WRC-19 | 30 October

APT

GSMA

Introduction

Moderator

Peng Zhao
GSMA

John Giusti
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GSMA

GSMA

MNO

Golnar Khomami
Telstra

Wang Hu
Huawei

GSA

SPECTRUM

THE FUNDAMENTAL ELEMENT OF MOBILE

Welcome

John Giusti

GSMA

2G

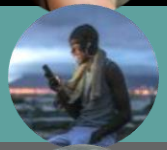
3G

4G

5G

All about calls and texts

The start of mobile data

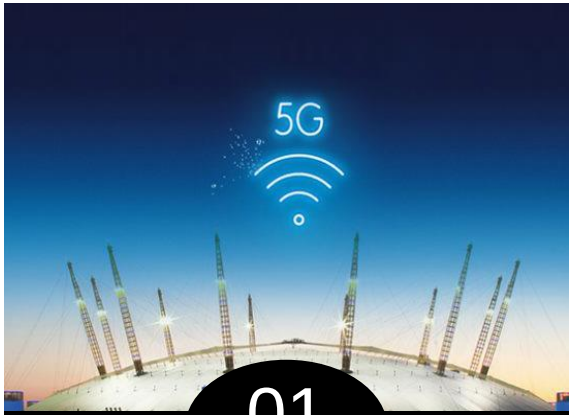


The arrival of mobile broadband services and applications

The network adapts to the application

Ultra high speed
Ultra low latency
New applications

5G Ramps Up



01

LG Uplus is seeing 1.3 gigabytes of data a day per subscriber in the early days of its 5G launch

Early 5G data usage has tripled, according to SK Telecom, in comparison with 4G

02

03

In Saudi, 1820 TB of data, a 66% increase in daily consumption, were consumed over Hajj in Mecca using networks including 37 5G sites

5G connections forecast has increased by

12.5%

It now stands at

1.6 BILLION

by 2025

5G adoption forecast has increased to

18%

by 2025

37

COMMERCIAL 5G NETWORKS

launched across

19

MARKETS

with

75 further launches

across

50 markets soon

ROUTERS

DRONES

129

5G DEVICES

TVs

ROBOTS

HOTSPOTS

2018 Mobile operators will invest

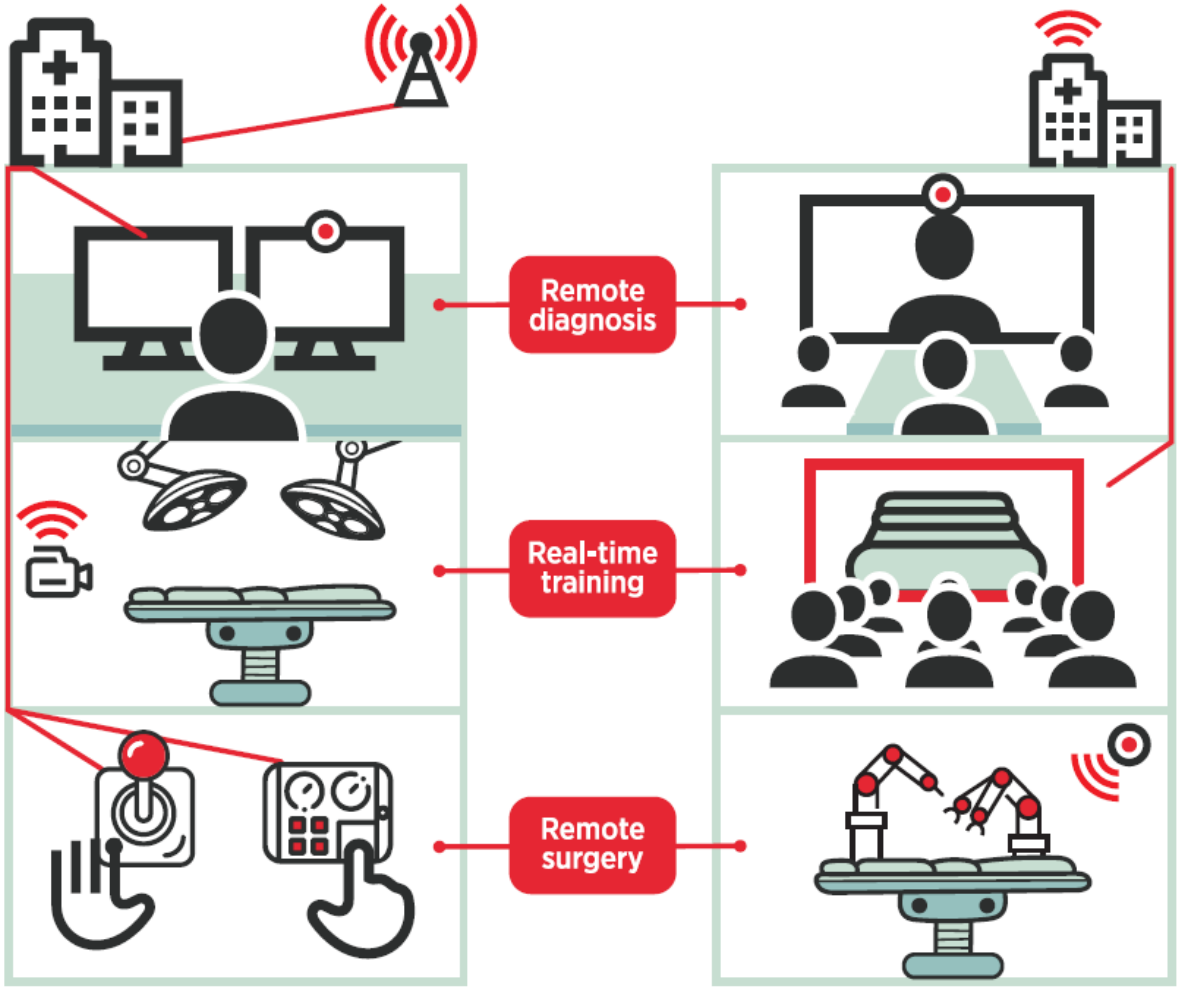
$480BN WORLDWIDE

2020 in mobile capex

Use Case

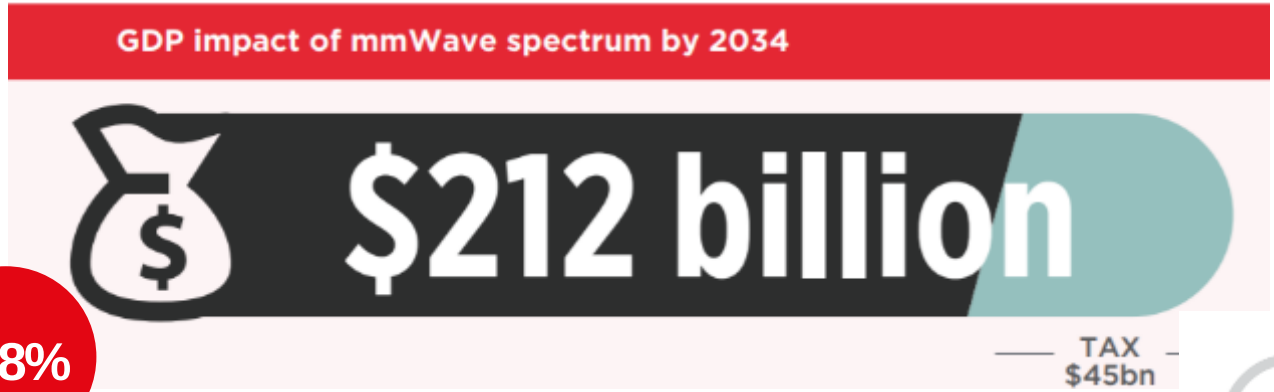
5G CAN MAKE IT HAPPEN

Healthcare



The socio-economic benefits of mmWave 5G (2020-2034)

Asia-Pacific Edition



0.8%

GDP growth

The share of 5G services using mmWaves

SPECTRUM

THE FUNDAMENTAL ELEMENT OF MOBILE

5G Trials and Launches

Golnar Khomami

GSMA

Delivering 5G for Australia – tactics and use cases

Golnar Khomami, Telstra Spectrum Specialist

Across Mobile Networks Globally*

2018 - 2024

30%

Growth YoY of mobile traffic

2024

~4.1B

Total number of IoT connections compared to ~300M in 2015

2024

35%

Mobile data traffic carried by 5G networks

Telstra Mobile Network

2009 - 2019

100x

Theoretical speed increase on the fastest device

2009 - 2019

93x

Mobile network traffic growth

The way we are using mobile networks is changing

Telstra's mobile network

Our network has more than

2.5M km²

mobile network coverage

Our mobile network has the

largest coverage,

vastly more than any other mobile network in Australia

99.2%

of 4G coverage

more than 8750 4G enabled sites

3.0M km²

of Cat M1 coverage

3.5M km²

of NB IoT coverage

Launch and expansion of our 5G network

Commercial 5G launch in May 2019 using the 3.6 GHz band.

Included all seven Australian capital cities, plus three major regional centres: Gold Coast, Launceston and Toowoomba

Customers with 5G devices are achieving downloads speeds approximately twice as fast than comparable 4G devices in 5G areas

Over the next 12 months, 5G coverage will increase in area almost five-fold

Expand into 25 additional cities (major regional centres)

Further expansion of coverage in capital cities beyond the CBD

Future technology advances

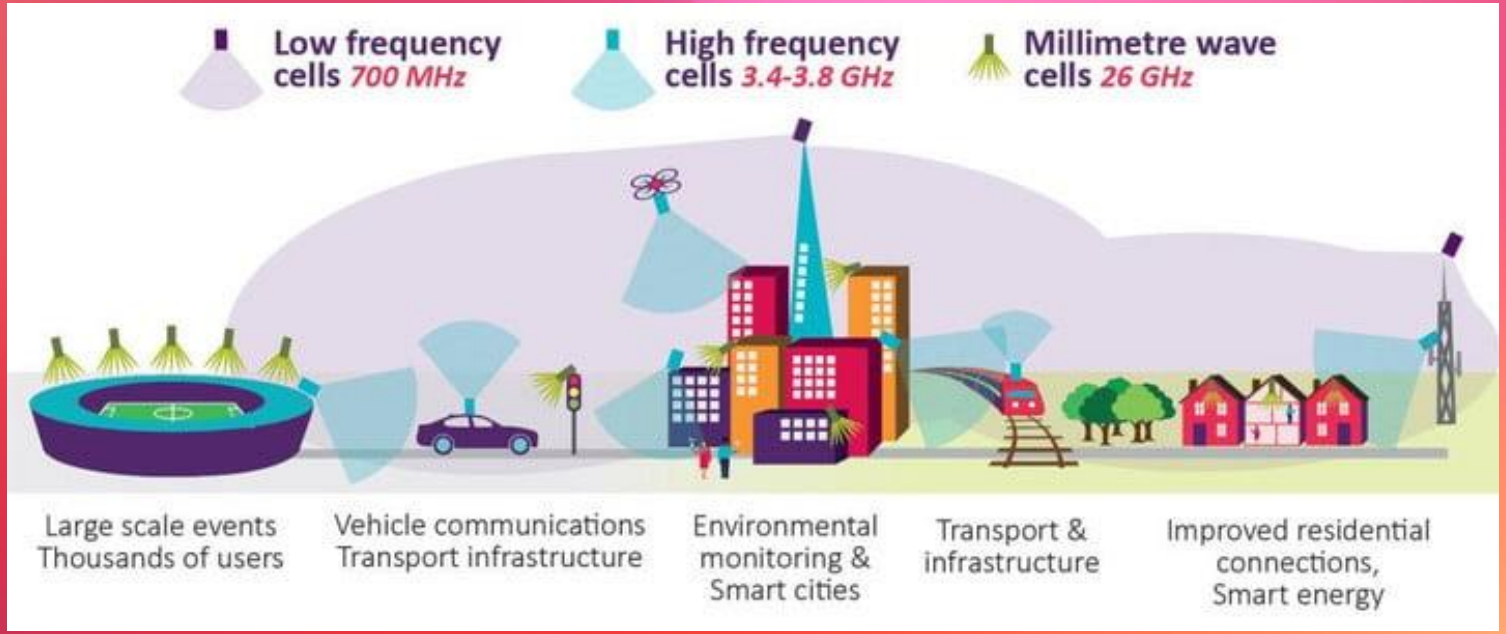
Repurpose some of our 850MHz spectrum from 3G technology to 5G

Spectrum (mmWave) auction in 2021

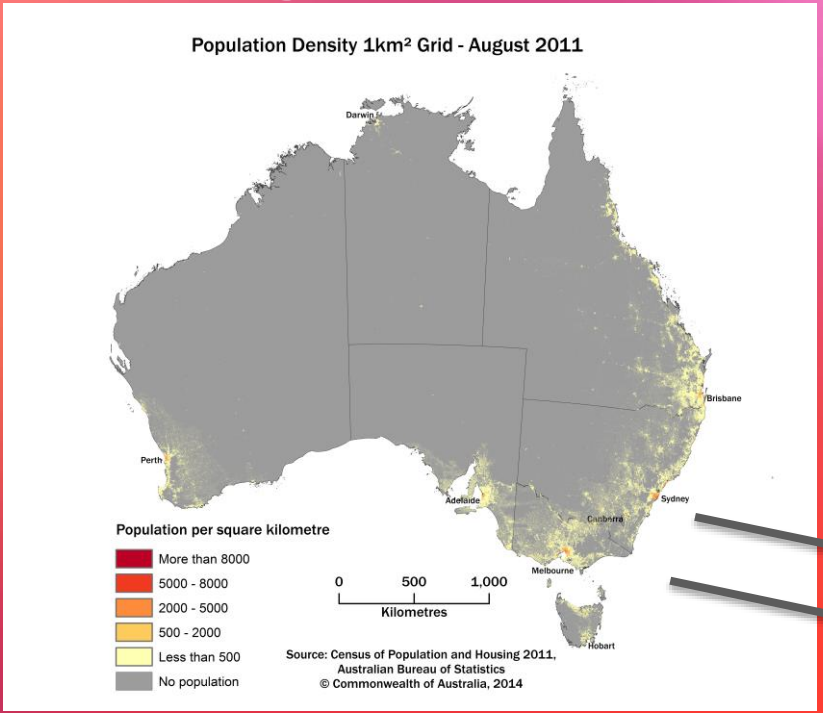
Next Generation Core network for network slicing and other advanced 5G services

Edge Computing to bring applications and services closer to our customers

- **Diverse Use Cases lead to diverse spectrum requirements**

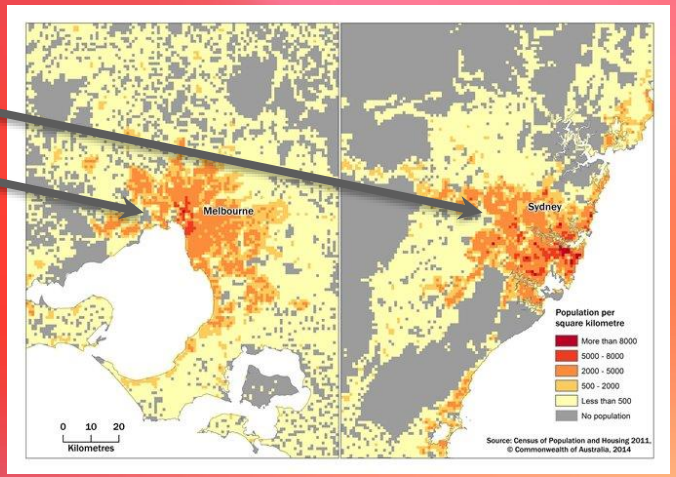


• A single spectrum band can’ t cover all use



At Telstra we need a combination of different spectrum bands for services in:

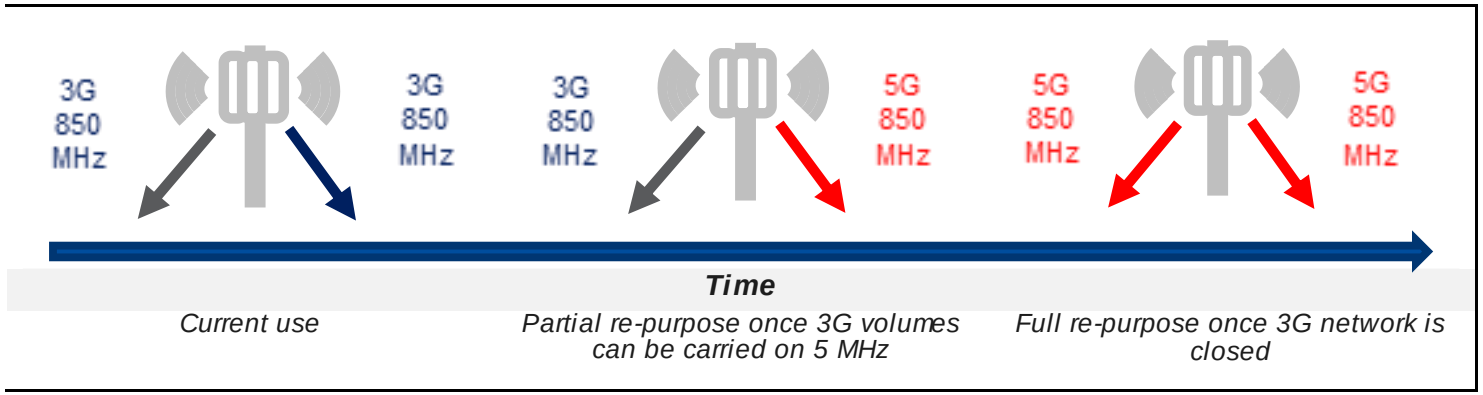
- Cities with dense population
- Regional and rural area with vast empty spaces



Frequency matters – coverage

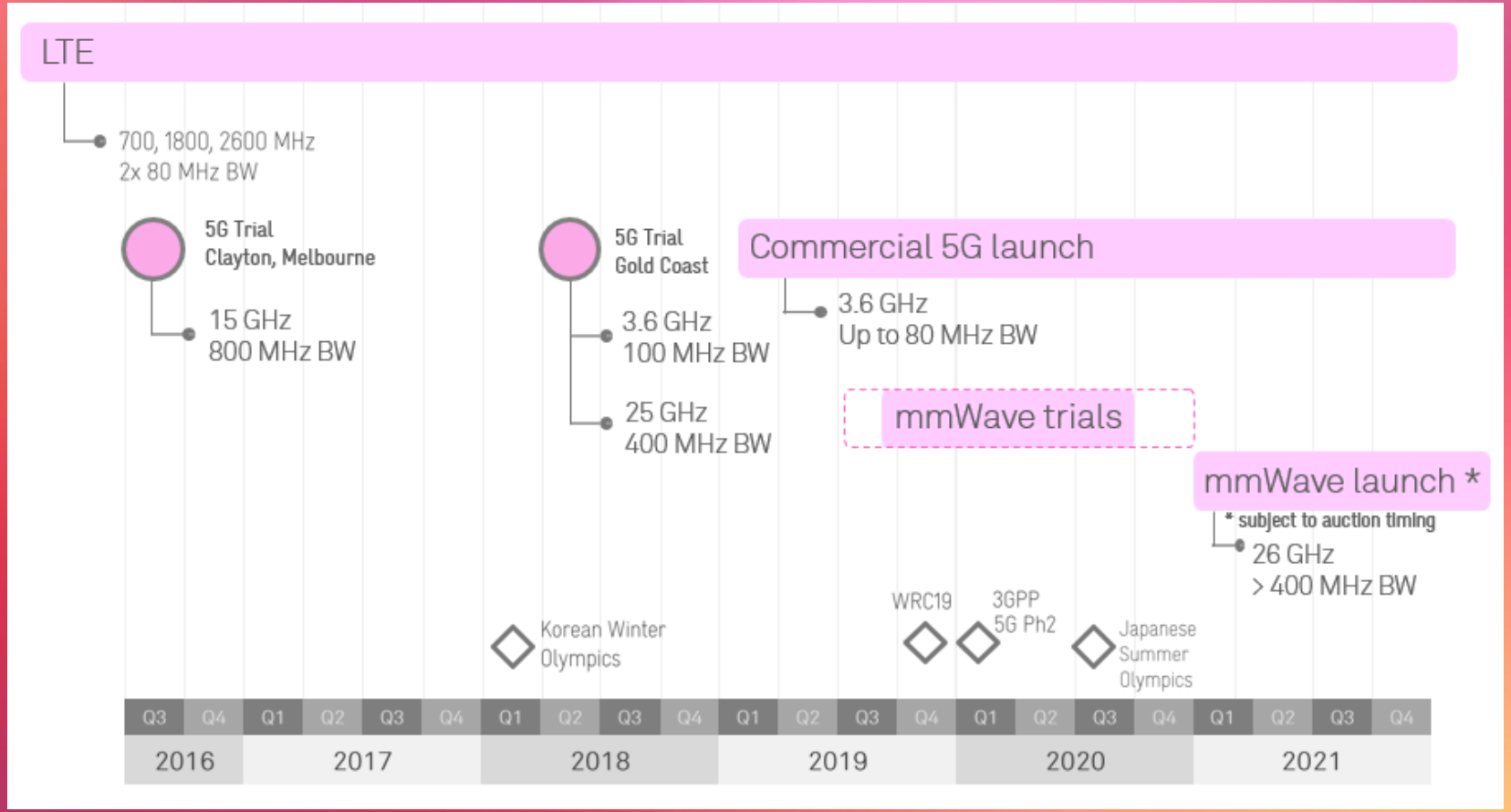
- The lower the frequency the more the coverage

As 3G traffic declines, we are able to progressively re-farm 3G (850MHz) spectrum to enable 5G without impacting our 3G customers



And this is made possible by modernising the equipment across our mobile network

• Telstra 5G timeline

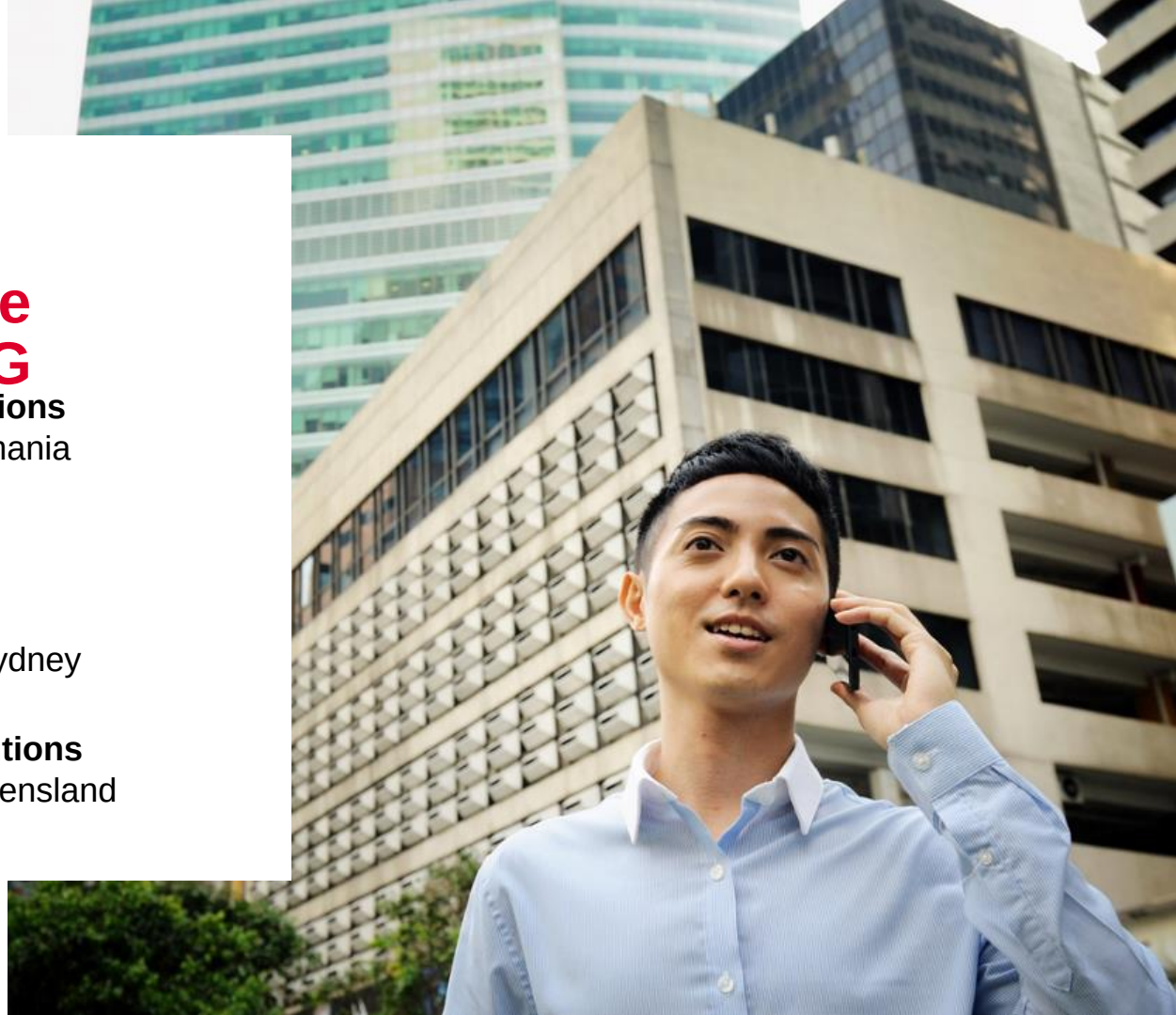


Exploring different use cases for 5G

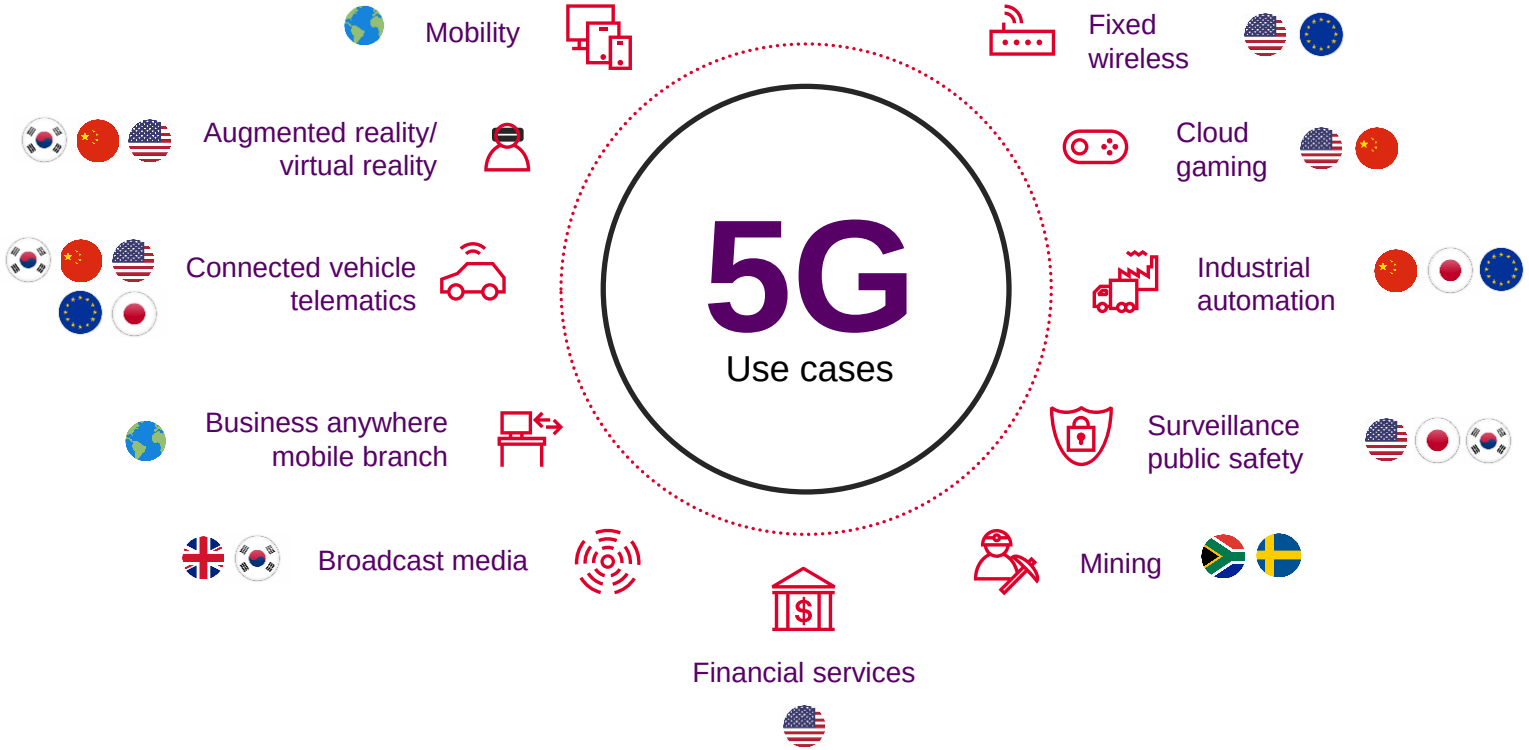
Smart city ambitions
Launceston, Tasmania

Edge computing advancements
Melbourne and Sydney

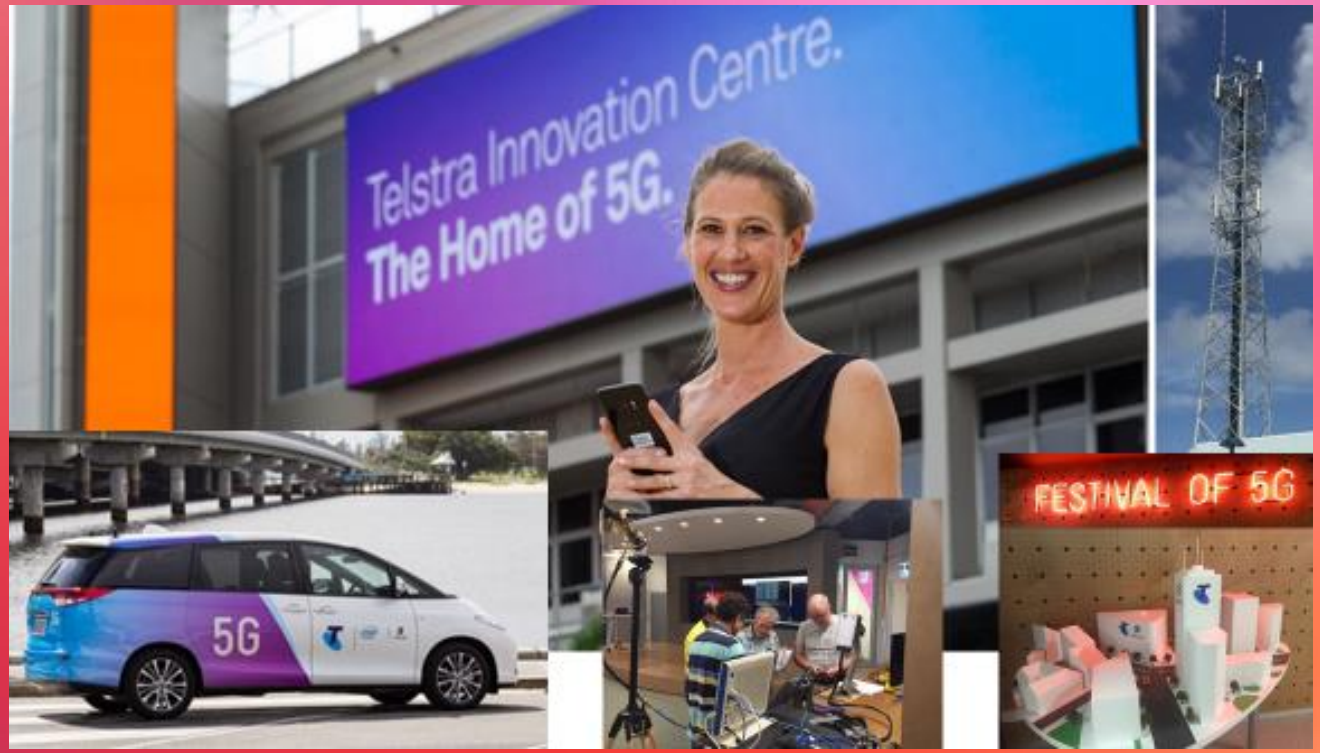
Agricultural solutions
Toowoomba, Queensland



We are globally aligned in exploring leading 5G use cases

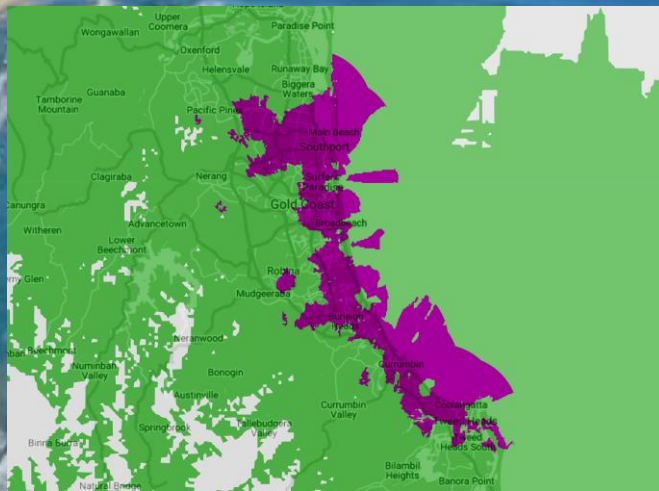


- **Telstra 5G Innovation Centre at the Gold Coast**



https://exchange.telstra.com.au/first-taste-of-5g-gold-coast-easter/

- **Gold Coast 5G coverage**



- **Thank you**

5G Ecosystem

Wang Hu

GSMA

5G ECOSYSTEM UPDATE

Wang Hu
GSA Asia Pacific

VISION

VISION

wirelessly connect almost all 7 billion people globally to new and exciting services through 100 billion devices and things, by 2030

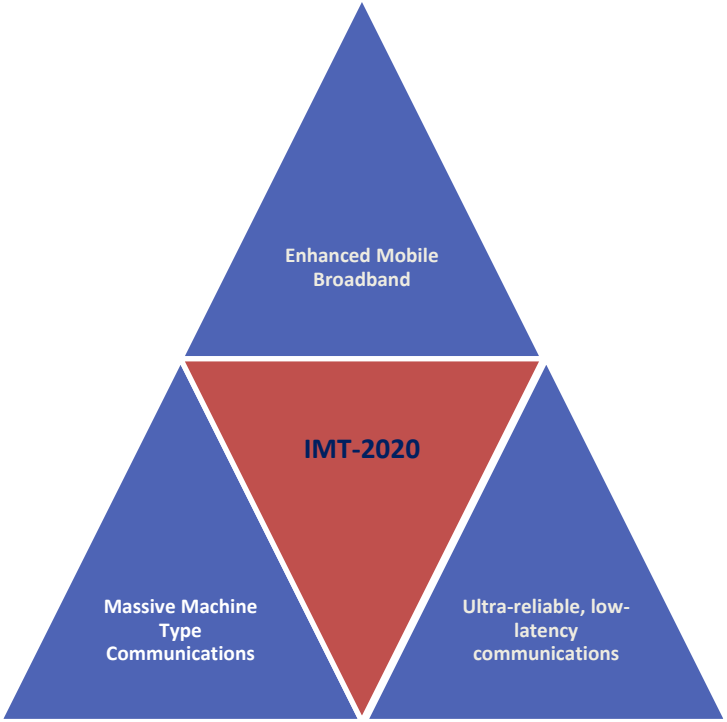
HOW

spectrum from the low-band, mid-band and high-band frequency ranges helps realise the Vision

WRC-19 GOAL

large contiguous amounts of high band (mmWave) harmonised spectrum, with suitable regulatory conditions, helps enable extreme capacity and ultra fast local area services.
planning for the future with WRC-23 mid & low band agenda item

USE CASES



STANDARDS

GLOBAL INITIATIVE

Release 15 complete (2017-2019)

Release 16 development (2018-2020)

Enhancements, Unlicensed, URLLC+ & IoT+, V2X, etc

Release 17 planning (2019-2021)

Enhancements to support verticals, coverage improvements, NTN, etc

3GPP 5G specs complete – work underway on enhancements

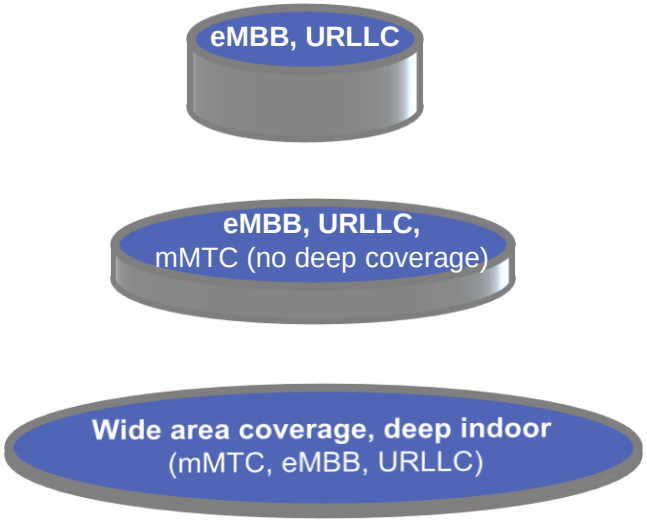
PRODUCTS

BASE STATIONS

DEVICES

CHIPSETS

SPECTRUM



High band
Extreme capacity

e.g. 24.25-29.5, 37-43.5 GHz etc
800-1000 MHz MNO/Network contiguous 2020 onwards

Mid band
Both coverage & capacity

e.g. 2.3, 2.6, 3.3–4.2, 4.4-5 GHz etc
80-100 MHz MNO contiguous 2020 onwards

Low band
Extended coverage

e.g. 600, 700 MHz etc
Upto 20 MHz channel bandwidth 2020 onwards

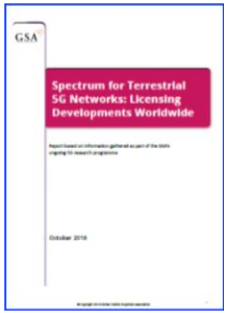
Various applications and services require access to spectrum from low, mid and high bands

THANKYOU

Check out www.gsacom.com for regular report updates

5G ecosystem update

5G licensing update



ERICSSON QUALCOMM HUAWEI NOKIA intel SAMSUNG

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Conclusion

Peng Zhao

GSMA

Our Asks

26 GHz
(24.25-27.5 GHz)

- Limits to protect EESS (passive) -28 to -32 dB(W/200MHz)
- No conditions necessary for FSS/ISS since sharing studies show significant protection margin

40 GHz
(37-43.5 GHz)

- Identification of whole range provides harmonisation with other Regions
- FSS downlink: ES sharing is a national issue
- FSS uplink: sharing studies show a significant protection margin

50 GHz
(45.5-52.6 GHz)

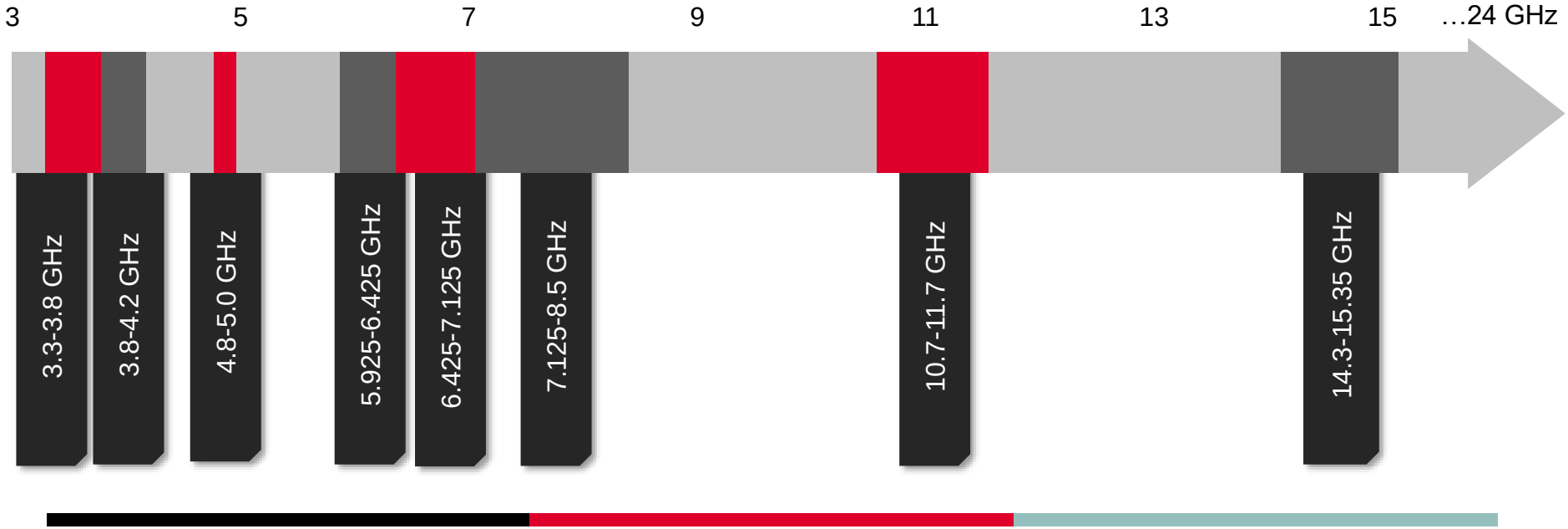
- Good options to support future 5G growth
- Studies have been performed and show sharing is possible

66 GHz
(66-71 GHz)

- Flexible use for unlicensed 5G systems - both IMT and non-IMT technologies
- Shared with WiGig
- Supported by APT, ATU, ASMG, CEPT

WRC-23 supported bands

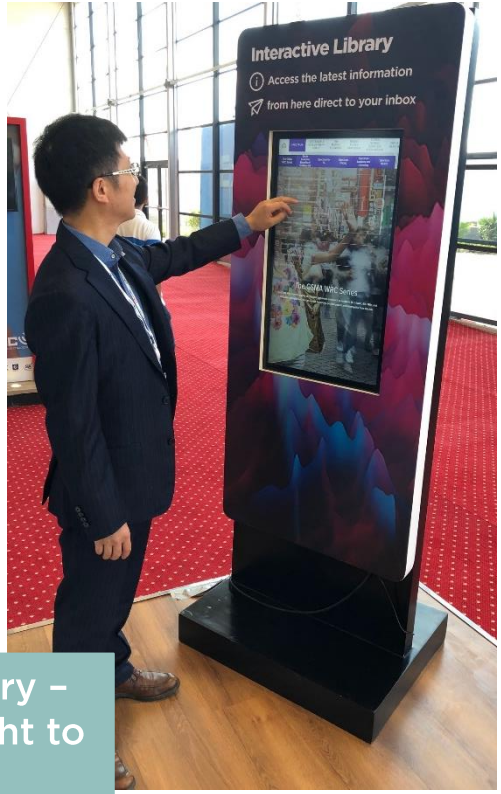
GSMA supports WRC-23 AIs for IMT in 470-960 MHz, and consideration of the bands below



GSMA stand at WRC-19

Live 5G demos

City of the Future VR experience



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