Australian Mobile Telecommunications Association

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AMTA and Communications Alliance Submission

House Standing Committee on Communications and the Arts

Inquiry into 5G in Australia

1 November 2019

Contents

Background

This submission is made jointly by the Australian Mobile Telecommunications Association (AMTA) and Communications Alliance (the Associations).

AMTA is the peak industry body representing Australia's mobile telecommunications industry. Its mission is to promote an environmentally, socially and economically responsible, successful and sustainable mobile telecommunications industry in Australia.

Communications Alliance is the primary telecommunications industry body in Australia. Its vision is to provide a unified voice for the telecommunications industry and to lead it into the next generation of converging networks, technologies and services. The prime mission of Communications Alliance is to promote the growth of the Australian communications industry and the protection of consumer interests by fostering the highest standards of business ethics and behaviour through industry self-governance.

The combined membership of the two Associations includes Australia's mobile network operators, mobile service providers, network equipment vendors, handset manufacturers, retailers and suppliers as well as telecommunications carriers, carriage and internet service providers, content providers, IT companies, consultants and business groups.

Executive Summary

5G networks will transform the way Australians live and work by delivering unprecedented digital connectivity across the community and economy.

5G will deliver substantial improvements in the speed, latency and reliability of mobile networks in order to meet the current and forecast strong and ever-increasing demand for mobile services including new capabilities that will be enabled by this next generation of services.

5G is expected to transform industries and sectors including agriculture, transport and logistics, manufacturing, health, education and emergency services. It will change the way both Government and enterprise deliver goods and services as we transition to smarter cities and an increasingly connected world.

Mobile technology has long been recognised for its enabling impact on our economy and productivity. 5G has the potential to magnify that impact in a transformative fashion as the world moves towards Industry 4.0.

Eighty percent of Australian businesses report that they have already implemented at least one emerging technology, or that they expect to do so in the next 3 years.

The mobile industry directly contributed $8.2 billion to our economy in 2017-18 and directly employed almost 25 000 FTE people. For every FTE role employed by the mobile industry there are also 3.7 people employed in flow-on industries.

Mobile technologies are also driving productivity. Deloitte Access Economics estimates that the productivity impact of mobile will be equivalent to $2500 for every Australian by 2023. This amounts to a total of $65 billion of additional GDP by 2023, or a 3.1% increase in GDP.

The growing demand for 5G is driving continued industry investment in radiocommunications spectrum and the deployment of network infrastructure.

It is in Australia's national interest that the transition to 5G is fast-tracked so that the economic, productivity and social benefits can be realised sooner.

As a small, agile economy with a history of early adoption of digital technology and innovation, Australia is uniquely positioned to take advantage of the potential that 5G has to offer to develop our role in the region and globally as a leading technology nation. For the last four years, Australia has consistently ranked 1st in an index that includes 165 countries (representing 99% of global population) for its mobile connectivity. 5G is the innovation platform that will grow the mobile industry's capacity as a key contributor to Australia's future global competitiveness.

This will require a co-ordinated policy approach from all levels of Government, working with industry and across key portfolios, to ensure that policy and regulatory settings support efficient network deployment. This includes timely spectrum allocation and broad community support for and understanding of the economic and social benefits of 5G.

Ensuring a pipeline of new spectrum is made available for 5G and progressing reviews of technical frameworks so that in-market spectrum is 'fit for 5G' is critical to meet forecast demand.

AMTA estimates that each mobile operator will need additional low band spectrum, around 100 MHz of mid band spectrum and an initial 1GHz of mmWave spectrum for 5G to reach its full potential and deliver what it is designed to do.

Similarly, timely and efficient deployment of network infrastructure requires a flexible regulatory framework including thoughtful consideration and timely decision-making by policy makers to ensure that the benefits of 5G are realised. It is imperative that industry has certainty on the regulatory inputs to its investment decision making processes to encourage 5G infrastructure deployment.

5G services will be as critical as power, gas and water. Indeed, communications is commonly regarded as the fourth utility. Long term reform is required so that telecommunications can be treated in a manner consistent with the other utilities with regard to access to public property, just as we are seen as vital infrastructure in national security matters and by consumers and businesses alike.

Industry is keenly aware that the deployment of 5G mobile networks has caused concern among some members of the community, both in Australia and overseas, in relation to health and safety.

Australian mobile network operators and equipment suppliers all adhere to and operate conservatively within the safety standards set by the regulator – the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) as endorsed by the World Health Organisation (WHO).

Industry relies on the expert opinions and guidance of leading health, safety and research agencies such as ARPANSA and the WHO in relation to electromagnetic energy (EME). Following extensive global research both ARPANSA and the WHO note that there are no established health effects from the radio waves that the 5G network uses.

Industry regards safety as paramount, both for customers and employees, and prioritises compliance with the requisite health and safety standards across all business operations to ensure safe, reliable networks and mobile devices.

Finally, we believe there is scope for Government to play a greater role in leading a strategy to work with all levels of government and industry to promote a pathway to 5G including building awareness around the potential benefits of 5G within the public sector itself as well as across industries and enterprise.

1. Introduction – 5G will transform the way we live and work

5G networks will transform the way Australians live and work by delivering unprecedented digital connectivity across the community and economy.

As a small, agile economy with a history of early adoption of digital technology and innovation, Australia is uniquely positioned to take advantage of the potential that 5G has to offer to develop our role in the region and globally as a leading technology nation. For the last four years, Australia has consistently ranked 1st in an index that includes 165 countries (representing 99% of global population) for its mobile connectivity.[1] 5G is the innovation platform that will grow the mobile industry's capacity as a key contributor to Australia's future global competitiveness.

5G will deliver substantial improvements in the speed, latency and capacity of mobile networks in order to meet the current and forecast strong and ever-increasing demand for mobile services including new capabilities that will be enabled by this next generation of services.

5G has the potential to transform industries and sectors including agriculture, transport and logistics, manufacturing, health, education and emergency services. It will change the way both Government and enterprise deliver goods and services as we transition to smarter cities where everything that can be connected is connected.

This submission:

- outlines the potential benefits of 5G for Australian society and the economy;
- highlights a few of the many use cases for 5G;
- addresses community health concerns about 5G and small cells; and
- outlines how Government can work with industry and across key portfolios, to ensure that policy and regulatory settings support efficient deployment of networks, including timely spectrum allocation, and that there is broad community support for and understanding of the economic and social benefits of 5G.

i 5G will connect our communities and transform the way Australians live and work

[1] GSMA Mobile Connectivity Index, The State of Mobile Internet Connectivity Report, July 2019

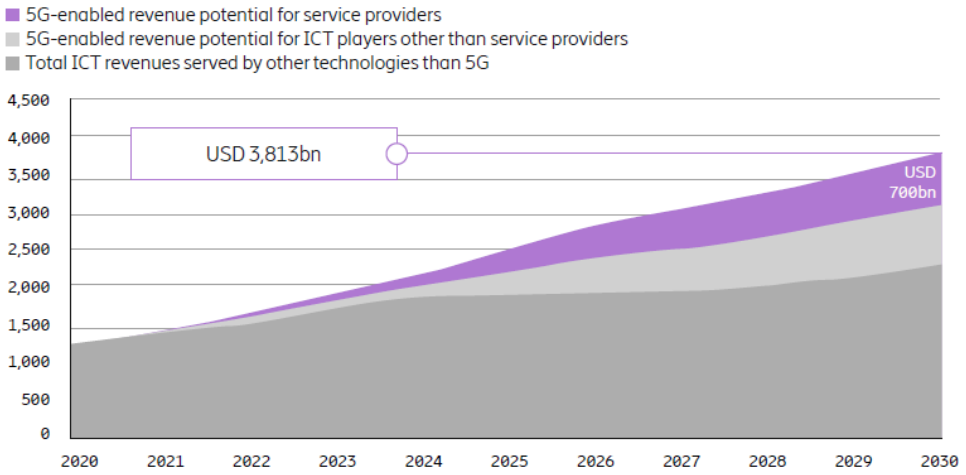
2. Economic impact of 5G

5G is enabling the digital revolution

Mobile telecommunications have historically had an enabling impact on other industries, across the economy and society. Latest generation mobile technologies, applications and services continue to change the way we work, live and play by enabling a mobile and data rich dimension to our connectivity. 5G has the potential to drive economic growth further as it enables service providers to offer cost-effective technology to meet consumer demand for data and new advanced 5G services.[2] Digitisation is forecast to generate USD 3.8 trillion in revenue for the ICT industry by 2030, with USD 700bn to be addressable by mobile service providers. The graph below shows up to 18 per cent of this 5G enabled opportunity is addressable my mobile service providers.[3]

ii 5G enabled global revenue potential for service providers

Figure 2: Of the total ICT revenue expected in 2030, up to 18 percent of the 5G-enabled opportunity is addressable by service providers



Source: Ericsson and Arthur D. Little [4]

Demand for mobile continues to grow

The total number of global mobile subscriptions has surpassed 7.9 billion.[5] This takes global mobile subscription penetration to 104% with smartphone users accounting for almost 70% of subscriptions.

Ericsson reports that mobile data traffic continues to grow strongly with an increase of 78% from Q2 2018 to Q2 2019. This growth is being driven by increasing use of data on smartphones and other mobile devices with video content driving the increasing average data volume per subscription.[6]

Ericsson also reports that the adoption of 5G is happening at a faster pace than previously predicted. In terms of forecast demand, by the end of 2024, it is now estimated that globally there will be 1.5

[2] Ericsson and Arthur D. Little, 5G for business: a 2030 market compass, Oct 2019, page 3
[3] Ericsson, 5G for business: a 2030 market compass, Oct 2019, page 4
[4] Ericsson, 5G for business: a 2030 market compass, Oct 2019, page 4
[5] Ericsson Mobility Report, Q2 Update, August 2019
[6] Ericsson Mobility Report, Q2 Update, August 2019

billion 5G subscriptions for enhanced mobile broadband, with 5G networks covering 40 percent of the world's population and carrying 25% of the world's mobile data traffic.[7]

South Korea, one of the early adopters of 5G, acquired 1 million 5G subscribers in only 69 days, which is faster than the 80 days it took to get the country's first 1 million 4G subscribers in 2011.[8]

As of 9 September 2019, South Korea had:

- surpassed 3 million 5G subscribers, with coverage expected to reach 93 per cent of the population by the end of the year.[9]
- deployed 90,000 5G base stations deployed, nearly double the number installed at launch with a choice of two 5G smartphone models from Samsung and LG. [10]

Looking ahead, in the first five years, 5G subscription uptake is expected to be significantly faster than that of LTE, following its launch in 2009.[11]

5G will deliver substantial improvements in the speed, latency and capacity of mobile networks in order to meet the current and forecast strong and ever-increasing demand for mobile services including new capabilities that will be enabled by this next generation of services.

Ensuring a pipeline of new spectrum is made available for 5G at a price that will not deter investment and progressing reviews of technical frameworks so that in-market spectrum is 'fit for 5G' is critical to meet forecast demand.

AMTA estimates that each mobile operator will need additional low band spectrum, around 100 MHz of mid band spectrum and an initial 1GHz of mmWave spectrum for 5G to reach its full potential and deliver on what it is designed to do.[12]

Recent research points to the potential of 5G for consumers [13] with a key finding that data usage for one in five users could reach more than 160GB per month on a 5G device by 2025. Other key findings were:

- Australian consumers expect 5G to provide relief from urban network congestion in the near term - *especially in Australia's bigger cities, where nearly half (47%) smartphone users report facing network issues in crowded areas* - and to create new home broadband choices.
- Current 4G usage patterns are not indicative of future usage behaviours. Video consumption is set to rise significantly with 5G. Australian consumers expect to not only stream video in higher resolutions but also use immersive video formats such as Augmented reality (AR) and Virtual reality (VR), resulting in an additional two hours of video content

[7] Ericsson Mobility Report, Special Edition, World Economic Forum, January 2019
[8] Venture Beat 2019, South Korea hits 1 million 5G subscribers in 69 days
[9] Mobile World Live, 24 Sept 2019, South Korea hits 3m 5G subs as base stations double
[10] Mobile World Live, 24 Sept 2019, South Korea hits 3m 5G subs as base stations double
[11] Ericsson Mobility Report June 2019, Mobile subscriptions outlook. The peak of LTE subscriptions is projected for 2022, at around 5.3 billion subscriptions, with the number declining slowly thereafter. However, LTE will remain the dominant mobile access technology by subscription for the foreseeable future, and it is projected to have nearly 5 billion subscriptions at the end of 2024.
[12] AMTA submission to ACMA's Five Year Spectrum Outlook, 16 May 2019.
[13] Ericsson 5G Consumer Potential report, 2019

being watched weekly on mobile devices by users in the 5G future when they are out and about, including half an hour wearing AR glasses or VR headsets.

- Consumers are willing to pay a premium on 5G, with Australian smartphone users stating that they are willing to pay 20 percent more for fifth-generation services, and early adopters as much as 42 percent more.

Mobile contribution to Australia's economy and productivity

Australia's mobile sector is an integral part of the broader telecommunications industry. It is a significant component of the critical infrastructure that facilitates our ability to connect, work and transact.

The mobile industry directly contributed $8.2 billion to our economy in 2017-18. The industry also directly employed almost 25 000 FTE people in 2017-18.

Indirectly, the industry contributed $14.7 billion of economic activity, through contributions to revenue and employment in other sectors.[14]

And for every FTE role employed in the mobile industry there are 3.7 employed in flow-on industries.[15]

Beyond the total $22.9 billion value added to GDP by mobile in 2017-18 and the employment contribution, mobile technologies, including 5G, continue to drive productivity throughout the Australian economy. While productivity has generally declined over the last decade, mobile technologies have boosted both labour and capital productivity as shown in the diagram below.

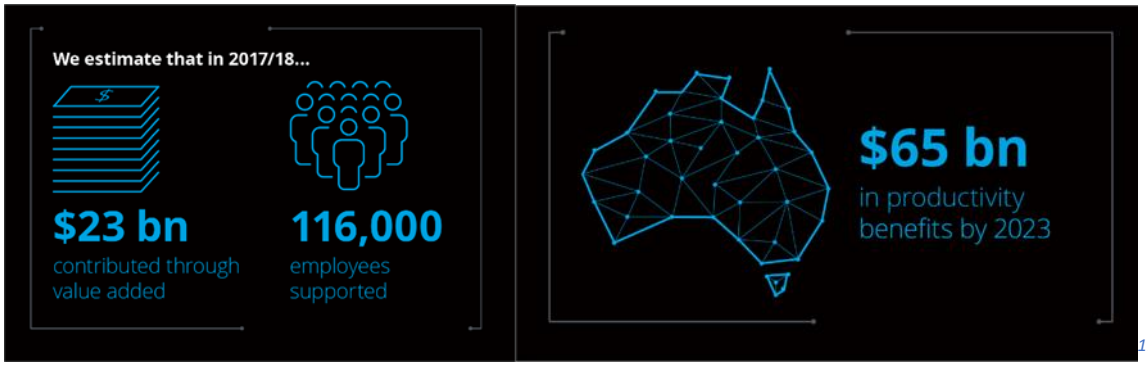
iii Productivity benefits of mobile

16

[14] Deloitte Access Economics, Mobile Nation 2019: the 5G Future, chapter 2
[15] Deloitte Access Economics, Mobile Nation 2019: the 5G Future, chapter 2
[16] Deloitte Access Economics, Mobile Nation 2019: the 5G Future, page 18

Deloitte Access Economics estimates that the productivity impact of mobile will be equivalent to $2500 for every Australian by 2023. This amounts to a total of $65 billion of additional GDP by 2023, or 3.1% increase in GDP.

iv Forecast productivity benefits by 2023



[17]

The Bureau of Communications and Arts Research also recognises that:

> "Digital transformation has long held the promise of improving productivity outcomes, and the planned rollout of 5G internationally has been viewed as the next development continuing the critical enabling capacity of communications services across the economy."[18]

The Bureau's own research forecast a $1300-2000 per capita benefit to GDP after the first decade of a 5G roll-out in Australia, noting that this is a conservative estimate that did not fully consider consumer and indirect benefits. The Bureau, however, concludes that 5G has the potential to transform the economy by "supporting, and even accelerating, Australia's digital transformation".[19]

The Bureau also notes in its findings that the Government's stated 5G strategy,

> "...details the actions that are to be taken to allow for the introduction of 5G in line with international developments, including:
>
> - Making spectrum available in a timely manner
> - Actively engaging in the international standardisation process
> - Streamlining arrangements to allow mobile carriers to deploy infrastructure more quickly, and
> - Reviewing existing telecommunications regulatory arrangements to ensure they are fit-for-purpose.[20]

In addition to the direct and indirect impacts on productivity and connectivity 5G will play a central role in an increasingly convergent and intelligent technology ecosystem that will drive the 4th Industrial Revolution.

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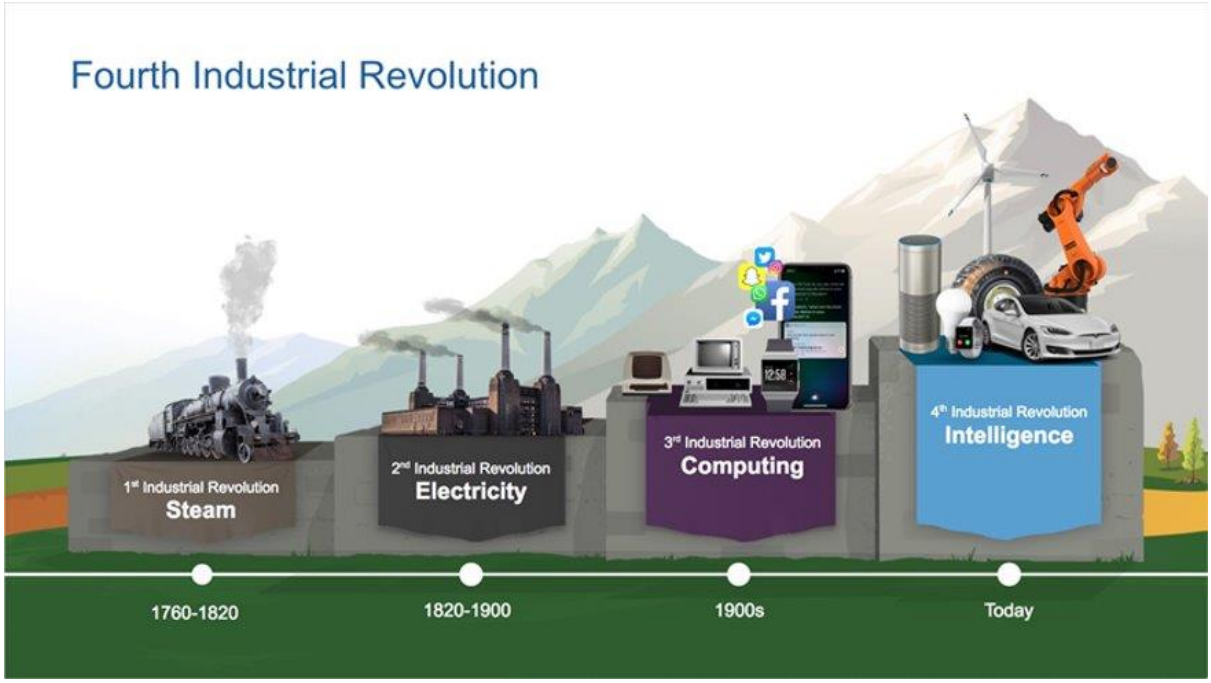
[17] Deloitte Access Economics, Mobile Nation 2019: the 5G Future, chapter 2
[18] Bureau of Communications and Arts Research, Impacts of 5G on productivity and economic growth, April 2018
[19] Bureau of Communications and Arts Research, Impacts of 5G on productivity and economic growth, April 2018, page 6
[20] Bureau of Communications and Arts Research, Impacts of 5G on productivity and economic growth April 2018

In addition to the direct and indirect impacts on productivity and connectivity 5G will play a central role in an increasingly convergent and intelligent technology ecosystem that will drive the 4th Industrial Revolution as illustrated below.

v Industry 4.0



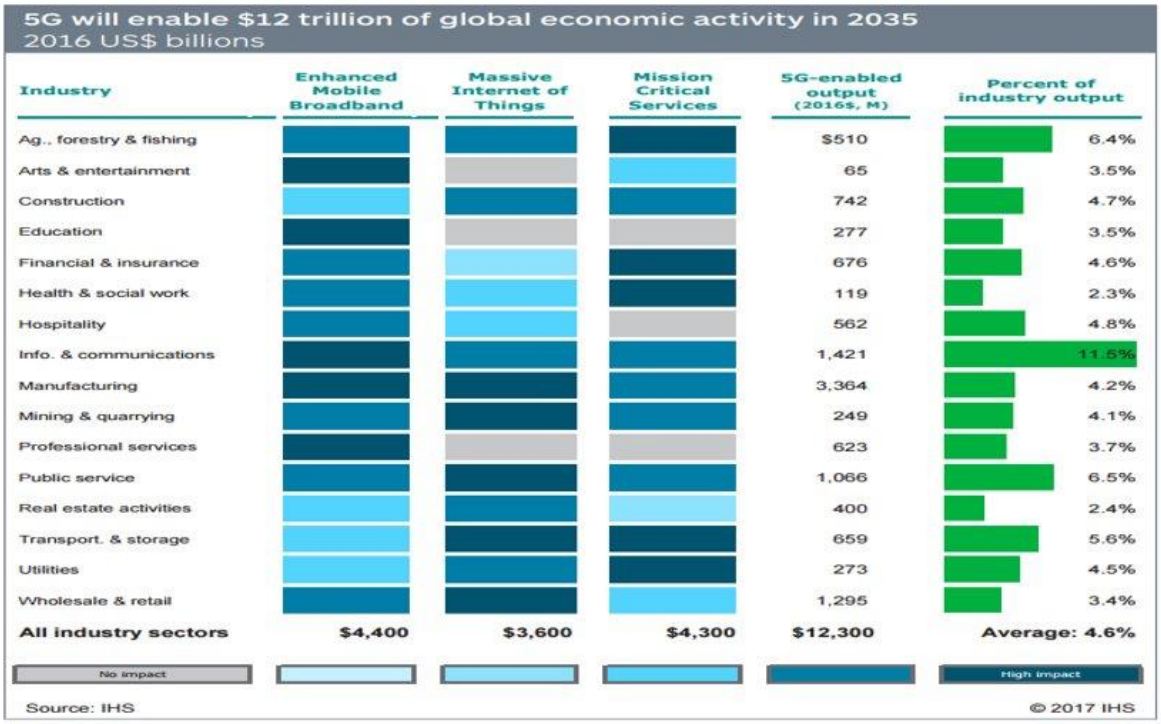
We believe that 5G will enable the infrastructure to underpin Australia's transition to Industry 4.0 as businesses move to increase automation and become ever increasingly reliant on data. Australian businesses will increasingly rely on mobile derived data to drive innovation, develop new revenue streams, and streamline operations. In a 2018 survey of 550 Australian businesses by Deloitte Access Economics, 80% of enterprises reported that they had already implemented at least one emerging technology, or that they expect to implement one in the next 3 years.[21]

Mobile's global impact

A less conservative global forecast by Qualcomm predicts $USD12.3 trillion worth of goods and services will be enabled by 5G by 2035, as illustrated in the graph below.[22] In the same timeframe, Qualcomm found that 22 million jobs could be supported globally with $3.5 trillion revenue generated by the mobile supply chain alone. And the overall contribution of 5G to global GDP could be as high as $3 trillion. [23]

[21] Deloitte Access Economics, Mobile Nation 2019: the 5G Future, chapter 4
[22] Qualcomm, The 5G Economy, 2018
[23] Qualcomm, The 5G Economy, 2018

vi 5G impact on global economic activity



[24]

Social benefits of mobile technology

Mobile technology also provides significant social benefits with 60% of Australians reporting that their smartphone has replaced 3 or more other devices or items, such as cameras, street directories, or calendars. And 94% of mobile users do not leave the house without taking their smartphone with them. Mobiles are now a multi-purpose utility tool that enable us to remain connected both at work and socially.

5G promises applications and use cases that will revolutionise the health, transport and education sectors. Mobile devices provide social connectivity as well as enable flexible work arrangements, promoting greater workforce participation.[25] Wearable mobile devices can help Australians track their health and reach fitness goals, and can also provide more critical health monitoring, enabling older Australians to live in their own homes for longer. Transport and logistics will be able to rely on IoT smart trackers to improve efficiency and autonomous vehicles will reduce costs as well as improve safety and accessibility for all road users. The NRMA notes that autonomous vehicles will deliver improved safety, decrease congestion, provide options for young, elderly and disabled people, as well as reduce pollution and emissions.[26]

[24] Qualcomm, The 5G Economy, 2018, IHS Report 2017
[25] Deloitte Access Economics, Mobile Nation 2019: the 5G Future, page 33
[26] NRMA, Driverless cars: the benefits and what it means for the future of mobility

Growing demand for 5G drives continued investment in spectrum and networks

Some Australian mobile carriers began deploying 5G mobile services in 2019 and all have flagged their commitment to invest in 5G networks.[27] The deployment of 5G requires significant capital investment in both spectrum resources and network infrastructure to both densify and expand network capacity.

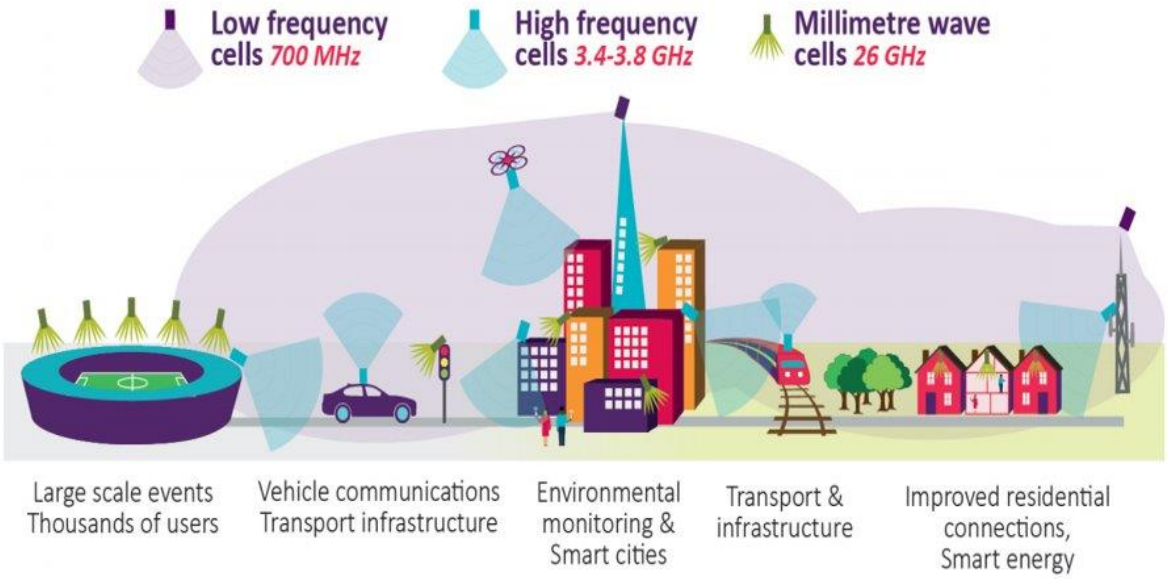
AMTA notes the Government's recognition that spectrum must be made available in a timely manner to enable innovation and productivity across industry sectors with a particular focus on enabling the early deployment of 5G mobile networks in Australia.[28]

Ensuring a pipeline of new spectrum is made available for 5G and progressing reviews of technical frameworks so that in-market spectrum is 'fit for 5G' is critical to meet forecast demand.

It will also ensure Australia remains at the forefront of rolling out the next generation of mobile technologies to enable transformative social and economic benefits across industries such as transport and logistics, health, agriculture, education, emergency services and the automotive industry,[29] as well as consumer benefits.

We welcome the Government's recent decision to bring the 26 GHz band to market, however it is critical that more spectrum for 5G is progressed to market in a timely manner (see *Spectrum required for 5G* - page 35). Note the diagram below refers to 'High frequency cells' which are more commonly referred to as mid-band/frequency in the Australian market.

vii Spectrum frequencies for 5G



[27] Optus, Telstra, Vodafone Hutchison Australia;
[28] Department of Communications and the Arts, 5G-Enabling the future economy, Directions paper, Oct 2017.
[29] AMTA Mobile Minute '5G A connected future for Australia' June 2017

3. What is 5G?

5G is about enhancing mobile broadband and connecting things to people and other things.

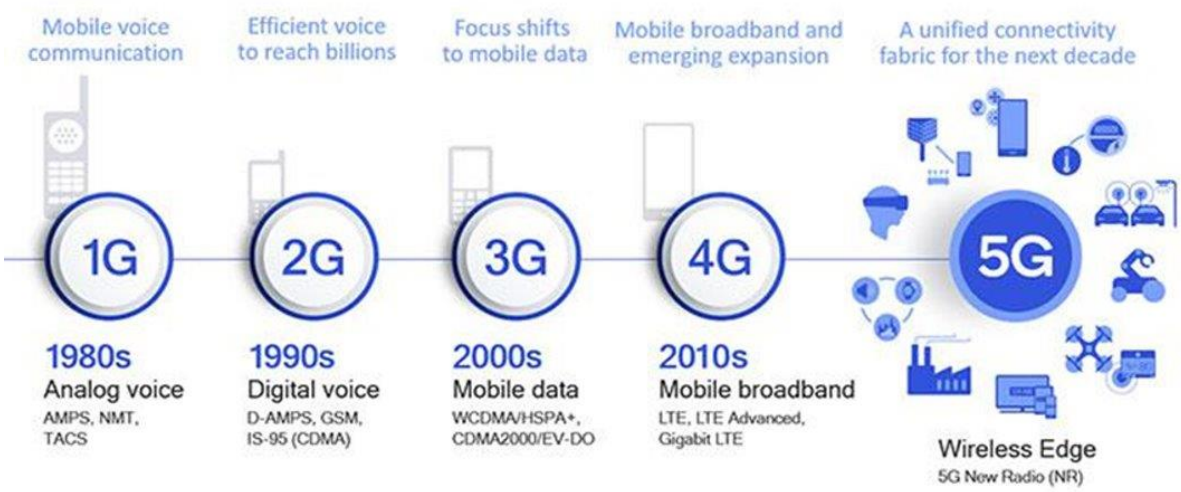
Previous generations of mobile networks, as illustrated in the diagram below, delivered predominantly voice and SMS in 2G, email and web-browsing in 3G, and higher-speed data and video streaming in 4G.

5G is focused on the both the requirements of people and industries - and is in effect the 1st generation of mobile for machines.

2019 has seen the initial deployment and availability of 5G services in many countries, including Australia, with widespread global availability expected by 2025.

The transition to 5G will not only deliver an enhanced mobile broadband experience to consumers but also deliver technology tools for enterprises and government services to move to Industry 4.0 and increased digitisation. 5G will deliver data rates up to 100 times faster than 4G, network latency will be lowered by a factor of 5, data volumes expanded by a factor of 1000, and battery life will be improved by a factor of 10. 5G networks will be more sustainable and will enable the use of remote devices for IoT applications on a much wider scale.

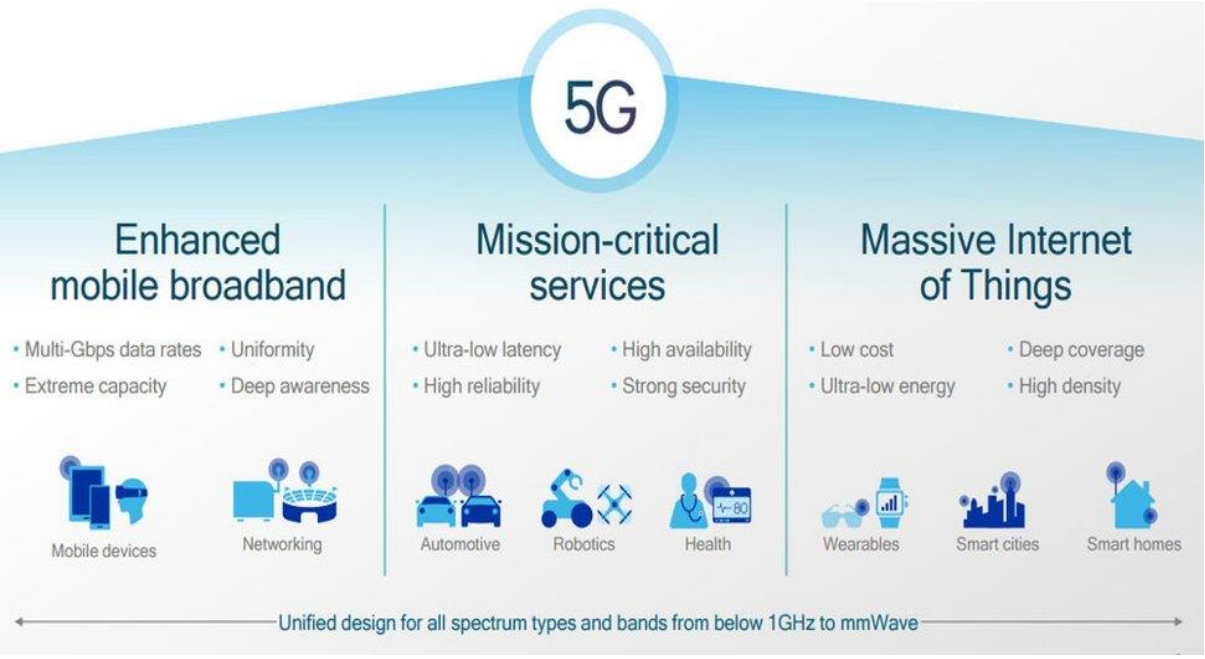
viii. Mobile generations - 1G to 5G



This video[30] from Ericsson explains 5G and its primary use cases – eMBB (enhanced mobile broadband, URLLC (ultra-reliable low latency communications) and MMTC (massive machine type communication).

[30] Ericsson, This is 5G, Jan 16, 2019.

ix 5G Primary Use Cases – eMBB, URLLC and MMTC



Enhanced mobile broadband (eMBB)

Enhanced mobile broadband will provide substantially faster data speeds as well as greater capacity for networks.

Ultra-reliable low latency communications (URLLC)

5G will also enable **ultra-reliable low latency communications** for mission critical applications, as illustrated in the diagram above. This has the potential to open up a new world where remote medical care, procedures and treatment are all possible.

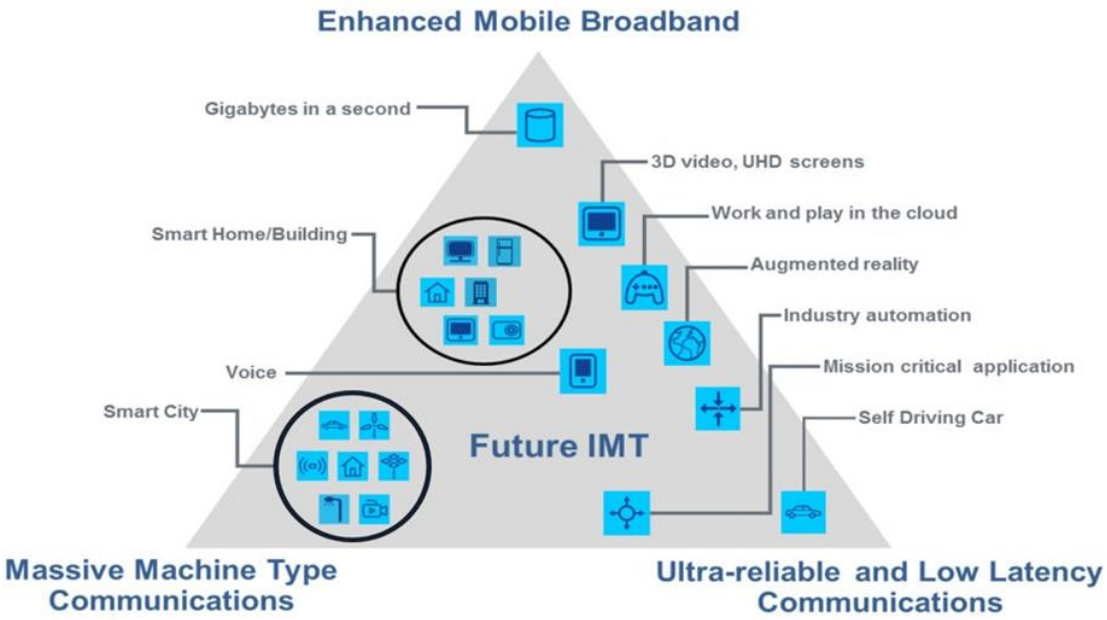
Massive machine-type communication (MMTC)

Massive machine type communication with 5G will enable a truly connected world, meeting the growing demand for data and enabling innovations that will build on the Internet of Things (IoT) to connect billions of devices without human intervention at a never before seen scale. As shown in the diagram above, this has the potential to revolutionise modern industrial processes and applications, including agriculture, manufacturing, transport and business communications.

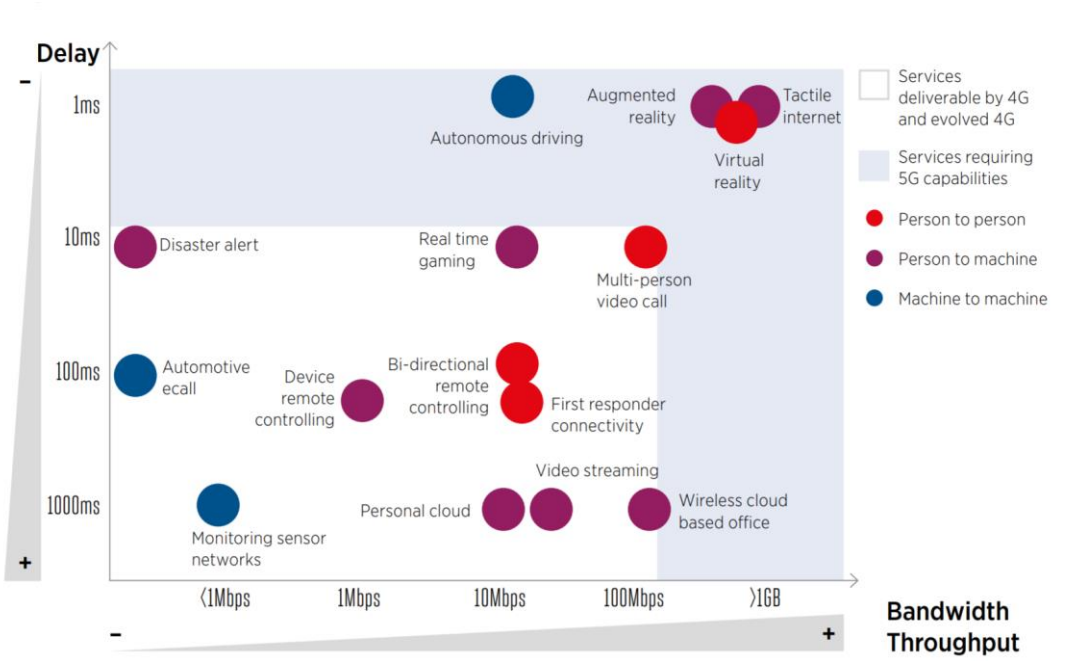
The 5G ecosystem will also make use of the characteristic strengths of satellite services as part of the service delivery matrix, including in areas such as coverage extension (including for IoT), remote-area backhaul, content caching, multi-casting and additional resilience.

The prime benefits of 5G, compared to 4G, will be significantly faster speeds in data access, downloading and streaming content. 5G devices will have increased computing power and make use of lower latency, meaning that devices will enjoy virtually instantaneous connections to the network, as well as greater connectivity when on the move due to the use of antenna beam steering.

x The key benefits delivered by 5G – eMBB URLLC and MMTC



xi Services supported by 5G



[31]

As shown above, two of the key mobile technical characteristics are the speed of data transmission (the throughput) and the time taken for the data to be transmitted across the network (the delay – also termed latency). Many applications today are supported on existing 4G networks, however as requirements for lower latency and higher bandwidth increase so the demand for 5G will grow.

[31] GSMA Intelligence

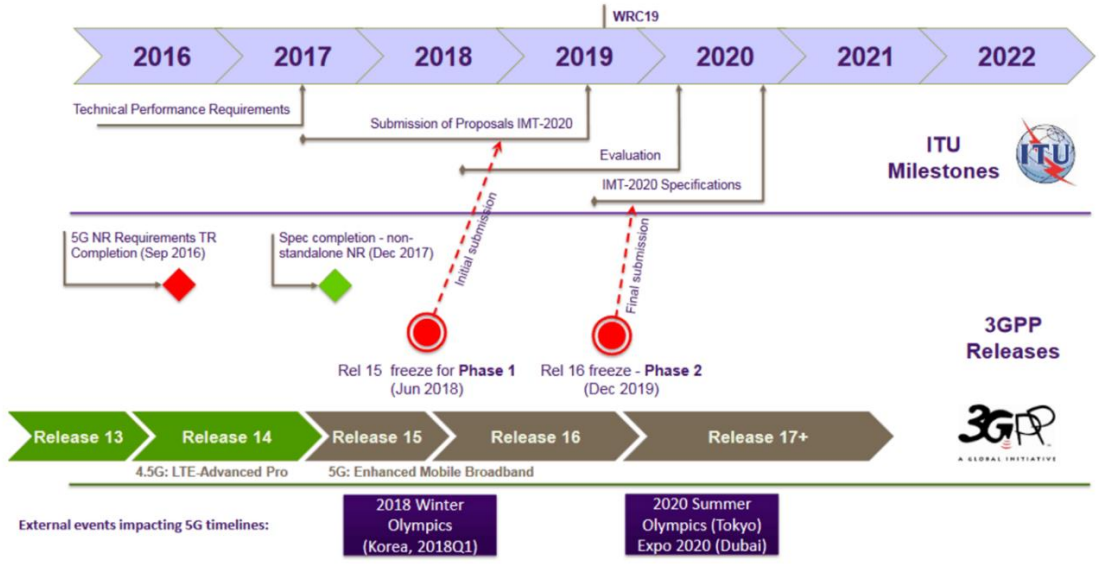
4G/5G ecosystem and development of technical standards

5G has been designed to meet the very large growth in data and connectivity of today's modern society, the internet of things (IoT) with billions of connected devices and tomorrow's innovations.

As with 4G, 5G mobile networks will complement the NBN, fixed wireless and satellite services, as an essential part of the nation's interconnected system of telecommunications networks. Mobile networks deliver a connectivity capability to consumers and businesses alike, while still relying on interconnection with fixed and microwave networks to provide the requisite backhaul and capacity.

The 3rd Generation Partnership Program (3GPP) has already developed the requisite initial technical standards for 5G. This includes several standards, including those for the wireless over the air interface and the network architecture which will be released in stages as per the diagram below. In parallel, the ITU will specify 5G requirements in 2020. Commercial deployments of 5G have been and will continue to be made while the Standards are in development.

xii 5G technical standard releases (3GPP)



[32]

5G networks will initially integrate with 4G networks to provide a continuous connection. A mobile network has two components: the radio access network (RAN) and the core network. The border between the RAN and Core network is blurred in 5G, with many of the components running as virtual network functions.

The RAN consists of various types of infrastructure including small cells, towers, masts and dedicated in-building and home systems that connect mobile users and devices to the main core network.

When transitioning from 4G to 5G, operators have two options, Non-standalone (NSA) and standalone (SA). At a high level, 5G NSA refers to a 5G network that requires a 4G one to work. 5G stand-alone (SA) is not linked to a 4G network and will provide support for a wider set of use cases.

Most operators are initially launching with NSA and it is expected they will evolve to SA over time.

[32] 3GPP website – Specifications releases and freezes.

5G base stations

Small cells are mini base stations that will be a feature of 5G networks particularly where the new mmWave frequencies are used as the connection range is very short. Small cells will provide additional capacity and coverage over a small geographic area, utilising lower power than a traditional mobile phone base station and using smaller equipment. Small cells will therefore complement the macro network that provides wide area coverage. Small cells are already used in today's 4G networks in order to provide coverage and capacity in areas not adequately serviced by the macro network, for example, as illustrated in the images below.

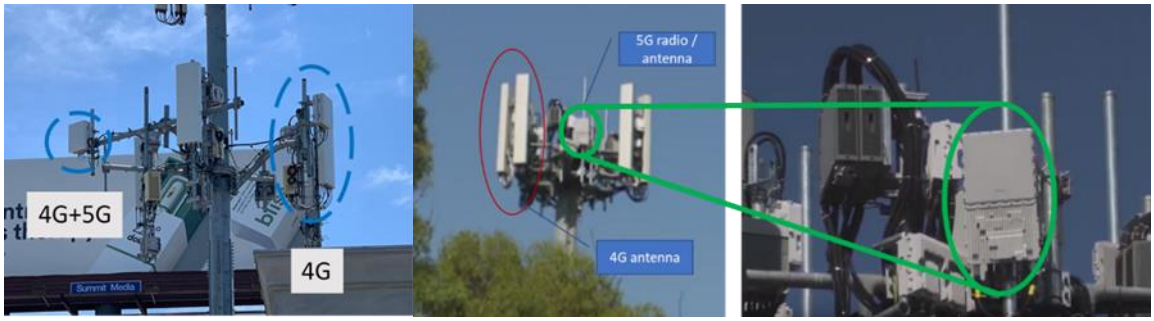
xiii Small cells

Macro cells (traditional base stations) will also continue to be used for 5G and will utilise MIMO (multiple input, multiple output) antennas that have multiple elements or connections to send and receive more data simultaneously. This enables more users to simultaneously connect to the network and maintain high throughput. Where MIMO antennas use very large numbers of antenna elements they are referred to as 'massive MIMO' although their actual physical size is similar, or smaller, to existing 3G and 4G base station antennas, as can been seen in the images below.

Beam steering is a technology that allows the massive MIMO base station antennas (pictured in the images below) to direct the radio signal to the users and devices rather than in all directions. The beam steering technology uses advanced signal processing algorithms to determine the best path for

the radio signal to reach the user. This increases efficiency as it reduces interference (unwanted radio signals). Greater efficiency, in turn, will mean lower power and therefore generally lower EME emissions than used today.

xiv MIMO 5G Antennas – smaller than 4G antennas

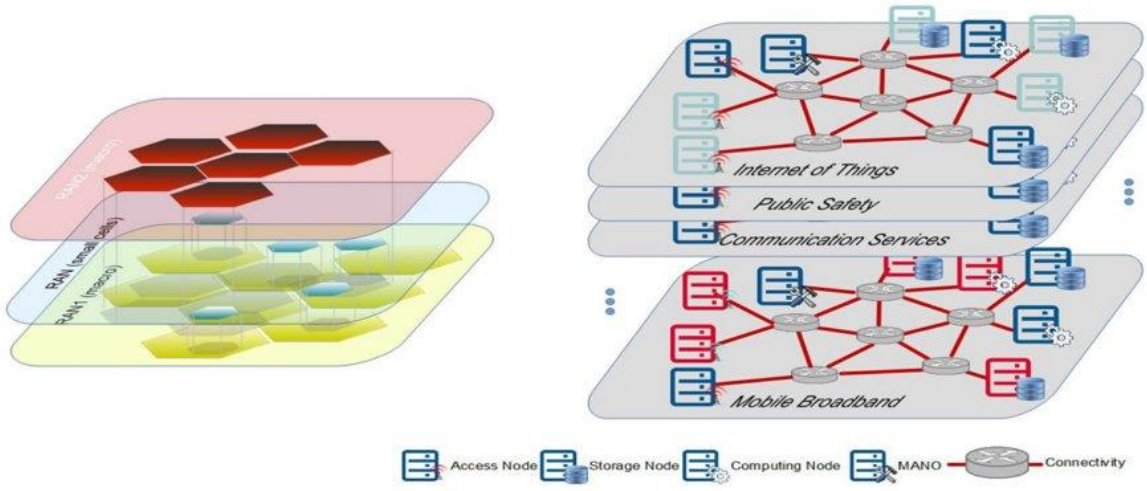


Network slicing – a key differentiator

Network slicing is a key differentiator that will be enhanced by 5G, as compared to 4G. Network slicing enables a smart way to segment the network for a particular industry, business or application. For example, emergency services could operate on a network 'slice' that is independent of other users, as illustrated below, thus avoiding congestion and providing dedicated services. Network slicing therefore has much potential for both enterprise and government services that require guaranteed connectivity, security and reliability.

xv Network slicing enables secure segmenting of 5G networks for various applications

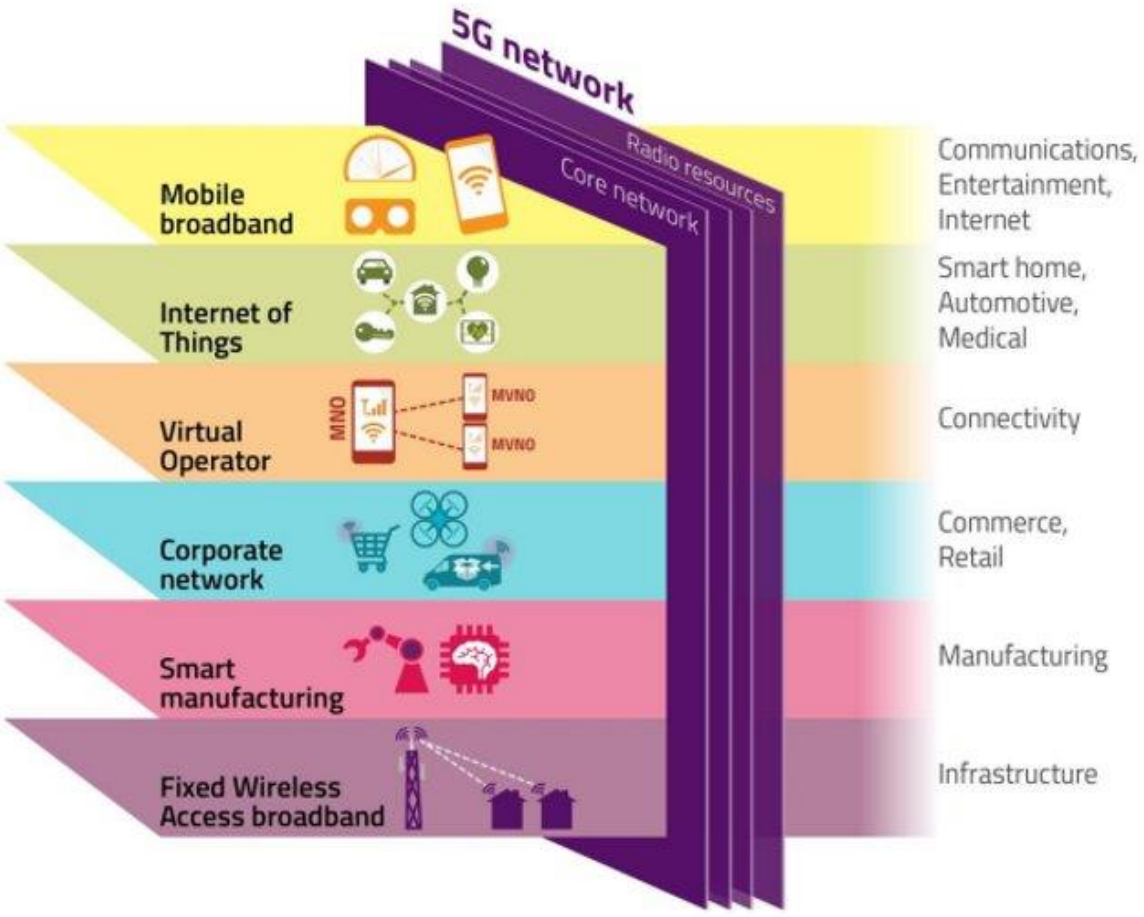
Figure 16: Example of network slicing



[33]

[33]GSMA: Unlocking Commercial opportunities from 4G evolution to 5G

xvi Network slicing enables various uses in different network segments



4. Health and safety

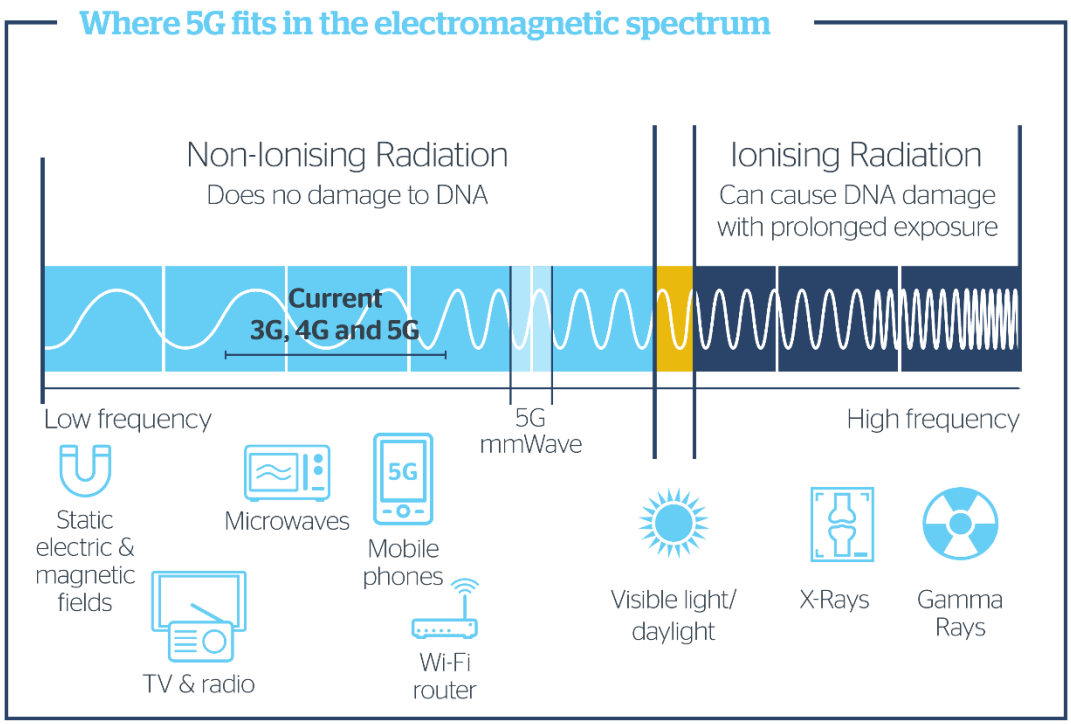
Industry is keenly aware that the deployment of 5G mobile networks has caused concern among some members of the community, both in Australia and overseas, in relation to health and safety.

Australian mobile network operators and equipment suppliers all adhere to and operate within the safety standards set by the regulator – the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA)[34] as endorsed by the World Health Organisation (WHO)[35].

Safety is paramount, both for our customers and employees, and industry complies with the requisite health and safety standards across all business operations to ensure we deliver safe, reliable networks, customer equipment and devices.

Electromagnetic frequencies used for 5G are part of the non-ionising range of radio frequency spectrum which has been extensively researched in terms of health and environmental impacts for decades. The diagram below (not to scale) illustrates where the spectrum used for 5G sits in the electromagnetic spectrum – well within the non-ionising range.

xvii 5G spectrum - where it fits



International safety limits for 5G

Comprehensive international guidelines exist governing exposure to radio waves including the frequencies proposed for 5G. The limits have been established by independent scientific organisations, such as the International Commission on Non-Ionizing Radiation Protection (ICNIRP),

[34] ARPANSA website
[35] WHO website

and include substantial margins of safety to protect all people including children and the elderly at all times.

These guidelines have been widely adopted in standards around the world, including in Australia by the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) and are endorsed by the World Health Organization (WHO).

In relation to 5G, ARPANSA note for their standard:[36]

The operating frequencies of the 5G network are included within the limits set by the ARPANSA safety standard. 5G infrastructure and devices emitting RF EME are regulated by the Australian Communications and Media Authority (ACMA), and emissions are required to comply with the limits of the ARPANSA safety standard.

How safety standards are set

In most Western countries, safety standards for human exposure to EME are based on the guidelines produced by ICNIRP[37]. ICNIRP is a special commission of the World Health Organisation and is made up of a wide range of independent scientists who are expert in the key areas that the guidelines address (i.e. the whole body of research on the health effects of EME). ICNIRP periodically undertakes an extensive review of the new EME research literature to determine that its guidelines remain current and appropriate for the protection from the known effects of EME on human health for all members of the public, including children. The guidelines apply across all RF applications at all frequencies in the range 100kHz-300GHz, including those frequencies used by 5G now, and into the foreseeable future.

ICNIRP's guidelines are in turn adopted by national and international agencies to implement in regulation within respective jurisdictions to ensure public and worker exposure to EME is within the guidelines. In Australia, the agency responsible for adopting these limits in a safety standard is ARPANSA, while the regulating bodies who implement the standard are the Australian Communications and Media Authority (ACMA) for general public exposure, and the Federal and State Work Health and Safety agencies for occupational exposures.

The current ICNIRP guidelines and Australia's own safety standard (the ARPANSA standard[38]) is based on guidelines first published by ICNIRP in 1998[39]. These guidelines were again reviewed in 2009[40] when ICNIRP published an update having reviewed research up to that time and found the guidelines remained protective with a significant safety margin although some detailed adjustments may be warranted to provide greater scientific consistency with advances in EME measurement and calculation. Importantly, there was no new health research that suggested any changes to the limits were required.

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[36] ARPANSA, 5G new generation mobile phone network and health

[37] ICNIRP website

[38] ARPANSA 2002. Maximum exposure levels to radiofrequency fields – 3 kHz to 300 GHz, Radiation protection Series No. 3 (RPS3), available here.

[39] ICNIRP 1998, ICNIRP Guidelines for limiting exposure to time varying electric, magnetic and electromagnetic fields (up to 300 GHz), Health Physics 74 (4):494-522; 1998, available here.

[40] ICNIRP 2009, ICNIRP Statement on the "ICNIRP Guidelines for limiting exposure to time varying electric, magnetic and electromagnetic fields (up to 300 GHz)", Health Physics 97 (3):257-258, 2009, available here.

ARPANSA also reviewed its own standards, making similar findings in their 2014 report[41] that the limits continued to provide ample protection but could be improved with some detailed adjustments arising out of improved measurement and calculation techniques.

Following their 2009 update, ICNIRP conducted an exhaustive review of the scientific research up to the present time, and again examined their guidelines for any required adjustments, issuing a draft new guideline in 2018[42] for public and scientific review. ICNIRP presented the draft guidelines at the 2018 BioEM Conference and emphasised the thorough review of the science to support the new guidelines, the conservative nature of the guidelines and that they cover the existing and new mmWave 5G frequencies. The draft guidelines maintained a conservative approach and made no major departures from the previous guidelines even though a further 10 years of scientific study had been undertaken, indicating the basis for the original and current guideline remains sound and appropriate for protection of the public. ICNIRP have indicated the completed new guideline will be published in the peer reviewed scientific journal *Health Physics*[43] in the coming months.

Precautionary limits used in other countries

Some countries, including several European jurisdictions, choose to adopt precautionary limits which are more stringent than those recommended in the ICNIRP and Australian standards. These limits are adopted for political and social reasons and are not based on any new or different scientific basis. Therefore, these limits also provide no benefit for those countries' citizens in terms of safety from exposure to EME, although in several cases the limits have frustrated the deployment of mobile networks in those countries, and if retained, will also inhibit the deployment of 5G.

The WHO have warned against such precautionary limits, noting in their framework document[44] that

'Large disparities between national limits and international guidelines can foster confusion for regulators and policy makers and increase public anxiety.'

Further, the guidelines already incorporate significant precautionary or safety factors, as the WHO note:[45]

'International guidelines and national safety standards for electromagnetic fields are developed on the basis of the current scientific knowledge to ensure that the fields humans encounter are not harmful to health. To compensate uncertainties in knowledge (due, for example, to experimental errors, extrapolation from animals to humans, or statistical uncertainty), large safety factors are incorporated into the exposure limits.'

No further benefit to the public can therefore be gained from any additional precautionary limits but the societal benefit of mobile technology may be lost.

For example, in Switzerland, an Ordinance relating to Protection from Non-Ionising Radiation (ONIR) specifies a precautionary 'Installation Limit' (i.e. applying to installed base stations only) about 100 times below the international exposure limit values. Swiss authorities acknowledge these limits are

[41] Report by the ARPANSA Radiofrequency Expert Panel on Review of Radiofrequency Health Effects Research – Scientific Literature 2000–2012 (ARPANSA 2014) available here.
[42] https://www.icnirp.org/en/activities/public-consultation/consultation-1.html
[43] https://journals.lww.com/health-physics/pages/default.aspx
[44] WHO 2006, Framework for developing health-based EMF standards, available here.
[45] WHO, What is EMF

not suggested by the established EME science, noting that for the ICNIRP limits, '*…if these limits are complied with, none of the scientifically accepted negative effects on our health can occur.*'

Similarly, in Brussels (Belgium), a limit of about 400 times less than the ICNIRP guidelines has been imposed on top of the international limits. It was not possible to deploy 4G in Brussels under these restrictive limits and in 2014 the Brussels Environment Minister relaxed the limits (to about 100 times less than ICNIRP) to allow 4G to proceed although much delayed. A 2018 report (PDF)[46] by the Federal Belgian Institute for Postal Services and Telecommunications (BIPT) concluded that the present Brussels limits negatively impact current 4G indoor coverage and would need to be at least relaxed by a factor of two to allow the deployment of 5G. The commercial deployment of 5G is consequently currently on hold.

The conclusion from the experience in these two countries alone is that there is a very significant loss of benefit in economic and social productivity that 4G and 5G services can bring, with no benefit to the population in terms of health and safety from the unnecessarily low limits their governments have imposed.[47]

Health effects research for 5G

The electromagnetic frequencies used for 5G are part of the radio frequency spectrum which has been extensively researched in terms of health impacts for decades. Over 50 years of scientific research has already been conducted into the possible health effects of the radio signals used for mobile phones, base stations and other wireless services including frequencies planned for 5G and mmWave exposures.

In relation to radio frequency exposures and wireless technology and health, including frequencies used for 5G, the World Health Organization (WHO) states[48]:

"Despite extensive research, to date there is no evidence to conclude that exposure to low level electromagnetic fields is harmful to human health."

ARPANSA states[49]:

"This [5G] network currently runs on radio waves similar to those used in the current 4G network, and in the future will use radio waves with higher frequencies. It is important to note that higher frequencies does not mean higher or more intense exposure. Higher frequency radio waves are already used in security screening units at airports, police radar guns to check speed, remote sensors and in medicine and these uses have been thoroughly tested and found to have no negative impacts on human health."

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[46] BIPT 2018, Study of 12 September 2018 on the impact of the radiation standards in Brussels on the deployment of mobile networks, available at https://www.ibpt.be/public/files/en/22619/Study_impact_radiation_standards_Brussels_deployment_mobile_networks.pdf

[47] A PwC analysis conducted on behalf of the Swiss operators compared the deployment costs in Switzerland to those of Germany, France, Italy and Austria (all of which are neighbouring countries). Costs were estimated to be 40-110% higher with about one third of the extra costs linked to complying with the restrictive installation limit values.

[48] World Health Organization: What are ElectroMagnetic Fields

[49] ARPANSA. 3 June 2019. 'Misinformation about Australia's 5G network'.

ARPANSA also states:

"*ARPANSA and the World Health Organization (WHO) are not aware of any well-conducted scientific investigations where health symptoms were confirmed as a result of radio wave exposure in the everyday environment.*", and in regards to 5G, "*… there are no established health effects from the radio waves that the 5G network uses."*

Australia's leading academic research centre in this area is the Australian Electromagnetic Bioeffects Research Centre (ACEBR), a federally funded Centre of Research Excellence, headquartered at the University of Wollongong. In their recent fact sheet[50], ACEBR note:

"Extensive research has been conducted on the 5G frequencies soon to be introduced, including specifically on mobile phone applications. For future 5G frequencies, there has been extensive research on other applications using these frequencies (for example, radar and military applications) which have been using these frequencies for many decades at power levels far higher than those used in mobile telecommunications. No indication of any health impacts from exposures at the intensities related to mobile communications have been observed."

International authorities have also considered the potential health effects of 5G technology. In a recent statement[51] from the UK health authority, Public Health England, PHE note that:

"Exposure to radio waves is not new and health-related research has been conducted on this topic over several decades."

And although in future 5G may be implemented at higher frequencies (mmWave) than used for current technologies:

"… the biophysical mechanisms that govern the interaction between radio waves and body tissues are well understood at higher frequencies and are the basis of the present ICNIRP restrictions. The main change in using higher frequencies is that there is less penetration of radio waves into body tissues and absorption of the radio energy, and any consequent heating, becomes more confined to the body surface."

PHE conclude:

"It is possible that there may be a small increase in overall exposure to radio waves when 5G is added to an existing network or in a new area. However, the overall exposure is expected to remain low relative to guidelines and, as such, there should be no consequences for public health."

In Australia, preliminary testing on Australian 5G networks conducted with commercial devices in real-world settings shows levels similar to 3G, 4G and Wi-Fi. In many cases, levels from 5G network base stations measured in the street and in homes and apartments were around 1,000 times below the safety limits.[52]

5G, small cells and health

A key feature of the infrastructure required to deliver future 5G services, and currently already a feature of 4G deployments, is the use of small cells. Small cells operate at lower power than a traditional mobile phone base station and use smaller equipment. Small cells can be deployed with

[50] ACEBR Nov 2018, 5G Wireless Technology Fact Sheet, available here.
[51] Public Health England, 2019 available at https://www.gov.uk/government/publications/5g-technologies-radio-waves-and-health/5g-technologies-radio-waves-and-health
[52] Telstra Exchange, July 2019, 5 Surveys of 5G show EME levels well below safety limits.

minimal visual impact as they use smaller antennas, smaller equipment and can be co-located on existing infrastructure such as electricity and light poles.

Some members of the public have expressed concern that this new type of deployment will bring EME sources closer to their homes and workplaces and therefore increase their exposure to EME.

The deployment of small cells, like all mobile network infrastructure, must comply with strict science-based safety standards set by ARPANSA. These limits protect the community, including children and the elderly, 24 hours a day. The environmental EME levels from small cells, the levels typically experienced by the public and which are many times below the safety standards, are reported in an ARPANSA environmental report, and are available at www.rfnsa.com.au.

Working safely with EME

In a world-leading initiative, in partnership with the industry, AMTA has developed an RF safety program, which is based on a publicly accessible database of all Carriers' mobile network radiocommunications facilities called the Radio Frequency National Site Archive (RFNSA)[53]. The website documents the details of all Australian mobile network base stations, including environmental EME reports (the ARPANSA report) for public information, site safety documentation for safe work on site, site locations, carrier contact details for existing sites and community consultation information for new sites, including 5G. The database is also used by the Carriers to assist them meet their regulatory obligations for EME safety under their licence conditions[54] with the ACMA, and also their regulatory obligations under the industry code for mobile base station deployment.

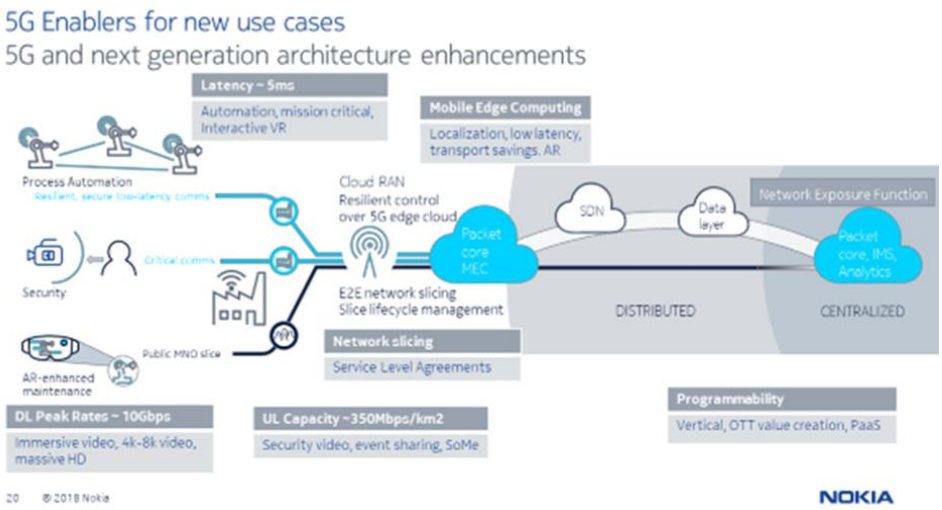
[53] RFNSA website

[54] Radiocommunications Licence Conditions (Apparatus Licence) Determination 2015.

5. 5G Technologies and use cases

5G's key capabilities - low latency, increased speed and more efficient, stable and secure networks and network slicing – will either significantly enhance or make possible a broad range of use cases for enterprise and government, as illustrated in the diagram below.

xviii 5G enablers for new use cases

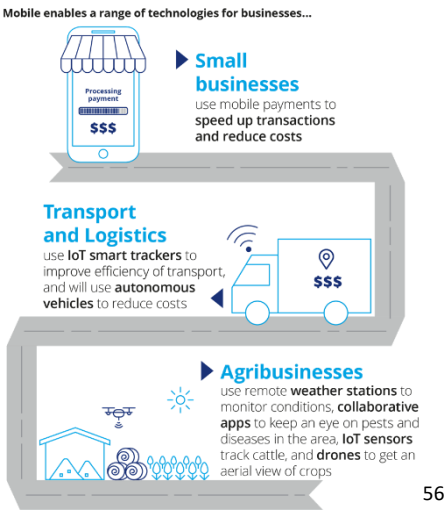


Provided below are use cases that explain 5G's potential for both Government and enterprise.

5G will drive innovation in enterprise

A survey of 550 businesses by Deloitte in 2018 found that 80% of them have already implemented, or expect to implement in the next 3 years, at least one emerging technology in their enterprise.[55] This willingness to implement emerging technology by Australia's business sector bodes well for early adoption of 5G technology by small to medium businesses.

xix Emerging technologies for businesses



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[55] Deloitte Access Economics, Mobile Nation 2019: the 5G Future, page 24
[56] Deloitte Access Economics, Mobile Nation 2019: the 5G Future, page 23

Financial services

The Commonwealth Bank (CBA) has partnered with Telstra and Ericsson to trial 5G edge computing across its network of branches. This will reduce the need for IT infrastructure at individual branch locations, enabling branches to set up more easily, responding to local needs.

"5G has the potential to transform the financial services sector and deliver innovation in a faster and more efficient manner," said Nikos Katinakis, Telstra's Group Executive, Networks & IT. [57]

"5G edge computing is all about bringing the network closer to the user or application. For financial institutions like Commonwealth Bank, it will help to enhance existing banking applications as well as deliver new use cases such as artificial intelligence, all supported by a range of software defined networking solutions," explained Mr Katinakis.[58]

Factories of the future

This video from Nokia shows how 5G will transform manufacturing.

Precision drives decisions in agriculture

The high-level global challenge in agriculture is to increase food production by 70% to meet projected population levels (9.6 billion) by 2050.

Related challenges such as falling productivity, limited land supply, climate change, water supply, energy supply/cost and labour/skills shortages – all point to a critical role for technology in so-called smart farming or precision agriculture.

5G will be central to precision agriculture with applications servicing real time data for on-farm needs such as monitoring, analysis and control of crops/stock, water/soil, pathogens/disease, planting/harvest cycles, vehicles safety maintenance (incl. drones), and power usage.

In addition, linking the smart farm to real-time data sources off-farm such as market trends and prices, options for transport, freight or logistics as well as climate conditions and weather forecasts further expand the role of technology and data in driving higher productivity, sustainability and international competitiveness.

For example, Australian start-up, Smart Paddock [59]is using IoT to track and monitor animal related health issues in cattle herds to identify animals that are sick (or especially healthy). As around 450,000 cattle die prematurely in herds across Australia each year — amounting to around 7 percent of cows in the country, or more than $700 million in lost revenue - this data helps to identify the causes of illness, and to reduce spread of disease within a herd, so that those premature death numbers can head as close to zero as possible.

Australia's agricultural sector, represented by 15 Rural Research and Development Corporations, have estimated that precision digital-driven agriculture could lift the gross value of production by 25% above 2014/15 levels. The role of 5G and Internet of Things (IoT) will be central to this degree of enhancement in future agricultural output and efficiency.

5G networks also have the potential to enable dynamic, end-to-end food traceability. Embedded IoT sensors can trace food from farm to table. The food supply chain will be able to further modernize

[57] Telstra, CBA and Ericsson to trial 5G for the banking sector, media release, 25 Feb 2019.
[58] Telstra, CBA and Ericsson to trial 5G for the banking sector, media release, 25 Feb 2019.
[59] Telstra, Oct 2018, IoT in focus: transforming the agriculture industry.

its practices and processes, becoming super-interconnected and better equipped to leverage technologies like blockchain and AI. This can increase the accountability of food businesses in the event of foodborne illness outbreaks, help organizations better mitigate food safety risk and streamline costs for companies and, in turn, benefit consumers.[60]

The combination of mobility and IoT provided by the 4G/5G ecosystem is key to smart farming just as it is for smart cities/homes.

Transforming transport and logistics

IoT smart trackers to improve efficiency and autonomous vehicles will reduce costs as well as improve safety and accessibility for all road users. The NRMA notes that autonomous vehicles will deliver improved safety, decrease congestion, provide options for young, elderly and disabled people, as well as reduce pollution and emissions.[61]

Autonomous vehicles are being used now with 4G, particularly in mining and agriculture, but 5G and ultra-reliable low latency communications will greatly enhance the use of autonomous vehicles across industries and the general community.

Telstra, Ericsson and Lexus have recently trialled Vehicle-to-Everything (V2X) technology over Telstra's 4G network in Victoria.[62] V2X technology lets cars talk to the environment around them using both short range communications and Telstra's 4G network. The 'environment' around the car could be other cars and trucks, traffic lights, roadworks or even pedestrians and cyclists. The use and development of V2X, over 4G and 5G networks will help create clever transport systems to support more efficient use of roads, better traffic management (i.e. reduced congestion) and, in the future, coordinated and safer driverless vehicle operation.

4G and IoT have already delivered benefits to the transport and logistics industry.

The transport and logistics industries are using mobile enabled IoT systems to improve tracking, cut costs and deliver a more transparent, reliable service for customers. DHL's Smartsensor technology monitors temperature and humidity, while also indicating shock and light events that help ensure goods are not damage during transportation.[63]

Similarly, Linfox's advanced fleet monitoring system, FoxTrax, uses precise GPS tracking and real-time communication between drivers and control room staff to improve safety, security and operational efficiency.[64]

In the public sector, Transport for NSW tracking data provides customers using the TripView app with live timetabling and capacity data to ensure a comfortable commute on public transport.[65]

5G, by providing ultra-reliable low latency communications will enhance the ability to track vehicles and goods being transported in real time and provide live information to business operators and customers alike.

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[60] RT Insights, July 2019, How 5G could improve food traceability.
[61] NRMA, Driverless cars: the benefits and what it means for the future of mobility
[62] Telstra, June 2019, Making our roads safer with connected vehicles.
[63] Deloitte Access Economics, Mobile Nation 2019: the 5G Future page 26
[64] Deloitte Access Economics, Mobile Nation 2019: the 5G Future, page 26
[65] Deloitte Access Economics, Mobile Nation 2019: the 5G Future, page 26

Government

More time for patients

Nokia has provided a solution to Oulu University Hospital that allows doctors and staff to focus their time on providing care for patients by automating many routine tasks that can be better performed by robots. This video shows how it is working. [66]

Another video from Nokia illustrates how radiology can be performed remotely, so that the specialist can actually review the patient's scan as it is happening. This eliminates the need to wait for the radiologist to review each patient's case and can enable 24/7 support from the specialist. 5G networks can enable technology like this that has the potential to improve accessibility to expert healthcare in Australia's regions. [67]

Emergency services – responding in real time with 5G

In Portugal, Ericsson has partnered with network operator, Altice to demonstrate how 5G technology can optimise and co-ordinate an emergency services response to a critical incident in real-time. As pictured below, first responders from several agencies were equipped with body kit, comprising of cameras and sensors connected via a 5G test network to a command centre, as they responded to a staged incident involving a driver trapped in a vehicle. Connected drones provided an aerial view. The extremely low latency of the 5G video allowed instant feedback from the scene, enabling the command centre to co-ordinate and monitor first responders and their actions.[68]

xx Ericsson live demonstration in Portugal

The connected ambulance – real time interaction

In a collaboration between Ericsson, Kings College and British Telecom, this connected ambulance shows how a doctor, paramedic and patient can interact in real time via 5G to expedite diagnosis. [69]

With 4G, near real time communication was via voice and video. 5G brings the capability to touch and move in real time over the network.

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[66] Nokia, More time for people – Oulu University Hospital, Dec 2018
[67] Nokia, See the future in action – remote radiology, May 2019
[68] Ericsson News, Sept 2019, 5G emergency response abilities highlighted by Altice and Ericsson
[69] Ericsson North America, Real time interaction with 5G: mobile ultrasound (the connected ambulance), March 4, 2019.

In this demonstration a patient is in an ambulance with a suspected blood clot on their way to hospital.

The paramedic adds a 5G data channel to the VoLTE call to connect to the Doctor at the emergency room.

Acting as a surrogate arm for the Doctor, the paramedic uses a haptic glove, controlled in real-time by the Doctor, to undertake an ultrasound examination.

By the time the patient arrives at the hospital diagnosis is complete and next treatment steps are clear.

The connected ambulance has the potential to save lives and improve both the efficiency and cost of healthcare diagnosis protocol.

Smarter cities

5G will enable smarter cities, homes, schools and communities. The technology will enable autonomous vehicles and smart parking meters. IoT sensors can be used to enable smart lighting of public spaces, guide emergency responses in crowded areas, monitor air quality and traffic patterns. Maintenance drones can be deployed to repair infrastructure and restore public services without endangering workers.[70]

The NSW Government is working collaboratively with 8 local councils, the Commonwealth, industry and community stakeholders to ensure that the Western Sydney City Deal delivers a 5G ready Western Parkland City.

This video shows how the Western Parkland City will deliver innovative digital connectivity across education, transport, the airport, manufacturing and an agribusiness precinct that will connect farmers to air transport and create a truly smart city.

[70] Ericsson, 5G will be the platform for tomorrow's smart cities, Aug 28, 2018

6. How can Government pave the way for a smooth 5G evolution?

Government and industry partnership

The Government has already indicated its strong support for the deployment of 5G networks by establishing the 5G Industry Working Group (the Working Group) – a partnership between Government and industry to enable a co-ordinated approach to the efficient deployment of infrastructure to ensure the benefits of 5G technology are fully realised.

The Terms of Reference of the Working Group indicate how such a partnership will work:

> *Having regard to the transformative potential of 5G networks for the Australian economy and how Australians live, and the facilitative role that communications technology plays in driving productivity and innovation, the working group's role is to:*
>
> *identify enablers and barriers to the deployment and effective use of 5G in Australia, including at the sector and industry level;*
>
> *examine how the Commonwealth regulatory settings in sectors, including but not limited to communications, can be optimised for 5G networks and technologies;*
>
> *provide a platform for collaboration across Government and industry on 5G matters;*
>
> *engage, with the input of subject matter experts, in ongoing strategic dialogue about 5G matters.*

AMTA and Communications Alliance have both been active participants in the Working Group, to date, and we see potential for the Working Group to guide the Government's stated 5G direction including a specific role in building awareness of the economic and social benefits of 5G across Government portfolios. We also see a role for the Working Group in relation to building awareness among the small business community and with consumers. 5G has the potential to revolutionise the way Australians live and work, but we need to ensure that businesses and communities are aware of the opportunities that exist so that these are not missed. We believe an awareness campaign similar to those that have supported the roll-out of the NBN could be very helpful in both allaying community concerns about health and safety as well as ensure that the positive impact of 5G is understood, enabled and shared.

Promoting industry and public awareness of 5G

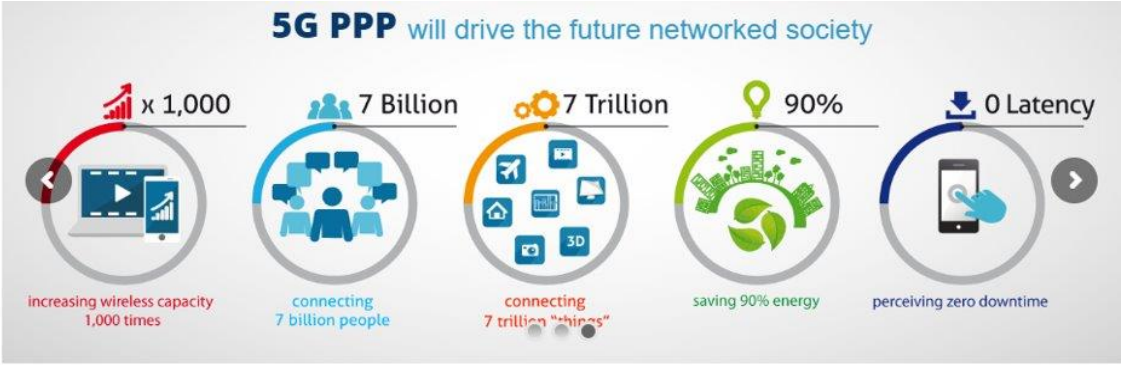
Globally governments are very focussed on the evolution of 5G including initiatives to support local industry via timely allocation of suitable spectrum and rules that allow efficient network infrastructure deployment. The Australian Government is also focussed in these areas as outlined in the 5G Directions Paper[71] and by the establishment of the Working Group.

In addition, the role of government in some jurisdictions extends to direct and/or joint funding of 5G programs ranging from test beds to public awareness and education campaigns.

For example, the European Commission has funded a multi-billion Euro Public Private Partnership (PPP) which is in its 3rd phase, aiming to secure 5G leadership position for Europe.

[71] Department of Communications and the Arts, 2017, 5G Directions Paper.

xxi EU's 5G Public Private Partnership



Similarly, the UK Government has contributed substantial resources to support the evolution of 5G. The UK regulator, OfCom is working with government and industry on a strategy "*Enabling 5G in the UK*". [72]

In the USA the President and Chairman of the FCC have several policies in play, most notably, the 5G FAST Plan.[73]

xxii The USA's FAST Plan

As a leading early adopter of mobile technology, the Australian mobile industry is at the forefront of 5G deployment with the opportunity to further develop a national leadership position. This opportunity will need support from the Australian Government, including strategic engagement with industries as well as State and local Governments. The Inquiry should consider how to best enable this level of collaboration and its focus, including learnings from other countries where public 5G programs have been implemented.

5G needs a fit for purpose regulatory framework

The deployment of 5G networks requires significant investment by industry in both physical infrastructure and spectrum resources. It is critical that Government supports and encourages this

[72] OfCom, March 2018, Enabling 5G in the UK.
[73] FCC, 5G Fast Plan.

investment with a policy approach that streamlines regulation, removes regulatory barriers and makes the necessary reforms to the existing legislative and regulatory framework.

Fit for purpose deployment related policy and regulatory settings will be critical inputs to support the implementation of 5G. Timely and efficient deployment of infrastructure requires a flexible regulatory framework as well as thoughtful consideration and timely decision-making by policy makers to ensure that the benefits of 5G are fully realised.

Industry is already building the first 5G networks, with critical investment decisions being made now and in the very near future. It is imperative that there is certainty around the ability to deploy the requisite infrastructure to provide certainty for the associated long-term investment decision-making processes.

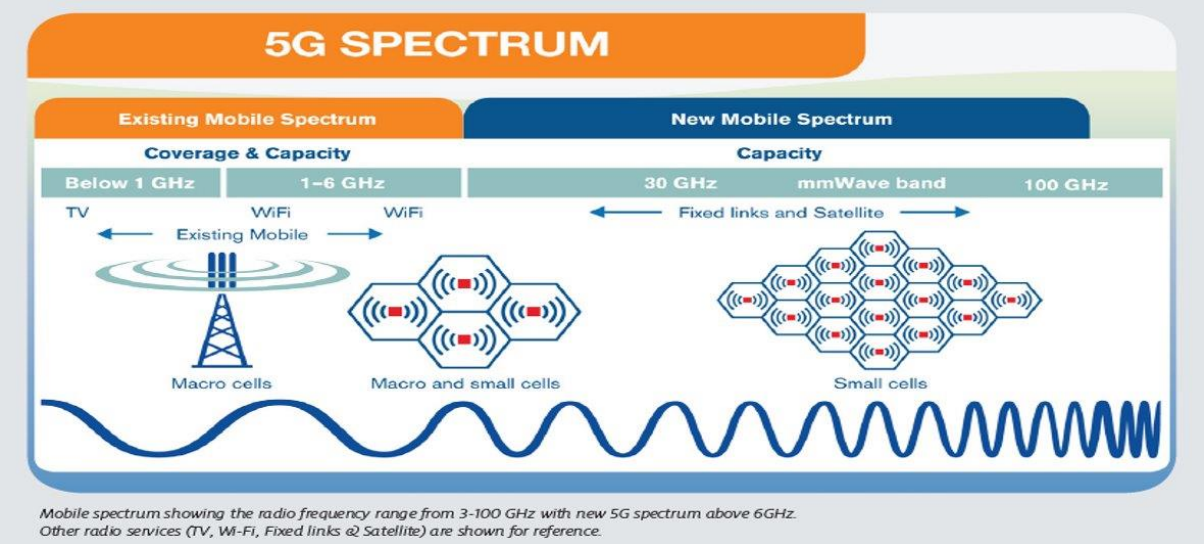
Spectrum required for 5G

In Australia 5G is initially utilising spectrum in the bands below 6 GHz as well as additional spectrum in the mmWave bands in the 26-28 GHz range.

We therefore welcome the Government's recent decision to bring the 26 GHz band to market, however it is critical that more spectrum for 5G is progressed to market in a timely manner.

The mmWave spectrum will supply the additional spectrum that 5G networks require to deliver ultra-high-speed capacity. Further work is needed in relation to existing bands to enable the deployment of 5G services, including reallocation of low band spectrum and licence reform in mid band spectrum.[74]

xxiii Spectrum ranges for 5G



Mobile spectrum showing the radio frequency range from 3-100 GHz with new 5G spectrum above 6GHz. Other radio services (TV, Wi-Fi, Fixed links & Satellite) are shown for reference.

AMTA estimates that each mobile operator will initially require additional low band spectrum and around 100 MHz of mid band spectrum and an initial 1GHz of mmWave spectrum for 5G to reach its full potential and deliver on what it is designed to do. [75]

[74] Includes, 2.1 GHz, 2.3 GHz and 2.6 GHz bands

[75] AMTA submission to ACMA's Five Year Spectrum Outlook, 16 May 2019

Industry notes the Government's recognition that spectrum must be made available in a timely manner to enable innovation and productivity across industry sectors with a particular focus on enabling the early deployment of 5G mobile networks in Australia.[17]

We strongly believe this is needed to ensure ongoing demand for all types of services can be met and Australia remains at the forefront of rolling out the next generation of mobile technologies to enable transformative social and economic benefits across industries such as transport and logistics, health, education and the automotive industry,[18] as well as consumer benefits.

5G has been designed to operate in the *operating bands* defined in 3GPP TS 38.104[76]. It is important that the spectrum allocations in Australia are aligned with the global standards. There is also the possibility to support 5G on spectrum currently utilised for 3G and 4G, potentially through a software upgrade to existing base stations.

The mobile industry notes the ACMA's spectrum work plan and supports the continuing work to bring additional spectrum to market. We also support increased focus on the timely reallocation of low band spectrum to enable the deployment of national 5G networks, especially in regional areas. We note the potential for use of spectrum in the 600 MHz band in the longer term.

We also support the work to optimise the 3.4 GHz band and the progression of planning work in relation to the 3.8 GHz (3700-4200 MHz) band.

The Associations have been working closely with the ACMA and Department of Communications, Cyber-safety and the Arts with regard to preparation of Australia's position and delegation to the World Radiocommunication Conference in 2019 (WRC-19).

AMTA has supported the development of an Australian position for WRC-19 Agenda item 1.13 that supports international harmonisation of key bands 24.25-27.5 GHz, 37-43.5 GHz, 66-76 GHz and spectrum around 50 GHz, for longer term use by 5G.

Reform of the spectrum management framework

The Government has been reviewing the way spectrum is managed under the current *RadioCommunications Act 1992*[77] with a view to reforming or replacing the Act to reflect a more contemporary spectrum management and planning framework.

The Associations have identified the following principles as key to reforming the current radiocommunications legislative framework to make it fit for purpose and encourage investment in a 5G world:

1. The licensing framework needs to be flexible as well as provide sufficient certainty to encourage continued investment.

2. Flexibility means technology neutral, and multi-purpose use.

3. Certainty means – spectrum licence tenure of up to at least 20 years; with renewal pathway certainty.

[76] 3GPP TS 38.104 NR; Base Station (BS) radio transmission and reception
[77] Radiocommunications Act 1992 (Cth)

4. Allocations need to be efficient through streamlining processes (in terms of cost, timeliness and complexity of engagement), using market forces where appropriate, and supporting secondary trading.

5. Property rights of licence holders need to be enforced.

6. Sharing should never be imposed on spectrum licence holders. Sharing of spectrum licences should be at the licence holder's discretion on a commercial basis. Introduction of sub-licence, as part of the spectrum reform agenda, would facilitate such sharing.[78]

The Associations have previously advocated for certainty in the radiocommunications licensing framework, and specifically, certainty around the licence renewal processes. Given the slow progress with drafting a new Act, the Government's recent decision to re-consider amendments to the existing Radiocommunications Act is welcomed as a way to expedite this important reform.

Please see **Appendix A** for more details regarding the spectrum management framework and future spectrum bands for 5G.

Network deployment reform

5G promises to be a comprehensive advance in mobile technology and the step from 4G to 5G will deliver broader and more diverse impacts on all sectors of the economy and community. 5G services require the deployment of new 5G networks.

Deployment related policy and regulatory settings are critical inputs to support the implementation of 5G. Timely and efficient deployment of infrastructure requires a flexible regulatory framework as well as thoughtful consideration and timely decision-making by policy makers to ensure that the benefits of 5G are fully realised.

Industry is already building the first 5G networks, with critical investment decisions being made now and in the very near future. It is imperative that there is certainty around the ability to deploy the requisite infrastructure to provide certainty for the associated long-term investment decision-making processes.

The regulatory framework should be agnostic to technology or deployment types, thereby relieving the need to constantly update the regulations as technology and deployment practices evolve. Issues of visual and other amenity, which are the real impact on communities, can be governed by a more constant over time set of principles based on what a deployment looks like and where it occurs. What function it performs or what technology it supports is not relevant to this consideration.

AMTA and Communications Alliance have been advocating for a package of reforms which would relieve a highly constrained system where only a few "permitted" developments are excluded from a regulatory process (i.e. not requiring planning approval) to a more inclusive and technology agnostic specification of permitted developments that is flexible enough to keep pace with the rapid

[78] The Associations are not opposed to spectrum sharing outside of spectrum licences where this could improve the efficiency of spectrum use. Sharing should involve cooperation and coordination between all relevant spectrum users.

evolution of mobile technology and infrastructure types. We continue to work with Government to finalise these reforms, and we welcome its finalisation in a timely fashion.

Communications is the 4th utility

As described above, 5G networks have the potential to be a key input into the 4th industrial revolution. 5G services will be as critical as power, gas and water. Indeed, communications is commonly regarded as the fourth utility. However, the communications industry does not have the same rights as utility companies to deploy assets in a timely and cost-effective manner. The industry is concerned that continuation of this approach risks making 5G networks commercially unviable

Communications is no longer a luxury but a key utility for all businesses. Too many local and state bodies see communications assets as a potential income stream rather than a facilitator of vital community services. Long term reform is required so that telecommunications can be treated in a manner consistent with the other utilities with regard to access to public property, just as we are seen as vital infrastructure in national security matters and by consumers and businesses alike.

Infrastructure sharing – passive and active

There is a well-established industry practice across fixed and mobile networks where operators share passive infrastructure such as towers, poles, buildings and housings. AMTA members expect sharing of passive infrastructure to continue on throughout the 5G era where it is technically feasible (e.g., physical space, wind-loading, matching equipment rack types, etc) and makes economic sense to do so. However, sharing active infrastructure such as electronics including radio transmitters and antennas, has a range of technical and economic constraints that make it generally not feasible to share.

One example of the type of technical challenge that can arise in active equipment sharing is the ability to build radio transmitters capable of spanning the spectrum holdings of multiple network operators. In the 3.6 GHz band, where operators are using 60-100 MHz, or worse, in the 26 GHz band where operators are likely to be using 800 MHz or more each, it is simply not possible to build a single radio system capable of spanning such a wide frequency range. Thus, multiple cells are still required in a 1:1 relationship for each carrier. A further example relates to the physical placement and orientation of antennas to avoid interference to/from other operators in the same or adjacent band(s). In practice, this means sharing of passive infrastructure such as a single tower is possible, but restrictions on the orientation of antennas mean separate electronics as one transmitter cannot drive two separate antennas.

As we move to deploying small cells, precise placement is critical for them to be effective. It will be rare that the needs of all carriers align for any small cell to a sufficient extent for sharing the small cell to be viable. The factors requiring precise small cell site placement include amount and geographic focus of customer demand and location of surrounding network elements (macros and other small cells) and these are unique to each carrier.

There are also economic challenges to be overcome. Most of the economic gains derived from sharing are made in the sharing of passive infrastructure given the cost of physical infrastructure such as towers and buildings. The incremental savings realised from sharing active infrastructure are marginal at best after compensating for the increased complexity arising from the need to coordinate between multiple operators. When offset against the yield and market share, reductions arising from the loss of competitive differentiation means there are strong economic incentives against sharing of active infrastructure.

While passive infrastructure sharing has and will continue to play a role in current network generations, even there, it is worth observing that carriers do not share every tower or facility. The reason is each carrier has a unique set of evolving constraints ranging from specific spectrum holdings, vendor capabilities (and limitations), engineering expertise, through to unique and changing target markets, customer demands and service offerings.

Support for EME health research and the agencies regulating EME safety

To ensure the continued confidence of the public in mobile networks in general and 5G deployment in particular, it is important that the public continue to hear the reasoned voice of Australia's world leading academic EME research bodies (such as the Australian Centre for Electromagnetic Bioeffects Research, ACEBR) and the government's own expert health agency (ARPANSA). It is important therefor that these bodies are suitably resourced to undertake the necessary research and review activities to allow them to remain at the forefront of knowledge on EME and health effects research and standards setting.

Funding for Australian EME research

While extensive research activities over many decades have not found any scientifically established health effects from exposure to EME from mobile network technologies, health bodies such as ARPANSA continue to note that while no health effects are expected from radio frequency exposures below the limits set in the ARPANSA standard*, "it is important to continue the research in order to reassure the Australian population."*[79] In 2017, ARPANSA published a research agenda[80] recommending future research topics including some specifically aimed at 5G (in particular the methods of measurement and calculation to ensure compliance with the ARPANSA safety standard for 5G applications).

The Associations strongly support ongoing funding of EME research in Australia. The National Health and Medical Research Council (NHMRC) funded centres of research excellence such as ACEBR continue to address public concerns about the safety of mobile network technologies through their publications, seminars fact sheets and other communications about the state of the EME science. This is particularly the case in the media, both traditional and digital, where often misinformed commentary can unnecessarily alarm the public, who may then seek to frustrate mobile network deployments within their communities. The continued ability of both research and health agencies to impact positively on such debates is vital to the efficient and effective deployment of 5G and realisation of the many benefits it brings to Australian communities and businesses.

ARPANSA

Likewise, ARPANSA as the primary health body responsible for the development of Australia's EME exposure standard, must also have a strong and authoritative voice in debates concerning the science of EME and plays an important role in ensuring public confidence in health standards and their implementation in Australia. The ARPANSA environmental EME report remains an important public information tool to assure typical EME levels in the community are not only in compliance with the ARPANSA safety limits, but base station EME is typically 100s of times below these limits. ARPANSA's RF survey activities play an important role in both informing the public about EME in their environment and also corroborating the industry's activities in assessing and communicating

[79] https://www.arpansa.gov.au/news/5g-new-generation-mobile-phone-network-and-health

[80] ARPANSA 2017, Radiofrequency Electromagnetic Energy and Health: Research Needs, Technical Report 178, June 2017available at https://www.arpansa.gov.au/research-and-expertise/technical-reports/radiofrequency-electromagnetic-energy-and-health-research

the compliance of all mobile network infrastructure, including 5G and small cells, with the science-based safety limits. The Associations therefore support a well-resourced ARAPNSA so that it can continue its valuable program of EME activities, especially at this critical time as 5G networks are rolled out.

Opportunities for enterprise and government

The opportunities for enterprise are clear as illustrated by the case studies outlined in section 5. There are also opportunities across all levels of government in Australia to be an early adopter of 5G. Government services are increasingly digitising and this is transforming how people interact with Government. There is also potential for 5G to further enhance how some of these services are delivered to the public.

Adoption of 5G at all levels of Government could be encouraged by requiring tenders for the provision of services to consider what role 5G technology could play.

7. Conclusion – Ensuring Australia reaps the benefits of 5G

The potential benefits of 5G for Australian society and the economy have been clearly outlined in this submission.

As a small, agile economy with a history of early adoption of digital technology and innovation, Australia is uniquely positioned to take advantage of the potential that 5G has to offer to develop our role in the region and globally as a leading technology nation. For the last four years, Australia has consistently ranked 1st in an index that includes 165 countries (representing 99% of global population) for its mobile connectivity.[81] 5G is the innovation platform that will grow the mobile industry's capacity as a key contributor to Australia's future global competitiveness.

It is in Australia's national interest that the transition to 5G is fast-tracked so that the economic, productivity and social benefits can be realised sooner

This will require a co-ordinated policy approach from all levels of Government, working with industry and across key portfolios, to ensure that policy and regulatory settings support efficient network deployment, including timely spectrum allocation and that there is broad community support for and understanding of the economic and social benefits of 5G.

5G networks will transform the way Australians live and work and we must ensure that the enabling effects of this next generation technology are fully realised and shared across the whole community.

[81] GSMA Mobile Connectivity Index, The State of Mobile Internet Connectivity Report, July 2019

Appendix A - Spectrum Management reforms needed for 5G

AMTA has identified the following principles as key to reforming the current radiocommunications legislative framework to make it fit for purpose in a 5G world:

- The licensing framework needs to be flexible as well as provide sufficient certainty to encourage continued investment.
- Flexibility means technology neutral, and multi-purpose use.
- Certainty means – spectrum licence tenure of up to at least 20 years; with renewal pathway certainty.
- Allocations need to be efficient through streamlining processes (in terms of cost, timeliness and complexity of engagement), using market forces where appropriate, and supporting secondary trading.
- Property rights of licence holders need to be enforced.
- Sharing should never be imposed on spectrum licence holders. Sharing of spectrum licences should be at the licence holder's discretion on a commercial basis. Introduction of sub-licence, as part of the spectrum reform agenda, would facilitate such sharing.[82]

AMTA has previously advocated for certainty in the radiocommunications licensing framework, and specifically, certainty around the licence renewal processes.

We note that while the current legislation[83] (the Act) does contain a pathway to spectrum licence renewal,[84] the gaps are:

- an absence of a clear entitlement of incumbent licence holders to renewal;
- uncertainty about the policy guidance for the criteria and mechanism for evaluation of spectrum licence renewal eligibility; and
- the determination of the renewal price.

AMTA would prefer to see a rebuttable right of renewal inserted in the Act. AMTA considers that this would balance the need for investment certainty against the public interest in ensuring highest value use of spectrum. Failing that, the next best solution would be timely, transparent and public Ministerial guidance on the criteria and the process to be followed for the re-issue of spectrum licences.

We accept that it is unlikely to be in the public interest to renew spectrum which does not support substantial existing investment. However, where such investment exists, it is not desirable to have a

[82] The Associations are not opposed to spectrum sharing outside of spectrum licences where this could improve the efficiency of spectrum use. Sharing should involve cooperation and coordination between all relevant spectrum users.
[83] Radiocommunications Act 1992
[84] Radiocommunications Act 1992, (Act) s82.

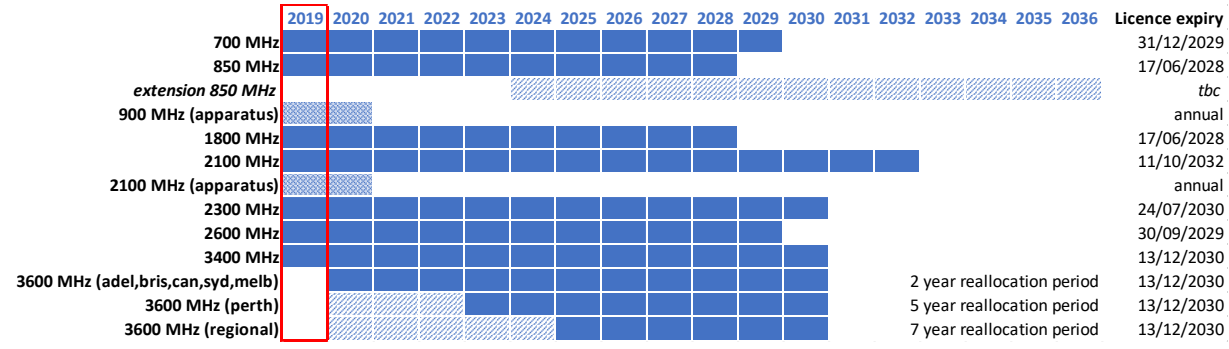
'presumption' of the return of spectrum to the market upon licence expiry, for the following reasons:

- Returning in-use spectrum to market will add cost to licensees as their investment in network infrastructure will have a shorter expected period of recovery (i.e. licensees should expect the spectrum will not be renewed and they may have to reinvest in alternative infrastructure after the licence term) and the cost of obtaining replacement spectrum is likely to be greater. The additional cost will be factored into bidding strategies, meaning lower returns to government from spectrum auctions. The shorter recovery period will also result in higher prices for consumers and/or reduced investment, particularly towards the end of a licence term.
- If the in-use spectrum is not re-issued, then the provider will either not compete in the related downstream markets (as it would not have any spectrum) and will be displaced by a rival, or it will need to find alternative spectrum and potentially displace another rival. This means that competition won't be enhanced, but rather competitors will just be replaced, and with a high deadweight loss given the real costs associated with replacing competitors.
- Even if the incumbent wins part of the spectrum being renewed and the remainder goes to a new entrant, it is most likely (given the increasing demand for spectrum to support mobile capacity) that the two providers now operating on spectrum previously held by one provider, will be capacity constrained. Competition is more likely when each has spare capacity – i.e. the incremental benefit of filling the spare capacity is high relative to the cost of leaving it unused. Providers that are capacity constrained have little incentive to compete with each other, as lowering price will increase congestion and worsen customer experience, so is less likely to attract any new customers.

AMTA also sees merit in codifying the process and timelines around licence renewal. For example, making clear in the Act that the renewal process must begin at least 5 years prior to the licence expiry date; and is to be completed within 12 months.

Making such decisions any closer to the licence expiry would reduce incentives for investment and secondary trading during the later years of the licence term and, if reallocation is required, may not leave sufficient time for the ACMA to complete a reallocation process before the expiry of the existing licences and potentially leaving the spectrum unused for a period of time.

The chart below illustrates the allocated mobile spectrum bands and licence expiry deadlines. The next tranche of spectrum licence expiries occurs in 2028 so a renewal pathway needs to be defined now to provide licence holders with the requisite certainty for ongoing investment in this spectrum.



AMTA has several suggestions for ways to improve the flexibility of the licencing framework that we have outlined below:

Align maximum licence terms to at least 20 years

The maximum available licence terms, which are currently hardwired into the Act at five years for apparatus licences[85] and fifteen years for spectrum licences,[86] should be aligned and extended to at least twenty years. It would then be a matter for the ACMA to appropriately determine licence terms, with Ministerial policy guidance where appropriate.

Greater flexibility for the ACMA in spectrum allocation

The existing legislation has highly prescriptive timelines for spectrum designation, conversion and re-allocation, as well as prescribed involvement of the Minister at several points in these processes.[87] These highly codified processes cause unnecessary cost and delay to the ACMA's work, and also restrict its discretion in respect of matters where repeated Ministerial involvement should not be required. AMTA's view is that relatively simple amendments to the relevant parts of the Act would remove these pain points and enable the Minister's role to be focused on policy guidance to the ACMA, with Ministerial decisions on allocation matters only to be retained (if appropriate) for the most sensitive and contentious aspects such as allocation limits[88] and reserve pricing.[89] We recognise that greater flexibility for the ACMA in releasing and re-allocating spectrum requires diligent consultation with all stakeholders, especially potentially affected licensees. However, this process does not need to be micro-managed in the Act with repeated Ministerial involvement, as is currently the case. Appropriate consultation is a fundamental principle of our administrative law that is already subject to adequate legal safeguards. Elimination of this detail in the Act would enable the removal of numerous provisions, which would amount to a significant reduction of 'red tape'.

Existing licence categories should be made more flexible in their use

Apparatus licensing has traditionally been applied to specific bands where supply exceeded demand and no single user required exclusive or consistent access across large portions of geographic area, and therefore over-the-counter assignment and coordination was sufficient. But congestion has arisen in some apparatus licensed bands, e.g. the 400 MHz band, and this has been addressed by the ACMA adopting Administrative Incentive Pricing.[90] This example illustrates the ACMA is able to work within the existing licence categories to continue the effective functioning of the regulatory regime. Indeed, the ACMA is now investigating the creation of a new 'area wide' type of apparatus licence.[91]

For this reason, AMTA considers that it should not be a reform priority to consolidate the apparatus and spectrum licensing categories into a single licence type. Such consolidation would likely involve high transition costs along with unnecessary complexity and uncertainty without significant benefit.

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[85] Act, s103(3).

[86] Act, s65(3).

[87] For example, the highly prescriptive steps in Part 2.2 of the Act (designation and conversion) and Part 3.6 of the Act "re-allocation).

[88] Currently s60(5) of the Act.

[89] Currently s294(3) of the Act.

[90] ACMA, Regulation Impact Statement - Opportunity Cost Pricing in the high density areas of the 400 MHz Band, June 2012, https://ris.pmc.gov.au/sites/default/files/posts/2012/08/ACMA-400MHz-RIS-20120717.pdf

[91] Consultation IFC 19/2019, Proposed area-wide apparatus licence. https://www.acma.gov.au/theacma/proposed-area-wide-apparatus-licence.

A similar outcome could be achieved through the ACMA continuing to exercise regulatory flexibility, possibly supported by minor changes to the legislation for the two licence types and Ministerial policy guidance.

A further step towards increasing flexibility between spectrum and apparatus licences would be to remove the restrictions which prevent segments of spectrum and apparatus licensed space being restacked into more efficient arrangements without requiring the prior conversion of apparatus licences to spectrum licenses. If equivalent quantities of spectrum are being reshuffled, and incumbent licensees do not object, then it should be possible for ACMA to do this administratively.

Licences should be neutral in technology terms so that licence holders can deploy any technology provided it meets the current licence conditions. With long duration licences there will be a need to refresh the Licence Technical Frameworks since these are always based on some assumptions around the technology expected to be most used. Most of the existing spectrum licences have assumed 4G technology, which may not be appropriate as new technology cycles are introduced. Previously, re-issue of a licence often resulted in some changes to licence conditions, however, with a 10-year technology cycle and 20-year licence duration we will need a way to update the licence conditions without detriment to the rights of spectrum licence holders. AMTA notes that this issue may be partly addressed through Issue 2 above, providing greater flexibility to the ACMA to amend licence conditions to reflect technology developments.

We also suggest that creating an ability for licensees to subdivide and sub-licence spectrum within their holdings would be a useful tool to further enable spectrum trading and sharing. This could also be extended to the sub-licensing of class licences which would give mobile operator licensees flexibility to control the authorisation and use of various types of ubiquitous user devices (e.g. handsets and mobile repeaters) within their holdings.

Allocation limits need to have one standard – i.e. section 50 of the CCA

The advice provided to the Minister by the ACCC on allocation limits for spectrum auctions,[92] has been carried out on the basis of differing criteria and considerations over time. AMTA's view is that the relevant criteria for advice should be made explicit and public at the time advice is sought from the ACCC. AMTA supports a public process, where the request for advice, industry submissions, and ACCC advice are made public. Further, where Ministerial action differs from the ACCC advice, AMTA sees value in requiring a statement explaining reasons for any difference.

AMTA also supports the Minister providing advice outlining the framework under which the ACCC is to undertake the work. At a minimum, this should require that the ACCC provide its advice on the basis of the criteria set out in section 50 of the *Competition and Consumer Act (Cth) 2010* (CCA). However, the Ministerial may also seek advice on further grounds contained in the CCA, for example the long-term interest of end-users (s.152AB of the CCA).

Further, it would be helpful to have a 'safe harbour' provision for any spectrum acquisition that has been subject of an allocation limit, to avoid any post-auction challenges that the quantity of spectrum a bidder has legitimately acquired is anti-competitive under s.50 of the Act.

[92] Act, s60(5).

Use of early access arrangements under section 153P of the Act should be formalised

AMTA welcomes the ACMA's innovative use of its discretion under section 153P of the Act to speed up access to spectrum that has been re-allocated, through early access licensing arrangements. This approach has now become a critical aspect of the flexibility of the bringing to market of spectrum by the ACMA. We think the Act could benefit from minor amendment to making this approach the default position, rather than requiring the administrative step of having the successful bidder apply for confirmation that it satisfies the 'special circumstances' requirement.

Introduce a graduated enforcement regime for compliance

The draft Bill[93] addressed the need for the ACMA to have graduated enforcement powers, rather than the current situation where only criminal enforcement is available.[94] AMTA's view is that this drafting can be used to amend the existing legislation, with the same outcome. A graduated enforcement scheme would enable more effective ACMA enforcement against devices causing harmful interference in an increasingly congested spectrum environment. While we think the ACMA should be devoting more resources to technical radiocommunications enforcement, our view is that even existing resources would be far better used if a graduated enforcement scheme (starting with a 'parking ticket' style option) was implemented. These reforms should also include better linkage between device standards and prohibitions, and the triggering of Border Force action under the relevant provisions.

Create an ability for the ACMA to accept enforceable undertakings from licensees on facilitating spectrum defragmentation

The mobile carriers have participated in successful spectrum defragmentation initiatives in both the 1800 MHz and 3.6 GHz bands. However, there are other bands in which defragmentation would result in considerable efficiency and community benefit, but which are frustrated by strategic and transaction timing hurdles, for example the need for a 1 MHz downshift in the 850 MHz band to support changes to licensing in the 900 MHz band. The provision and acceptance of undertakings by parties is a well-known and often used mechanism in Australian regulation. If incumbent licensees were able to provide undertakings to the ACMA regarding future participation in defragmentation activity based on potential allocations by the ACMA this would provide the ACMA with a strengthened capability to enable defragmentation. The ability to accept such undertakings would require only a minor addition to the Act. It would then be possible for the ACMA to make participation in future auctions and spectrum conversions in the relevant band, conditional on such cooperation by incumbents to defragment the band, in circumstances where secondary market failure would stymie this outcome.

Clarify stamp duty on secondary market trades

State and territory stamp duty continues to pose a material cost on and disincentive to secondary market trading of spectrum. There remains some uncertainty as to the instances in which stamp

[93] Exposure Draft, Radiocommunications Bill, 2017

[94] See, for example, the unlicensed operation offence in s46(1)(a) of the Act only allows for criminal prosecution, which is impractical in circumstances where mobile operators' customers are using illegal repeaters despite repeated request to shut down the infringing device. Given that authorised legal repeaters can be purchased for less than $1,000, amendment of the Act to provide for an administrative fine of up to $1,000 would be an effective means to obtain greater compliance. We believe that actual enforcement action would be rare -- mere awareness of the risk of this fine would be sufficient deterrent.

duty will be imposed by the states and territories which still apply this impost to spectrum trades. AMTA proposes a simple amendment to the Act which would prohibit the application of stamp duty to spectrum trades. We appreciate that this is a matter for COAG however we submit that it is important for the Department and the Minister to continue to highlight the issue.