost doubling of the forecast for the internet of things mobile market. Of the **3.5 billion cellular IoT connections**, expected to be present in 2023, 2.2 billion are anticipated to be active in North East Asia.

2. Video

It was widely predicted that video would make up 82% of all internet traffic by 2022. This predication proved a little ambitious but still at the end of 2022 it equated for 65%. The real opportunity for video teamed with 5G is for it to be consumed in a more immersive form.

> *The opportunity for customers to have much more immersive experiences around video, and differentiated experiences across video, across all of their devices, we think is really significant.*
>
> *Michael Ackland, Telstra Group Executive Consumer and Small Business*

Michael Ackland, Telstra Group Executive Consumer and Small Business, says use cases will be immersive experiences "in a stadium, at a concert, at an exhibition, in your home, where you're able to get high definition 4k, 8k video experiences combined with the immersive experiences around virtual reality or augmented reality in real time."

Telstra has already looked to move into this space with its delivery of 5G to the MCG for the AFL Grand Final in 2019. Since then all the network operators have moved to establish 5G in new stadiums in Perth, Parramatta, Sydney and Brisbane. Telstra wants to utilise 5G to deliver an enhanced stadium experience.

3. Gaming

> *A couple of things about gaming. First thing, gaming is not a niche application. We know that in our customer base we have more than 2.5 million households who are intense gamers. And they're not kids; 39% of these are Gen X and Gen Y, 24% are baby boomers. These are people who spend a lot of time gaming.*
>
> *Michael Ackland, Telstra Group Executive Consumer and Small Business*

The gaming industry itself is making a big transition away from expensive consoles towards cloud gaming. Console gaming is declining at 5% pa. Cloud gaming is growing at over 15% pa.

"To enable cloud gaming across all of your devices you need a different kind of connectivity experience. The benefits of 5G with its bandwidth, ultra-low latency and the speeds to create a seamless truly immersive, ultra-responsive gaming experience across all devices. Gaming will be one of the very first early use cases which only the combination of technologies will be able to deliver."

4. Location Tracking

5G allows for far more precise location tracking than what's possible currently in 4G. The technology requires more cell phone towers placed closer together – which allows for better triangulation. That combined with the higher speed and lower latency will mean real-time location tracking, which has applications in fleet management, warehouse efficiency, public safety, autonomous vehicles, marketing, and the list goes on and on. The business use cases for 5G in location tracking are endless.

5. Data Analytics

Data capture is at the sweet-spot taking full advantage of 5G network characteristics such as high-bandwidth, low-latency and mobile edge computing (MEC).

Although previous networks have focused on centralisation in the cloud, the 5G network will focus on diversification by handling as much processing as possible at the network edge.

Multi-Access Edge Computing (MEC) will make it possible to assemble information as it is provided from a broad array of logs and interactions and forward a summary to a core or larger node for further processing.

5G's ability to support massive connectivity across diverse devices – sensors, gateways, controllers – backed by the distributed compute architectures, creates the ability to translate big data-at-rest and data-in-motion into real-time insights with actionable intelligence.

6. Mobile Cloud/Edge Computing

Mobile Cloud Sensing, Big Data, and 5G make up an intelligent and smart world.

Mission-critical applications such as public safety and healthcare need analytics in real-time.

Thanks to slicing-based traffic prioritisation and MEC-based local analytics, combined with the latency improvements promised by 5G we will have a foundation for supporting mission-critical edge analytics and tactile internet applications.

5G makes it possible to not just sense and analyse at the edge, but also to trigger response actions within fraction of seconds as data seamlessly travels from cloud to end points and vice-versa.

Australian industries facing 5G disruption

Australia's mobile network providers are working hard to help industry see the potential use cases that 5G can deliver. Below is a view of how 5G could most disrupt and benefit industry verticals.

Energy and Utilities

The energy industry is responsible for the production and distribution of energy, water and gas across Australia. It overlaps considerably with the utility industry, which is responsible for the infrastructure used to provide public services - dams, sewerage systems, power lines, stormwater drains.

In the coming decades, it's expected that this sector will change considerably as it faces three main challenges: increasing demand for renewable energy sources, a growing need to invest in Australia's energy infrastructure, and the pressure to adapt to new policies and public expectations as private and public organisations respond to environmental changes.

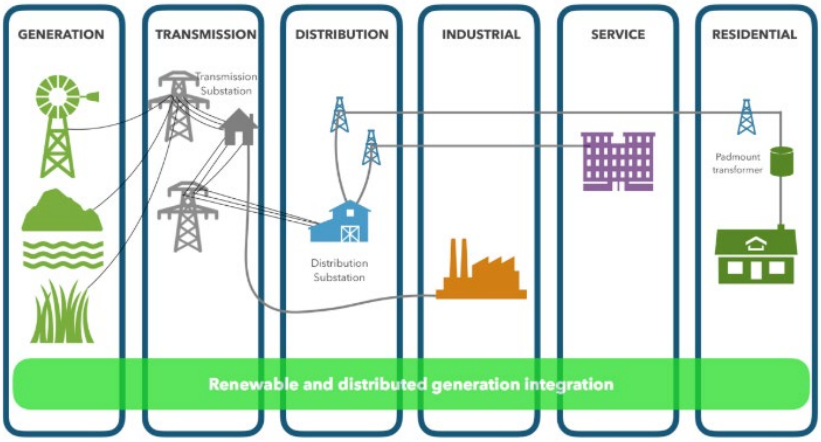
Smart Grids

5G will support energy utilities in the transition towards decentralised renewable-oriented systems and electrical grids. 5G will enable the "smart grid", which is essentially an electricity supply network that uses 5G technology to detect and react to local changes and usage.

Smart Grids can autonomously control and manage multiple energy sources to deliver more reliable power supply. These smart grids allow operators to better optimise energy usage via 'demand response' methods such as releasing or storing renewables according to peak demand, forecast weather and optimise for time of day.

5G will also dramatically increase the lifespan of battery-dependent devices, sometimes by up to 10 years. This makes mass deployment of IoT sensors a more practical solution for the energy industry.

5G also supports the use of drones to monitor and maintain transmission of production assets, leading to improved grid uptime. This alone could generate a 30% reduction in costs.



Mining

5G will enable automation and data analysis that will make Australian mines safer, more efficient, and better equipped to manage environmental concerns.

5G will enable better fleet management and machinery utilisation, wide area communications, introduction of autonomous vehicles, real-time location of assets, preventative and predictive maintenance, access to real-time data and analytics, and drones for exploration.

With many moving parts operating in harsh and often dangerous conditions, 5G will offer improvements in proximity and collision detection, along with the ability to monitor environmental factors like air and water quality.

Manufacturing

The biggest threat to manufacturing companies is not being able to move quickly enough to respond to fast-changing market conditions and customer requirements. They need to have the ability to 'scale-up' at a moment's notice. This requires an interconnected value chain and agile digital infrastructure, maintenance management, and is especially important as new data-intensive innovations continue to transform the industry.

5G is poised to help manufacturing production operations become more flexible and efficient, while also improving safety and lowering maintenance costs.

Smart Factories

5G technology will enable manufacturers to deliver 'smart factories' which leverage automation, artificial intelligence, augmented reality, and IoT.

Tethered and untethered robots could be controlled, monitored, and reconfigured remotely over the 5G mobile network.

Machinery can have sensors communicating information via 5G, supporting reduction in the number of errors and wasted energy, and in turn saving money.

Process automation, human/machine interfaces, logistics, warehousing, monitoring, and maintenance will all be enhanced by the availability of 5G connectivity.

Healthcare

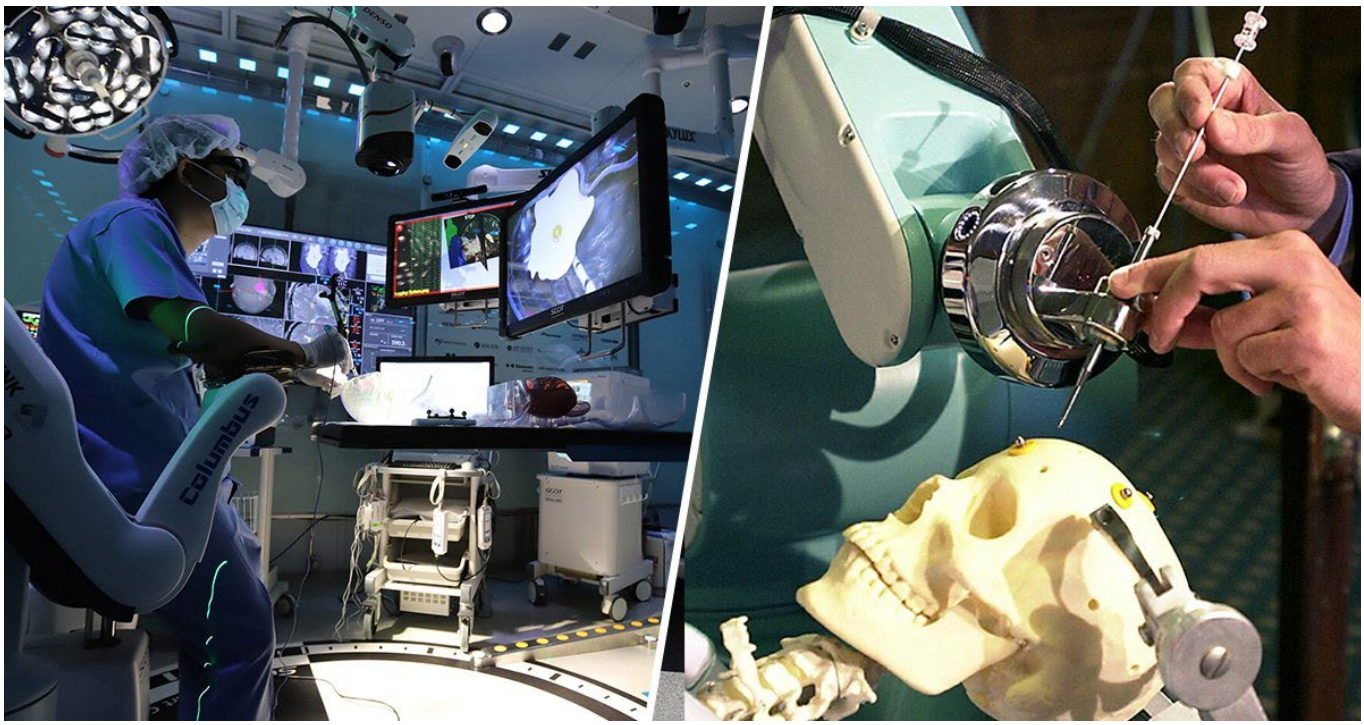
Healthcare is a strong match for 5G capabilities. It can help cut down healthcare costs for the aging population and improve patient access to mobile and other care. It can support robotic and remote surgery and augmented reality surgical tools. And it can enhance data-driven decision making.

The healthcare system needs faster, more efficient networks to keep up with the huge amounts of data it deals with, from detailed patient information to clinical research to high-resolution MRI & CT images.

5G can enable remote monitoring devices, like wearable tech, to have much longer battery lives while they send patient health data to doctors in real time.

Remote robotic surgery is enhanced by high-definition image streaming, low latency and high throughput communications. 5G networks could facilitate remote surgery procedures as they enable lag-free and ultra-fast connections.

The Covid pandemic has accelerated healthcare adoption of technology immeasurably.



Public Safety

In the public safety realm, 5G can help with growing public surveillance efforts, including CCTV, wearable cameras and facial recognition. It also has the potential to improve emergency response times, and to utilise the rise of IoT devices for public safety efforts.

Through the 5G network, applications such as real-time video, security communications, and media sharing could be used to assist first responders in emergency situations. Fire fighters, for example, could use augmented reality to move through an office building when they can't see due to smoky conditions, or don't know the layout of the building.

5G networks could improve information sharing within the public safety community, with secure and reliable video sharing from bodycams, drones, group chat, file sharing, and location sharing.

In post-disaster situations, 5G-connected drones could deliver relief materials and assist in locating missing individuals. These opportunities are being investigated as part of Australia's post-disaster recovery and resilience commissions of enquiry. Challenges remain that in many of Australia's recent bushfires and floods, the mobile network towers have also been damaged.

An enhanced network of sensors, cameras, and other automated devices could help create a fuller picture of any public safety situations, potentially making cities safer to live in.

Media and Entertainment

The media and entertainment industry faces challenges stemming from interactive and immersive forms of entertainment and the shifting role of the consumer as co-creator of content. The expansion of digital content through new platforms and market players, such as Netflix and Hulu, has also changed the industry.

On a 5G network, movie downloads will decrease from an average of 7 minutes to just 6 seconds. 5G will save people an estimated average of 23 hours of loading time per month while browsing social media, gaming, streaming music, and downloading movies and shows.

Expanded AR/VR experiences could also create a new channel for content producers to reach consumers, allowing people to connect with media through virtual items and characters in different ways - and 5G will facilitate these experiences.

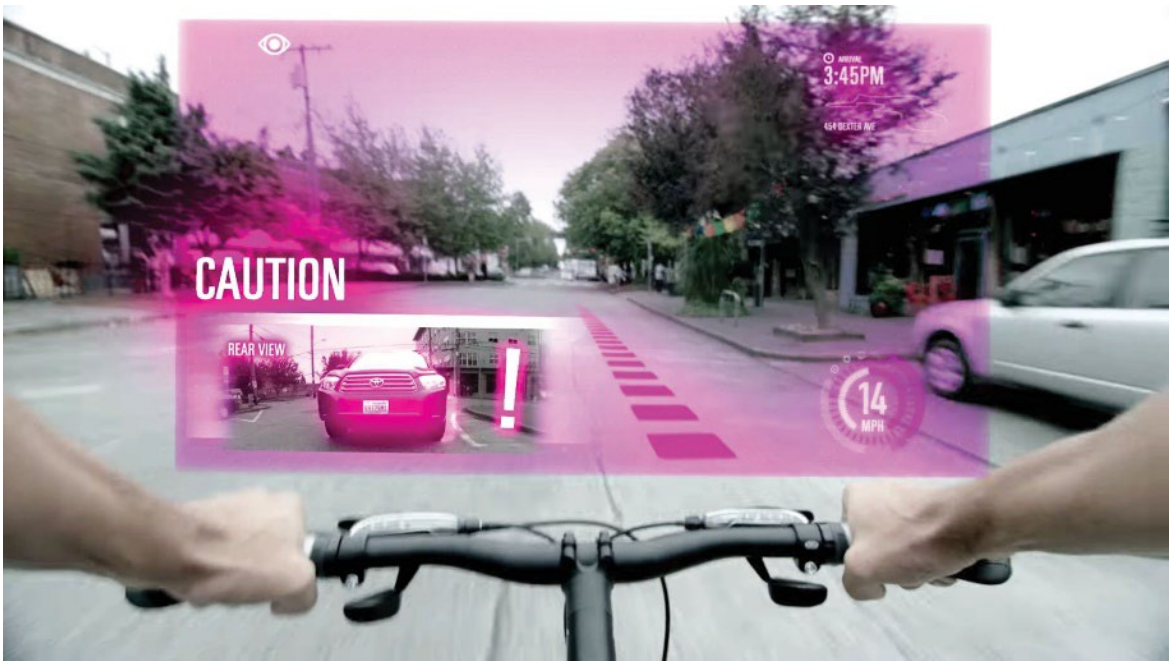
Automotive

The automotive industry is facing major disruption due to autonomous and connected cars, car sharing services, and electric mobility with decreasing battery costs.

5G will deliver enhanced vehicle-to-vehicle (V2V) communications, a key component to improving road safety in the emerging world of driverless vehicles.

It is essential that V2V communications take place in real time, as a matter of milliseconds could be the difference between a close call and a fatal collision. Achieving this high speed of interconnectivity requires vehicles to transmit large amounts of data between each other without any lags. 5G networks could make this possible with their low latency.

5G could also play a crucial role in vehicle-to-infrastructure (V2I) communications. V2I communications connect vehicles with infrastructure such as traffic lights, bus stops, and even the road itself. This could improve traffic flow, reduce external danger factors, increase vehicle reaction time, and make public transportation more efficient.



Transportation

Connecting public and private vehicles with 5G could change the way people and goods travel around the world.

5G technology could provide increased visibility and control over transportation systems, from public buses to private logistic fleets. As 5G networks become more prevalent, cities will gain invaluable access to real-time, end-to-end visibility into their transportation systems.

5G will impact the public transportation realm in that it can lead to more predictive maintenance, help get route information to passengers, and provide infotainment during travel.

Financial Services

The financial services industry has already been disrupted by online payments and e-wallets, changing customer relationships with online and mobile transactions, and consigning cash to history.

5G technology is poised to accelerate this digitisation, from internal operations to customer engagement. The increased speed made possible by 5G will allow users to make payment transactions instantly on their devices. 5G connectivity could also allow wearable devices to share biometric data with financial services to authenticate user identity instantly and accurately.

Agriculture

Farmers around the world are already using IoT technology to optimise agricultural processes such as water management, fertigation, livestock safety and maturity monitoring, crop communication, and aerial crop monitoring. 5G technology could lead to increased adoption of IoT devices that make this possible.

5G could provide real-time data for farmers to monitor, track, and automate their agricultural systems, resulting in increased profitability, efficiency, and safety. In a high-risk industry such as agriculture, these increases in production and precision are vital, especially as climate change poses new threats to farmers around the globe.

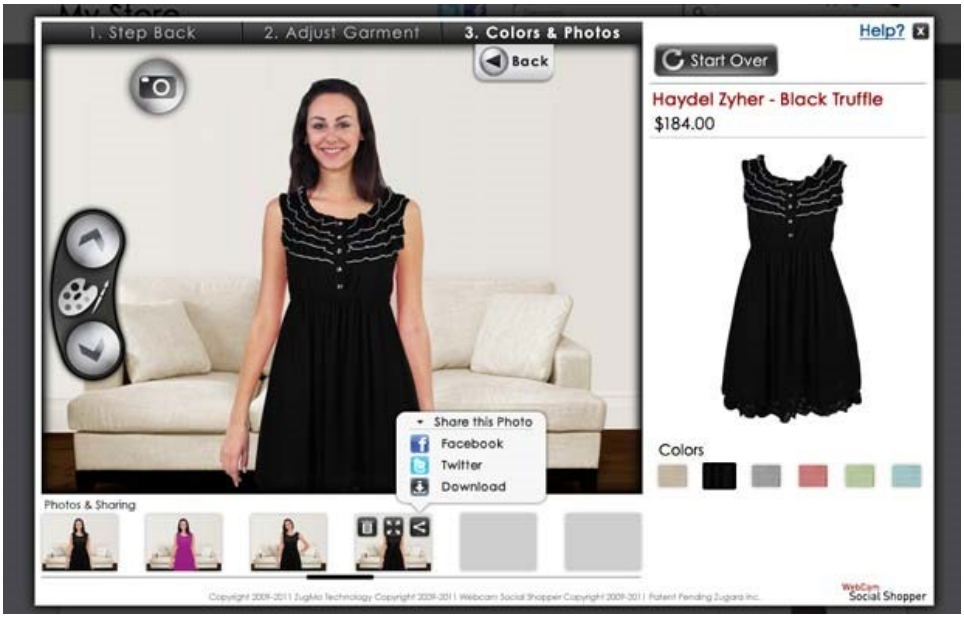
The technologies currently available are not advanced enough to cope with the massive data quantities and speeds required for smart farming, and the location of farms in regional, rural and remote locations also hamper access to 5G.

Retail

Eight out of ten Australians shop online, with 25% of sales made through mobile devices.

The migration to mobile shopping had largely occurred thanks to 4G/LTE and was significantly escalated when the onset of the Covid-19 pandemic forced the sector to shut its physical doors for long periods.

Virtual dressing room apps are already emerging. With 5G, mobile connections will be 10x faster and more immersive interactive mobile augmented reality possibilities will be enabled.



Supply Chain

Installing 5G-enabled IoT sensors on products will make a large amount of data available to stakeholders in the supply chain in real time. That data may include location, temperature, moisture, pressure, and other information that can be critical to safely manage products in a supply chain.

Introducing 5G IoT sensors into supply chains could mean fewer losses due to manual inefficiency or misplaced containers. As 5G technologies introduce more intelligent supply chain management, there could be potential for increases in production, streamlined logistical processes, and reduced costs.

Restaurants | Food Service

The pandemic hit hospitality hard and the industry was forced to shift quickly to online ordering, 'click and collect' drive-through, and home delivery.

5G will ensure the way restaurants interact with customers, prepare food, and deliver meals will continue to evolve.

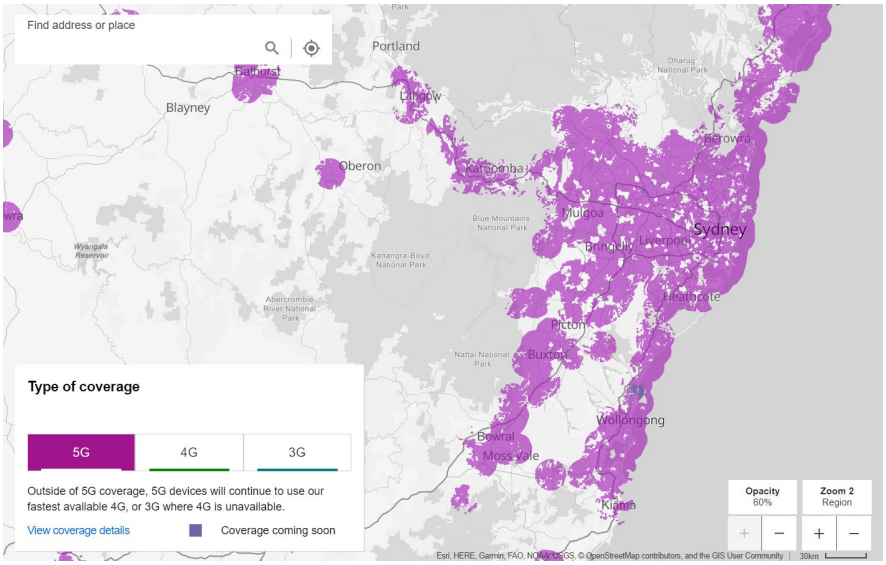
5G-enabled IoT devices could improve food tracking and waste disposal. Ordering platforms – from menus to drive-throughs – could evolve into more immersive and interactive experiences for customers. 5G-connected drones could allow restaurants to send out more food deliveries. Kitchen employees could be trained using 5G-connected AR/VR experiences, saving valuable inventory. 5G connectivity could also finally enable widespread adoption of robotics in restaurants.

With all of these new 5G technologies, the restaurant industry is likely to see reduced costs, more efficient food production, and enhanced consumer experiences.

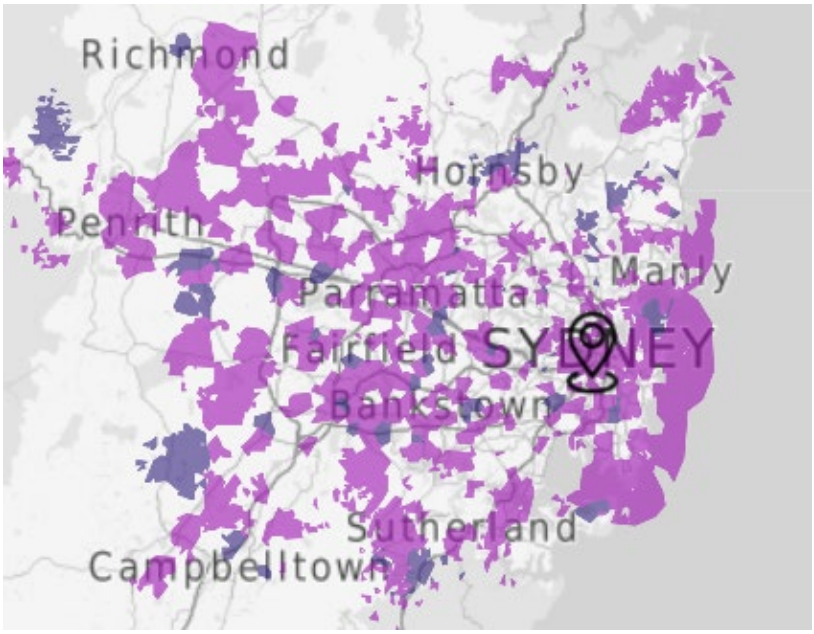
Australian rollout calendar

Initially 5G coverage was focused on hot spots and areas of high population density, however greater penetration into the regions and infilling of urban areas is now underway.

10 million Australians now pass through the 5G footprint each day. Coverage is growing fast as evidenced by the Telstra coverage maps below showing 5G in purple.



January 2023



June 2020

Small Cell Technology

The thing to know about the 5G build is that 5G makes use of "small cell" technology. The benefit of this is a station can fit on a smaller site such as a utility pole, the outside of a building, a bus shelter, or a lamp post. The downside is that the signal is not as far-reaching, so many more are needed.

Small cells use less power, have smaller antennas, and give coverage of 50-200 metres, as opposed to a macro 4G tower which provides coverage of several kilometres. Another challenge of the build is managing backhaul – the transmission of the data from the small cell station back to the core network.

> *National 5G coverage will not occur as quickly as with past generations of wireless infrastructure… 5G coverage will be focused on hot spots and areas of high population density.*
>
> *Sylvian Fabre, Gartner Senior Director Analyst*

When will the 5G rollout be completed?

Definitely no date published for this outcome.

Each of the three leading telco's in Australia have been making noise about how extensive their 5G coverage is, but as consumers we also have lived experience which tempers this rhetoric.

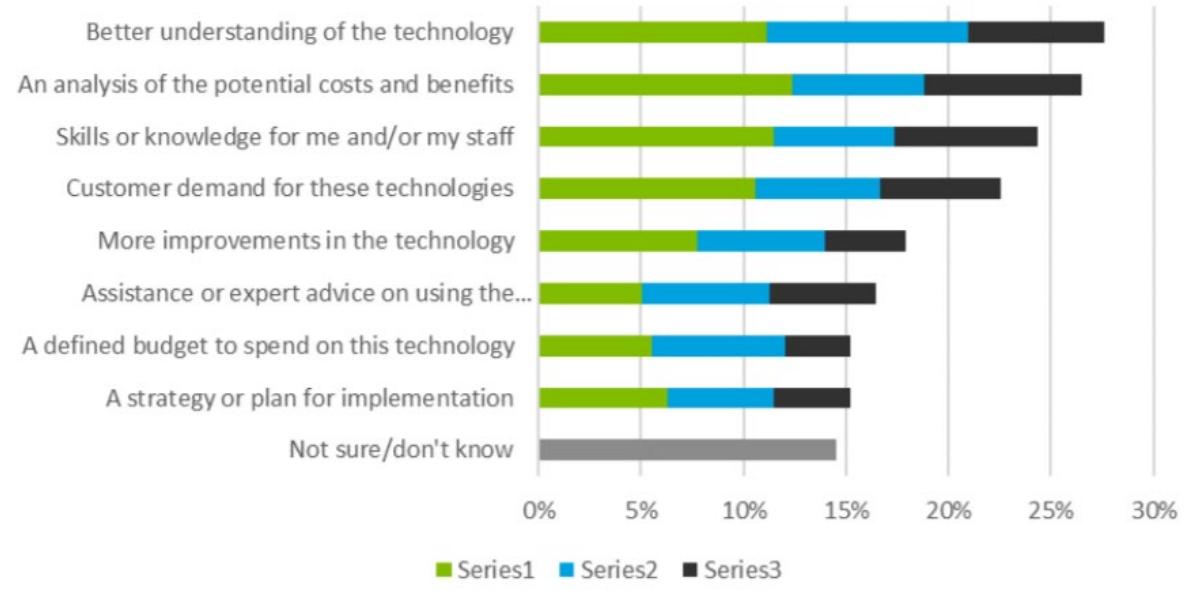
The reality is that small cell technology combined with natural physical barriers like hills, buildings, trees, and walls can mean a strong signal strength in one location and poor signal a few streets away, or even in the front yard versus the back yard.

However, before 5G networks have completely saturated the landscape, there will be many opportunities for 5G to revolutionise how we live and work.

Barrier to adoption is lack of clarity

The key barrier to enabling 5G adoption by Australian business leaders is the knowledge gap around what 5G can deliver to business.

In a survey commissioned by Deloitte Australia, Australian business leaders ranked '*better understanding of the technology*' as the key enabler for introducing 5G to their business in the next 24-36 months.



Source: Deloitte analysis based on data from Research Now

More than one in four respondents listed 'better understanding of the technology' in their top three choices for advancing the adoption of 5G.

Specifically, it was felt that more knowledge around the potential costs and benefits was required.

However, this situation is not exclusive to Australia. In the UK, Barclays found only 28 percent of businesses understand 5G or the practical business possibilities it could offer.

5G Action Plan for business

As 5G technology gains momentum, CIOs and business leaders need to prepare for the opportunities - and the potential security implications.

1. Decide who's in the driver's seat?

5G network bandwidth and speed will dwarf the bandwidth and speed of the communications we have today. This will facilitate a surge in high-bandwidth and real-time communications that companies will be anxious to deploy and exploit.

Australian companies need to determine who should be in the 5G driver's seat. Who would be the best fit to own the potential, to take accountability for understanding the opportunities, and to position the organisation to take advantage of the benefits of 5G?

This could be an individual or a specialist team. For CIOs, it may mean taking a leadership role to proactively raise the topic with key executives and managers in the business areas of the company.

2. Seek a 5G education

Leaders need to understand what 5G is and how it can support business goals. A recent survey by Deloitte found more than a quarter of Australian business leaders felt they needed a better understanding of 5G, its costs, and its potential use cases. 2020 is the year to self-educate. A few things to learn would be:

- understand network deployment and handset availability
- determine unique device needs
- understand the mobile network provider's 5G strategy
- consider how 5G might impact the corporate network
- understand potential opportunities for the business

3. Prepare the network for 5G

Now is the time for CIOs to make network and infrastructure revisions.

Undertake an audit of the present network infrastructure and identify upgrades and/or replacements to network hardware, software, and services that might be needed to exploit 5G.

Network upgrades are expensive, so it's advisable to build out a budget plan that phases in systematic upgrades over a multi-year period that can roughly follow the multi-year trajectory of enterprise 5G adoption.

How much will the network change? Networks, and the traffic they carry, will grow exponentially with 5G.

5G will also introduce new network management techniques. One of these is network slicing, which enables IT to partition a single physical network into multiple virtual networks that are dedicated to specific purposes, such as running an enterprise's IoT.

Network slicing will enable IT to better manage the performance of specific networks and applications. It also facilitates tighter security over these dedicated 'mini networks', since only certain users and applications will be permitted access.

4. Watch out for the data avalanche

An IDC research project predicts by 2025, six billion mobile users and IoT applications will have at least one data interaction every 18 seconds. IDC is projecting that this will result in more than 90ZB (90 billion terabytes) of data in 2025.

CIOs and other IT leaders should be preparing for the 5G data avalanche now. What kind of data will you accept? Are there certain types of data you want to exclude from network access? For the types of data you collect and manage, how will it be stored and accessed? All are action items that should be addressed in IT network and data planning.

5. Evaluate 5G use cases

5G is happening now. Whether your business sees the impact in one or five years, it’s coming.

Businesses must prepare for the technology today in order to achieve the performance improvements the technology offers for tomorrow.

2023 is the year to evaluate how 5G compliments the company’s overall digital strategy.

It is the time to determine all possible business use cases and develop a 5G strategy.

Plan now for the new wave of intelligent connectivity, data collection, and automation. Understand the changes required of the business network to support 5G use cases.

6. Ensure 5G fit

5G deployment will be a gradual process and it will exist alongside and in tandem with Gigabit-class LTE, 4G, low power wide area network (LPWAN) and other technologies. Any new IT project should ensure systems are future-proofed and can transition to 5G as it becomes available.

With 5G, even more momentum will be added to the business case for moving IT to the cloud, because one of the constraining factors for cloud that exists today - bandwidth - will virtually be removed with 5G.

Accelerated moves of mission-critical applications to the cloud will impact IT strategies in the areas of application deployment, support, governance, and security.

The bandwidth and data transfer capabilities of 5G are likely to reshape internal business processes and how IT supports them, as well.

7. Security, security, security

Along with 5G's promise comes the reality that more and more IoT devices and systems will be connected through 5G, and data will move through networks much faster.

At the same time, the prevalence of cyber threats has escalated by some 600% during the Covid years, and the sophistication of cyber criminals is challenging.

5G is still evolving, and many inherent security vulnerabilities may yet be discovered.

We have already seen the removal of Huawei from the deployment of 5G networks across the globe due to security concerns.

> *The Australian Government has announced it will disqualify any company (from taking part in the 5G infrastructure project) that was "likely subject to extrajudicial directions from a foreign government that conflict with Australian law."*

Without doubt, 5G will create heightened security risks that IT may not be prepared for.

There is a strong argument to prepare carefully and stagger implementation to balance risk and reward.

Cradlepoint 5G

A name to know in the adoption of 5G is Cradlepoint.

Who is Cradlepoint?

Cradlepoint are the global leaders in cloud-managed 5G router technology and edge solutions. They were the global leaders in bringing the hardware to market and deploying reliable and elastic 5G branch, mobile, and IoT networks. Based out of Boise, Idaho, Cradlepoint has more than 20,000 customers in 50+ countries around the world.

Pathway to 5G

As far back as 2017 Cradlepoint launched its revolutionary **Pathway to 5G** program which allows organisations to take advantage of LTE while providing a clear and investment-protected pathway to 5G as it becomes available to them.

In May 2020, Cradlepoint collaborated with its launch partner, Telstra, to deliver the world's first 5G for business solution.

The 5G enterprise wireless solution is made up of

- Gigabit-class LTE and a standalone 5G network from Telstra
- Cradlepoint's market leading routers and cloud-based software management platform, NetCloud™
- a Cradlepoint managed service which can be delivered by MobileCorp

MobileCorp is Australia's leading Cradlepoint Partner

> *Being Australia's first Elite Partner and 5G Enterprise specialist means that Cradlepoint has recognised MobileCorp as having technical capability and solution architecture expertise to lead Australian enterprises down the pathway to 5G.*
>
> *Stephen Aravopoulos, MD MobileCorp*

CRADLEPOINT CASE STUDY

MARINE RESCUE NSW

45 site cellular network

Every minute can mean the difference between life and death in an emergency on the water. A Cradlepoint future-proofed network protects boaters in distress.

Challenge

MRNSW has 45 sites spread along the NSW coastline and also located at the Alpine Lakes, Murray River and Lord Howe Island. The challenge was to ensure reliable communications from each site – known as a Marine Rescue unit – to mobilise crews in response to boater distress calls. There was a need to address prioritisation of mobile network performance due to seasonal congestion in popular beach site locations. There were also sites in locations without access to physical infrastructure, including water's edge, boat ramps and coastal headlands, as well as a mobile incident communications vehicle.

Solution

MobileCorp supplied, configured and deployed 69 Cradlepoint AER2200 routers that became the backbone of the solution, managing communications traffic links and access to the Telstra mobile network. The Telstra SIM cards in the Cradlepoint routers were enabled with the Telstra LANES 4G backup feature which allows traffic to be prioritised ahead of consumer and business use. MobileCorp provides a managed service for the Marine Rescue NSW mobility fleet providing one point of contact for device lifecycle management, end user support and telecom expense management.

Outcomes

An upgraded communications platform with robust, secure and intelligent network access utilising market-leading Cradlepoint routers to deliver traffic management and failover to the Telstra 4G network.

CRADLEPOINT CASE STUDY

MEDICAL RESEARCH FACILITY CONSTRUCTION

KEMPS CREEK, NSW

A Cradlepoint solution was delivered by MobileCorp to a construction site at Kemps Creek NSW, for a medical research enterprise customer.

Challenge

Communication on-site during construction of a Kemps Creek property on the outskirts of Sydney was proving problematic with poor mobile coverage making it impossible to send or receive data and constant dropouts of voice calls. Construction management had to leave the site and drive kilometres down the road closer to a tower to find reliable connectivity.

Solution

A site assessment by MobileCorp led to the installation of a Cradlepoint 4G router for data transfer and a Cel Fi GO Repeater to boost voice quality. Both devices were connected to a Yagi antenna positioned to intercept the 4G signal from the nearest cell tower.

Outcomes

Although 4G is a contended service, tests on the day revealed a download speed averaging 50Mbps and upload speed averaging 15Mbps.

We actually recorded speeds as high as 65Mbps download. The use of external antennas helped improve signal strength when connecting to Telstra's base station and the modems were pre-configured by MobileCorp to work on connection.

5G CASE STUDY

SUMMER OLYMPICS 2028

LOS ANGELES, CA

Los Angeles is promising to bring the best of Silicon Valley and Hollywood to the 2028 Summer Olympic Games.

The 2028 Los Angeles Olympics will be a united Californian story bringing together cutting-edge Silicon Valley technology and Hollywood entertainment.

> *We're the world's best storytellers, and we create the technology that allows people to see that. There's no greater set of stories for 17 days than the Olympic Games, and our ability to present that in a new and interesting and engaging way will be truly unique.*
>
> *Casey Wasserman, the chairman of LA's Olympic bid*

IOC sold on technology

Despite the promise of Hollywood glamour, it was the connectivity, technology and strong transport infrastructure that have been cited as key factors in LA winning the bid war.

> *We are hosting the 2028 Summer Olympics. What sold the IOC was the complete guest experience from door to door. The whole experience will be connected via technology.*
>
> *Kathryn Schloessman, CEO Los Angeles Sports and Entertainment Commission*

Back to the future

It's five years until the LA Olympics and no one can predict exactly what technology will look like even that far into the future. For a little perspective, the 4G network was only launched in Australia eight years ago in 2015.

However, those heavily involved in the LA bid are banking on technologies like 5G being fully realised by 2028.

Since LA is already home to multiple sporting arenas, there will be no need to invest in building stadiums. State-of-the-art venues already exist, and instead money will be invested in technology that will make the Summer Olympics in LA the most personalised and interactive games yet.

Just like being there

5G will be instrumental in creating an immersive experience whether the spectator is at an Olympic event in LA, or, watching from anywhere in the world.

Virtual and augmented reality, with its ability to replicate the physical experience of the Olympics to billions of people around the world, offers "a meaningfully significant opportunity".

This revolutionary technology delivered by 5G, will make the experience so much better, both for those inside and outside the stadiums.

> *What technology allows you to do is find the people who like a specific sport and communicate directly with them. You can also provide immediate information about players, so spectators don't have to spend time looking at their phone searching for pertinent details.*

Nobody's getting lost

5G and mobile technology is also expected to play a significant role in driving attendance and improving logistics in and around stadiums.

Sensors could be used to pinpoint the exact location of players and key personnel.

Badges could hold the information needed about attendees including tickets to their events.

No cars will be driving to the Olympics venues; public transportation will be included in the online purchase, allowing operators to see how and when patrons will be travelling.

Wasserman tells a story about attending the Olympics in Rio de Janeiro and nearly getting lost after the opening ceremony.

"If their credentials came embedded with GPS chips or locators, someone would always know where they were. The same credentials could also be used as athletes' village room keys for the athletes who often lose or forget their keys while focusing on their training or event."

Mass media replaced by 'my media'

As with most sporting events, the likeliest place for technological innovation is in media - how the events are presented to the entire world. The advent of recent technologies has allowed broadcasters to know their exact target audience and therefore present events in ways that reach different demographics.

"What technology allows and the new platforms allow is that you can actually find every one of those people directly," Wasserman said, "as opposed to putting it out and marketing it enough and hoping that people turn it on."

Athletes to benefit too

Another aspect of the 2028 Olympics that could be significantly influenced by technology is the athletes and sports themselves.

With ever more advancements in sports science, by the time 2028 rolls around, athletes could be performing on an unprecedented level with the help of information and technology. 5G wearables are already providing real time physical analysis, and other health and performance focused technologies.

"It relates directly to how does technology give the athletes better information. And the argument we made on behalf of our bid was we have the resources in this community to help athletes understand that, to perform better."

> *To think about an Olympic Games in Los Angeles where you're gonna have 12 million people, and the ability to use technology to make the experience for those 12 million people, the experience for the athletes, the experience for the family, infinitely better, that's meaningful.*
>
> *Casey Wasserman, Chairman of LA Bid*

About MobileCorp

MobileCorp is a communications technology MSP and MSSP based in Sydney.

We are a Cradlepoint Elite Partner and 5G Enterprise Specialist, as well as the Cradlepoint APAC Managed Service Partner of the Year.

We are a Telstra Platinum Partner and winner of the Enterprise Innovation Partner 2021 for our 5G go-to-market services.

We have made it our business to understand how 5G can be leveraged to benefit Australian organisations.

MobileCorp has been in business for 30 years and has a proven track record with assisting enterprise and business.

Early Enabler

MobileCorp has deployed some of Australia's first 5G and 5G-enabled networks, including for Marine Rescue NSW, Ticketek, RFQ, and many retail and construction clients.

Speak to us about a Proof of Concept trial for your 5G use case.

Talk to a MobileCorp expert about your 5G action plan

Meet some of the MobileCorp Team

Gavin Lo

Sales Director

Mobile: 0408 242 526

Email: gavin@mobilecorp.com.au

Gavin has years' experience in the ICT solutions industry and joined MobileCorp from Telstra where he was a Business Solutions Lead. Gavin is the person to talk to about corporate mobility and network solutions including how 5G could benefit your business.

Peter Jonson

Head of Managed Services

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Peter is a highly experienced telecommunications and endpoint management specialist. He is focussed on enabling organisations to adopt 5G-enabled digital transformation with a focus on project management.

Raj Reddy

Solutions Architect

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Raj has more than 20 years' experience in the IT industry beginning as a field engineer, moving to network engineering, and now as a network solutions architect.

His role at MobileCorp is to consult with organisations and help them realise their technology potential by leveraging his insights, expertise, and partnerships to deliver a custom solution strategy.

About the Author

Michelle Lewis is an accomplished technology writer, B2B Inbound Marketing strategist, content creator and storyteller.

She is a qualified journalist, and her varied career highlights include Head of Press for J Sainsbury plc in the UK, Media Manager for the New Zealand All Blacks, and Head of Corporate Affairs for New Zealand Cricket.

For the past 10 years she has specialised in deciphering the stories of IT and technology and retelling them in language that end users can understand.

She is the current Marketing Manager at MobileCorp and resides in Sydney with her three sons.

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