Impact of WRC-19: mobile services in Asia Pacific

Cristian Gomez
Director, Spectrum Policy and Regulatory Affairs
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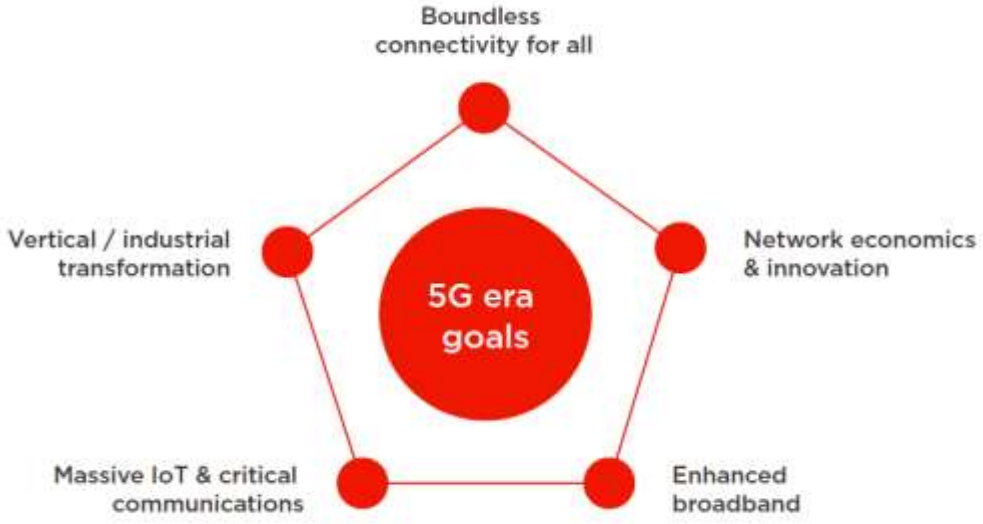
Five mobile industry goals with 5G



"As demand for continuous connectivity grows, 5G is an opportunity to create an agile, purpose-built network tailored to the different needs of citizens and the economy"

- Mats Granryd, Director General, GSMA

Mobile spectrum requirements to support multiple needs and fuel ever-growing applications

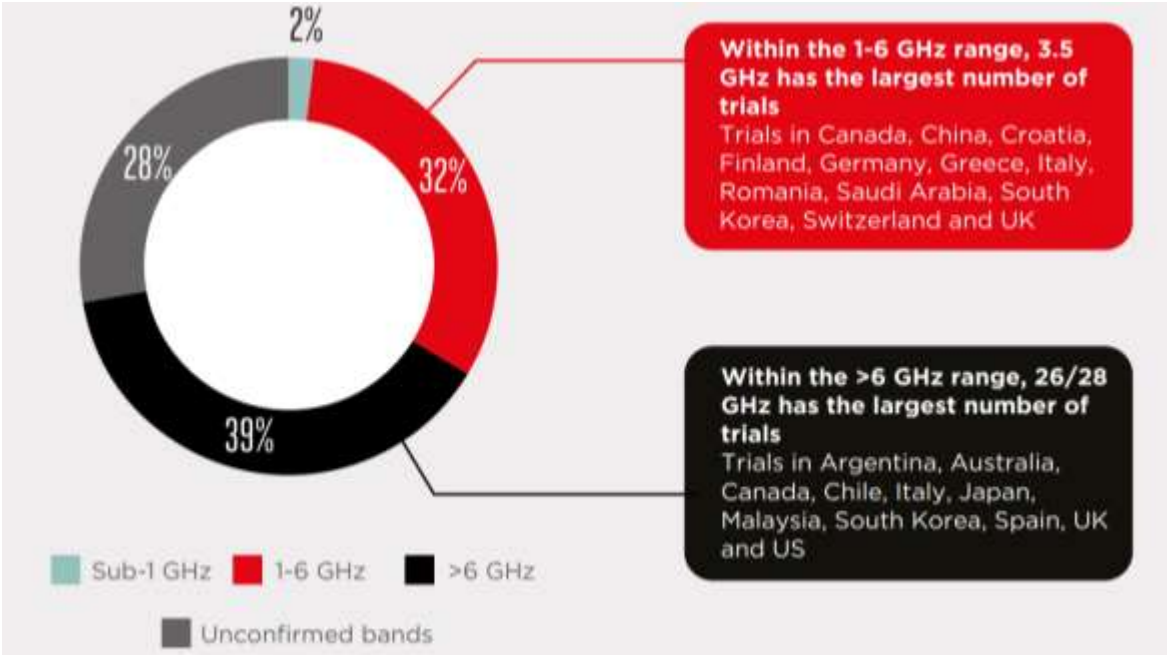
5G needs spectrum across three ranges

Sub-1 GHz: coverage
- Widespread coverage
- IoT services

1-6 GHz: capacity/coverage
- Good balance of coverage and capacity benefits

>6 GHz: ultra-high speeds
- Enhanced MBB & low latency
- mmWave

Spectrum bands used for global 5G trials



Source: "The 5G Era in the US" (Mar 2018), GSMA; ""5G Spectrum Public Policy Position" (Nov 2016), GSMA

Emerging 5G Bands

Which bands are emerging as key to 5G?

3.5 GHz

While certain spectrum, such as the 3.5 GHz range, is being readied for 5G, other bands are already under discussion. Importantly, bands above 24 GHz are being considered for 5G, both through the WRC and through existing mobile allocations.

26 GHz and 28 GHz

The 26 GHz and 28 GHz bands, along with the development of 40 GHz, have emerged as the most likely candidates to make the ultra-high-speed vision for 5G happen. The 26 and 28 GHz bands are adjacent, allowing economies of scale and facilitating early equipment availability for all or parts of both bands.

5G spectrum – an international summary

It is vital that 5G spectrum bands are **widely harmonized**

Enables the greater **economies of scale** needed for a good choice of low cost devices
Enables roaming and facilitates **cross border coordination**
Avoid spectrum fragmentation and incompatibilities between markets

600 MHz 

700 MHz 

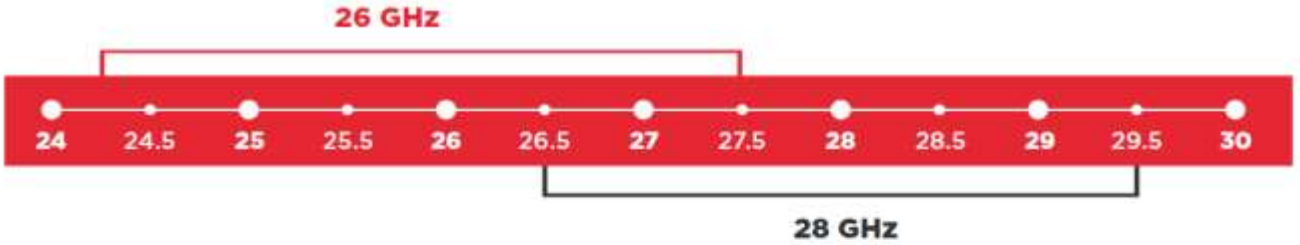
C-Band       

26 GHz   

28 GHz   

The introduction of 5G pioneers a new level of mobile performance with ultra-high speeds and low latencies. What makes this possible is millimetre wave spectrum. In this range, 26 GHz and 28 GHz have emerged as two of the most important bands. These may offer the widest harmonisation with minimised user equipment complexity.

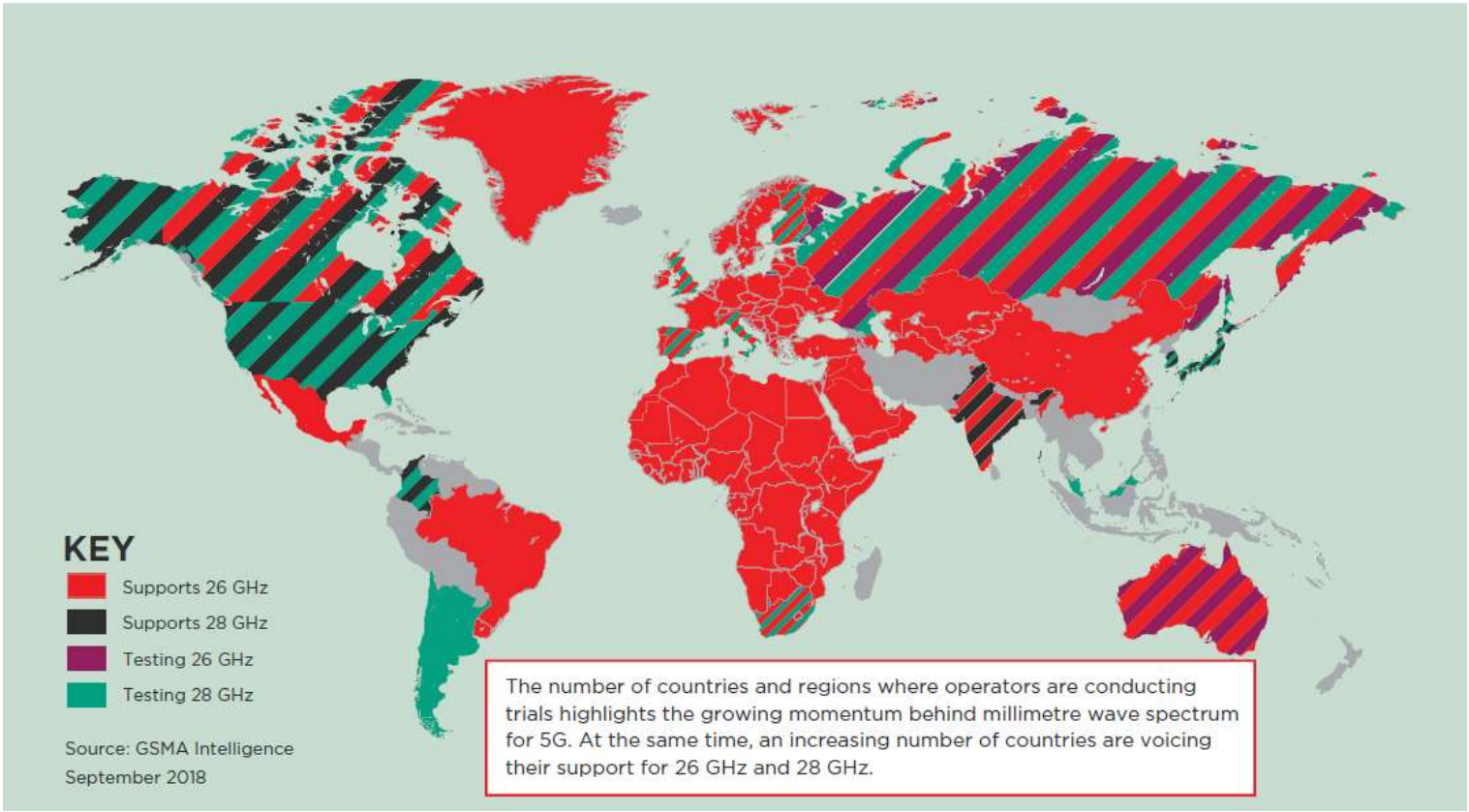
The availability of much larger amounts of spectrum in the millimetre wave bands will allow for ultra-high-speed mobile broadband services.



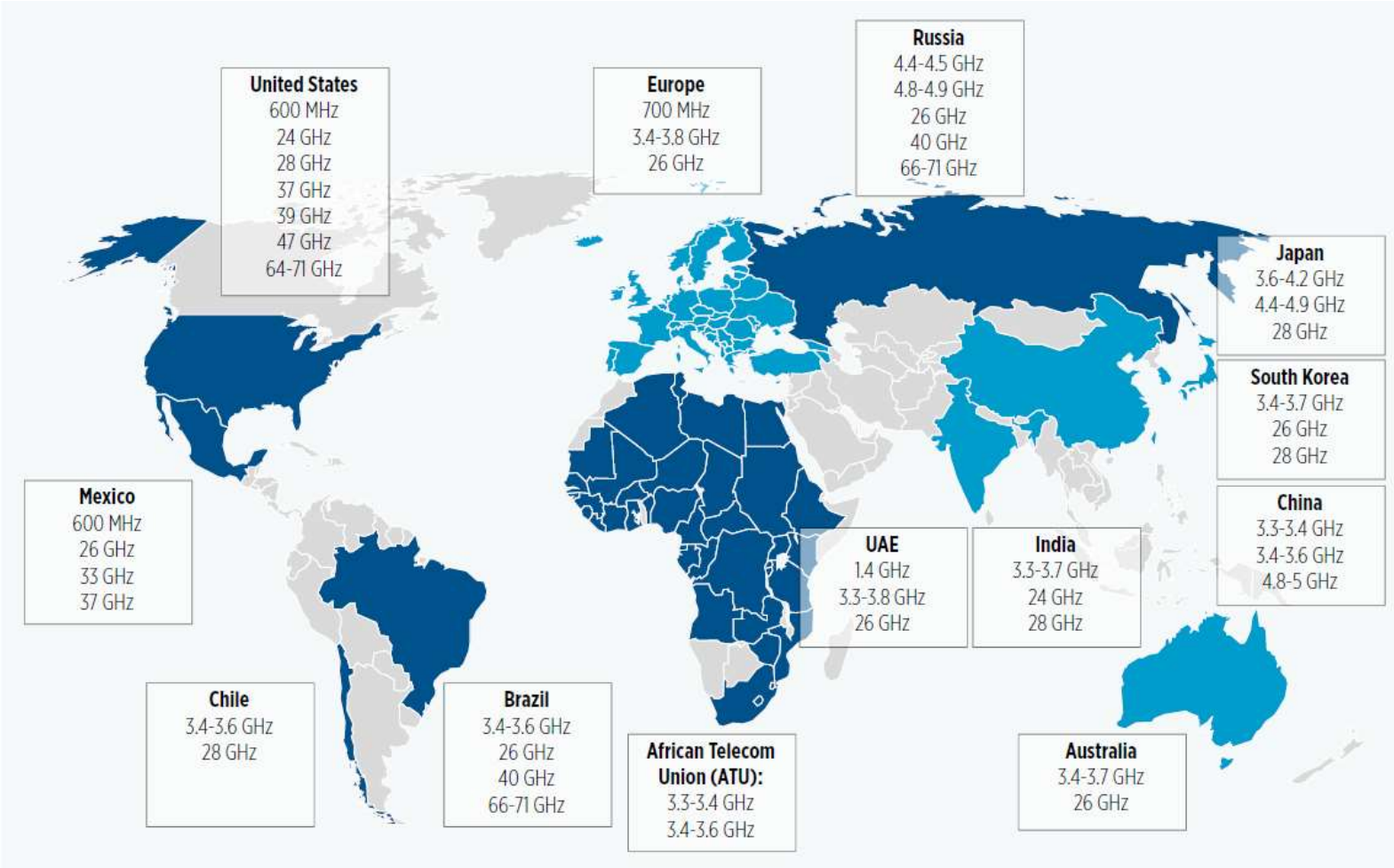
3GPP band n258 refers to the range between 24.25-27.5 GHz and is commonly called 26 GHz. And 3GPP band n257 refers to 26.5-29.5 GHz. It is commonly called 28 GHz.

The whole range between 24.25 GHz and 29.5 GHz is important. It will enable operators to meet the speed, latency, reliability and capacity requirements of 5G. The appropriate regulation, licensing and spectrum policies related to this range and other spectrum bands will encourage 5G investments and innovation. This includes usage conditions that don't hamper operators from making the most of it.

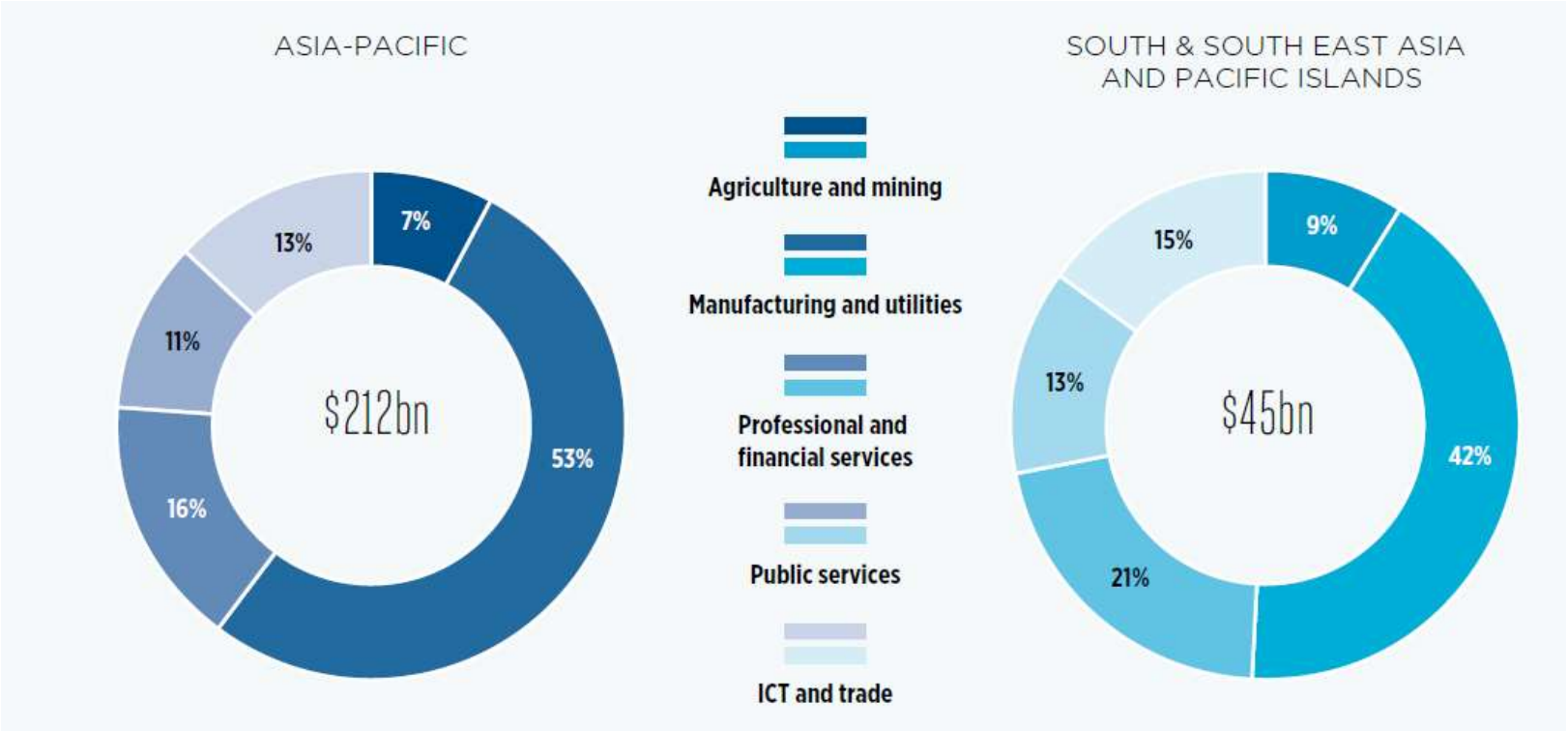
MOMENTUM IS PICKING UP



Summary of 5G priority bands in selected countries



STRUCTURE OF GDP CONTRIBUTIONS BY VERTICAL IN THE ASIA-PACIFIC REGION, 2034



WRC-19 Agenda Item 1.13

*"to consider identification of frequency bands for the future development of International Mobile Telecommunications (IMT), including possible additional allocations to the mobile service on a primary basis, in accordance with Resolution **238**"*

Seven spectrum ranges

24.25-27.5 GHz
31.8-33.4 GHz
37-43.5 GHz
45.5-50.2 GHz
50.4-52.6 GHz
66-76 GHz
81-86 GHz

Issues being addressed: OOB emissions

Region 1	Region 2	Region 3
23.6-24	EARTH EXPLORATION-SATELLITE (passive) RADIO ASTRONOMY SPACE RESEARCH (passive) 5.340	
24-24.05	AMATEUR AMATEUR-SATELLITE 5.150	
24.05-24.25	RADIOLOCATION Amateur Earth exploration-satellite (active) 5.150	
24.25-24.45 FIXED	**24.25-24.45** RADIONAVIGATION	**24.25-24.45** RADIONAVIGATION FIXED MOBILE
24.45-24.65 FIXED INTER-SATELLITE	**24.45-24.65** INTER-SATELLITE RADIONAVIGATION 5.533	**24.45-24.65** FIXED INTER-SATELLITE MOBILE RADIONAVIGATION 5.533
24.65-24.75 FIXED FIXED-SATELLITE (Earth-to-space) 5.532B INTER-SATELLITE	**24.65-24.75** INTER-SATELLITE RADIOLOCATION-SATELLITE (Earth-to-space)	**24.65-24.75** FIXED FIXED-SATELLITE (Earth-to-space) 5.532B INTER-SATELLITE MOBILE 5.533

- Working on achieving appropriate protection instead of overprotection
- Administrations wishing to identify the 26 GHz band for IMT should not be penalized
- Effects of overprotection: much higher costs for IMT deployment, impractical use
- Mobile industry is well placed to quantify OOB requirements (extensive standardization work over the years)
- Mobile industry track record in spectrum management practice
- Standardization work of EESS?

Issues being addressed: OOB emissions

Allocation to services		
Region 1	**Region 2**	**Region 3**
24.75-25.25 FIXED FIXED-SATELLITE (Earth-to-space) 5.532B	**24.75-25.25** FIXED-SATELLITE (Earth-to-space) 5.535	**24.75-25.25** FIXED FIXED-SATELLITE (Earth-to-space) 5.535 MOBILE
25.25-25.5	FIXED INTER-SATELLITE 5.536 MOBILE Standard frequency and time signal-satellite (Earth-to-space)	
25.5-27	EARTH EXPLORATION-SATELLITE (space-to Earth) 5.536B FIXED INTER-SATELLITE 5.536 MOBILE SPACE RESEARCH (space-to-Earth) 5.536C Standard frequency and time signal-satellite (Earth-to-space) 5.536A	
27-27.5 FIXED INTER-SATELLITE 5.536 MOBILE	**27-27.5** FIXED FIXED-SATELLITE (Earth-to-space) INTER-SATELLITE 5.536 5.537 MOBILE	

- Existing inefficient receiver filtering should not determine the practicable spurious emissions domain of efficient IMT spectrum use
- Certainly, inefficient receiver filtering should not impose unnecessary constraints on mobile use
- Should stringent overprotection be applied across the entire 26 GHz band????
- De-facto guard bands should be minimized to guarantee efficiency
- Aggregate mobile levels will not be significant during initial phases (i.e. indoor use)
- Effects of overprotection: much higher costs for IMT deployment, impractical use

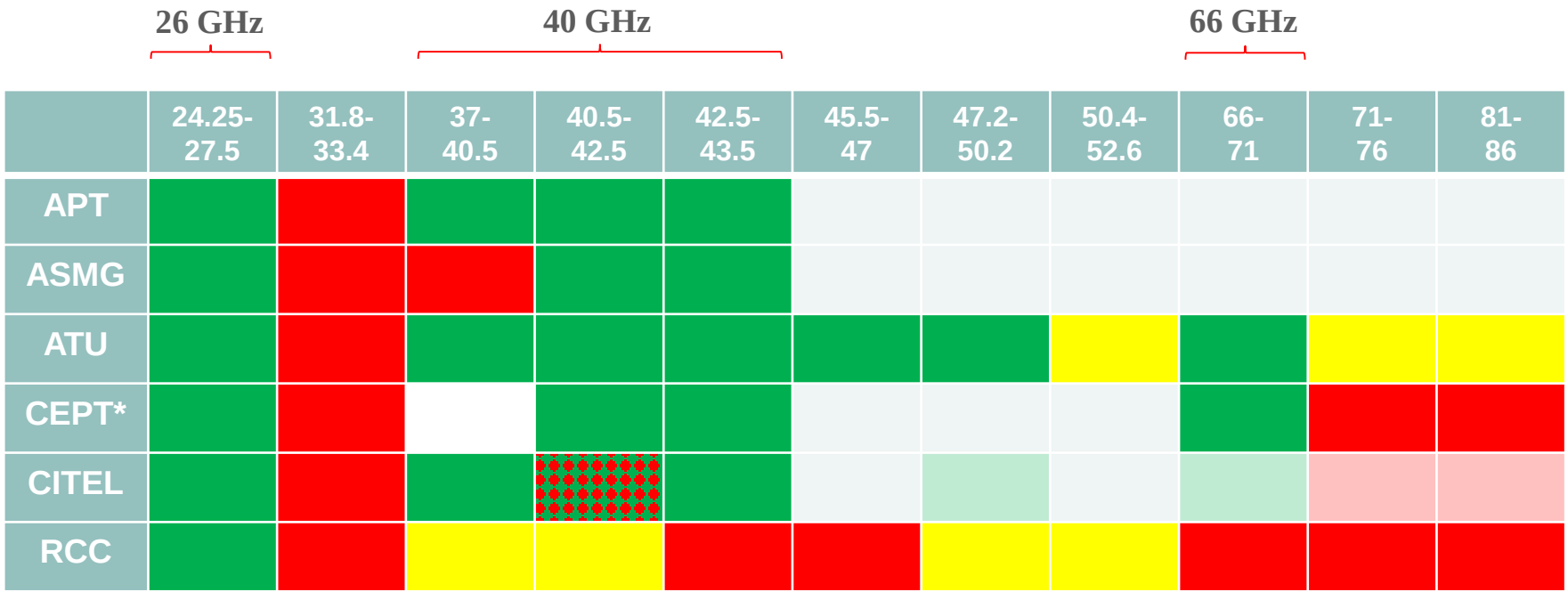
Working on achieving appropriate protection instead of overprotection

Issues being addressed: OOB emissions

- ✓ In the 26 GHz range, a lot of work has focused on the co-existence with passive services in the band 23.6-24 GHz.
- ✓ While it is important to protect passive services, it should be done with the right limit. Otherwise, an overly onerous limit will severely restrict the use of IMT in the 26 GHz band.
- ✓ The GSMA's study on OOBE limits for base stations supports the values -32 to -35 dB(W/200 MHz). This falls within the range supported by other regional groups ASMG and ATU, as well as preliminarily by CITEL.

-32 to -37dB(W/200 MHz) for BS;
-28 to -30dB(W/200 MHz) for UE.

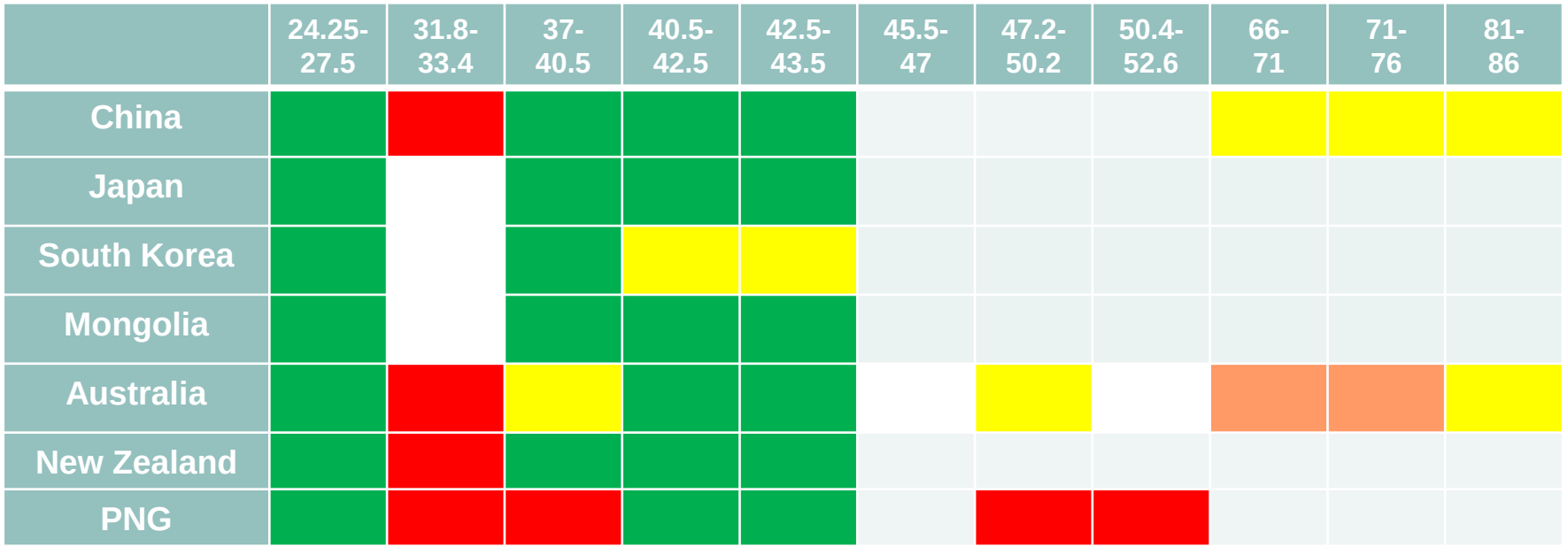
Support of mmWave bands by regional group



Green = supports

*CEPT supports with diverging conditions

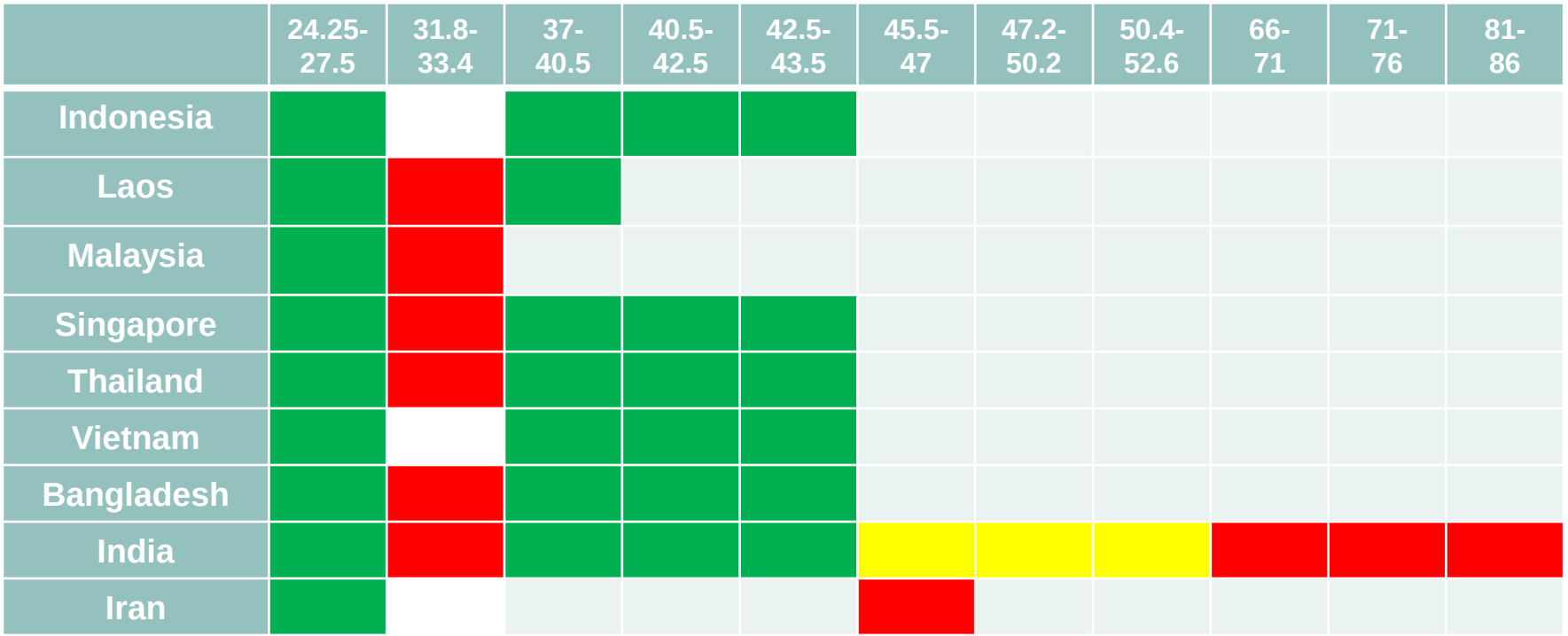
Support of Bands in APT (1)



	24.25-27.5	31.8-33.4	37-40.5	40.5-42.5	42.5-43.5	45.5-47	47.2-50.2	50.4-52.6	66-71	71-76	81-86
China											
Japan											
South Korea											
Mongolia											
Australia											
New Zealand											
PNG											

Note: Based on information from APG19-4.

Support of Bands in APT (2)



	24.25-27.5	31.8-33.4	37-40.5	40.5-42.5	42.5-43.5	45.5-47	47.2-50.2	50.4-52.6	66-71	71-76	81-86
Indonesia											
Laos											
Malaysia											
Singapore											
Thailand											
Vietnam											
Bangladesh											
India											
Iran											

GSMA position on mmWave 26 GHz at WRC-19

A successful identification of spectrum for IMT under Agenda Item 1.13 is vital to realise the full potential of 5G networks

Allowing flexibility for future deployment in 26 GHz or 28 GHz is important in the Pacific

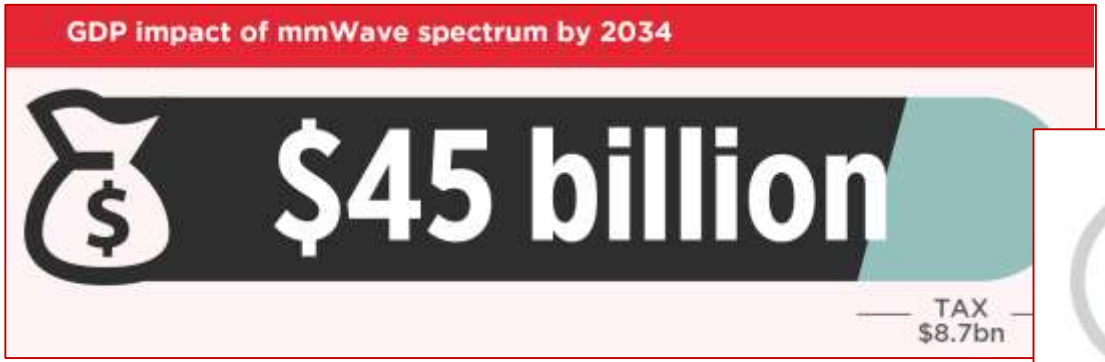
The GSMA supports 26 GHz as a key mmWave band for 5G under agenda item 1.13

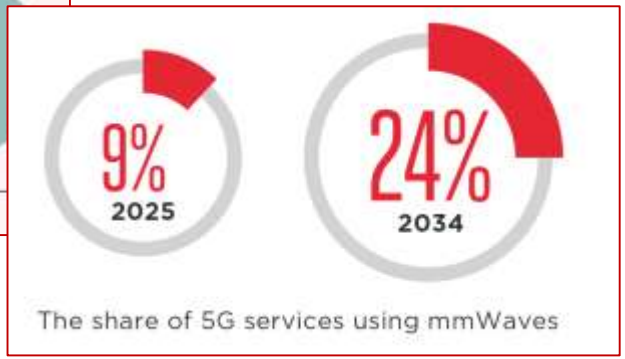
Due to the large amount of spectrum needed for 5G services, access to mmWave is necessary. Ecosystem growing in both 26 and 28 GHz

Technical studies show that coexistence between IMT and other services is possible

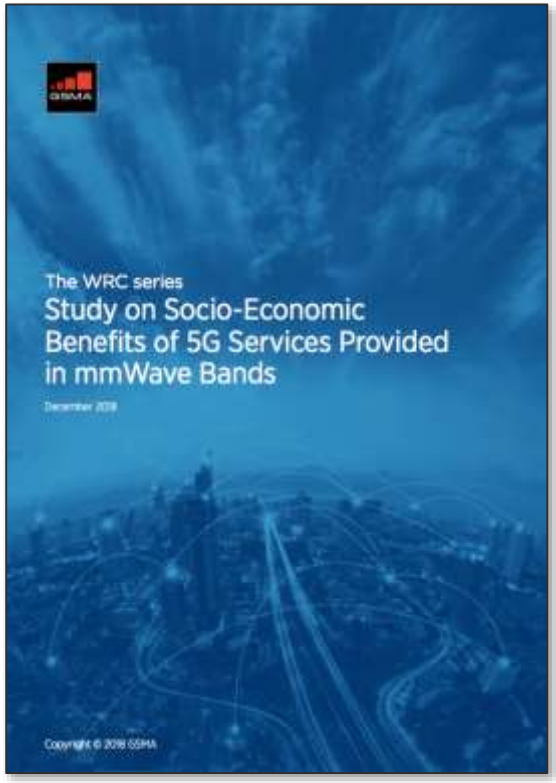
The socio-economic benefits of mmWave 5G (2020-2034)

South and South East Asia and the Pacific Islands





Mobile mmW Set to Deliver Socio-Economic Benefits



- 5G is predicted to provide important social and economic benefits globally
- mmWave spectrum will grow to become a significant piece of this impact over time, and
- Although economic benefits are greater in the early adopting economies over the period studies (2020-34), the rate of contribution of mmWave in later adopting economies outpaces that of early adopters in the later years of the study

Key steps for the Pacific to consider

- Asia and Pacific (ITU region 3) already has a co-primary allocation in the ITU Radio Regulations for the mobile service in the 26 GHz band. Existing allocation
- Identification of the 26 GHz band for IMT at WRC-19 will provide flexibility to implement 5G mobile services as national requirements emerge
- Pacific Islands will benefit from the growing economies of scale of 5G in the region
- Regional integration of the Pacific Islands is important as to benefit from global technological advances. **Early planning is key.**
- Important to support the development of these advances through the international spectrum work (APT, WRC)

GSMA Supporting Materials for WRC-19

THE GSMA WRC SERIES

https://www.gsma.com/spectrum/wrc-series

https://www.gsma.com/spectrum/5g-spectrum-guide/