ASIA PACIFIC WRC-15 UPDATE

Creating a sustainable future for mobile broadband

Herman Schepers, Senior Director Spectrum Campaign, GSMA

March 25th 2015

AGENDA

APAC Market Update
Stewart Wallace, Manager Radio Spectrum Strategy, Telstra

Recommended New Mobile Bands
Peng Zhao , Senior Policy Manager, Government & Regulatory Affairs, GSMA

Conclusions
Herman Schepers, Senior Director, Spectrum Campaign, GSMA

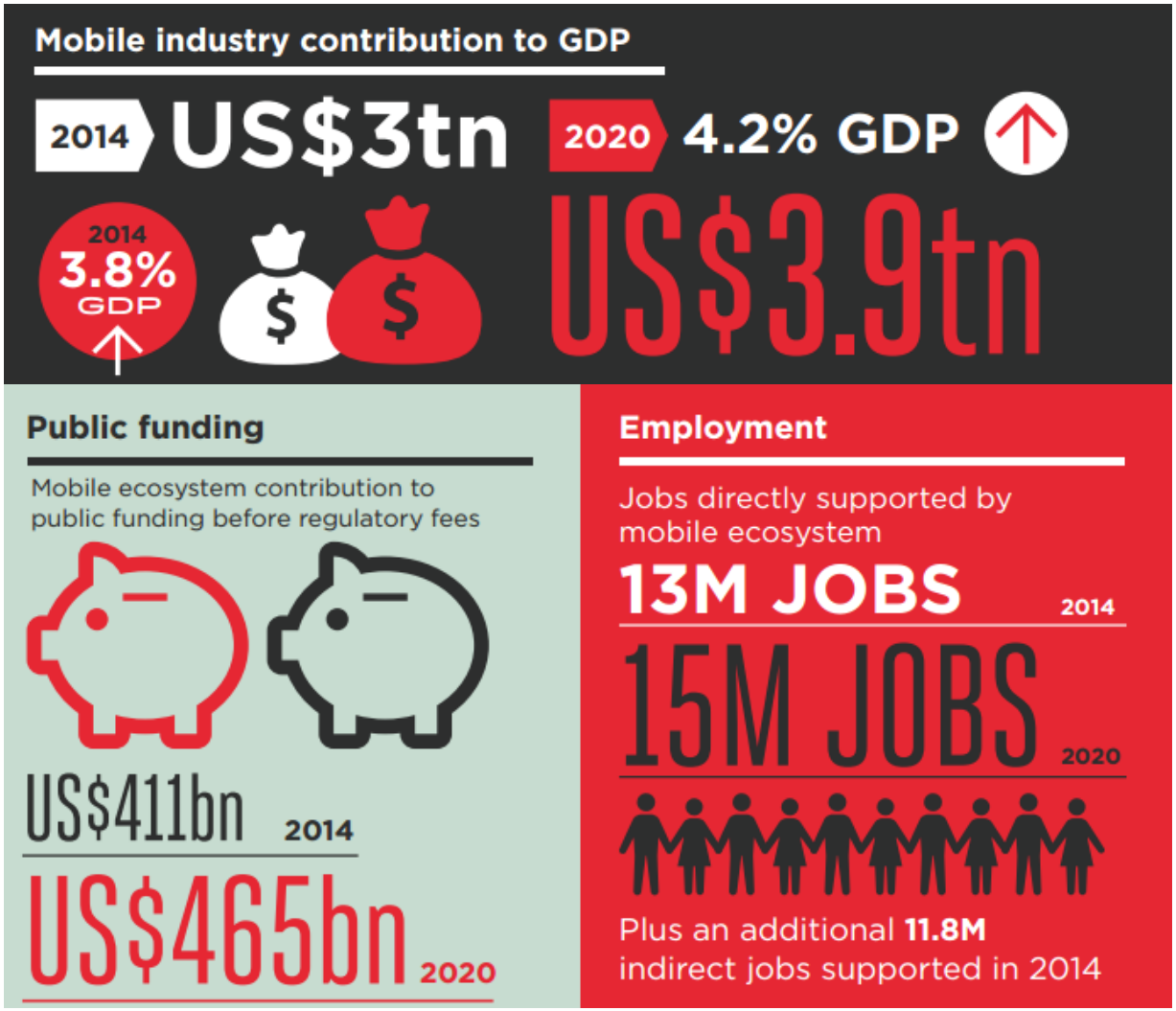
Lunch
GSMA Exhibition Area - CICG building





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GROWING MOBILE ECONOMIC IMPACT



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TELSTRA

Stewart Wallace
Manager Radio Spectrum Strategy

March 2015

A CASE FOR ADDITIONAL SPECTRUM RESOURCES

ENABLING ONGOING ECONOMIC GROWTH

CPM15-2 - GENEVA - MARCH 2015

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TODAY WE'LL LOOK AT:

- Telstra's mobile networks today
- Telstra's view of traffic growth in Australia
- Frequency Bands currently used for IMT in Australia
- Proposed candidate IMT bands for consideration at WRC-15
- Options for other Region 3 countries

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MOBILE NETWORK OVERVIEW



OUR MOBILE NETWORK IS UNMATCHED BY ANY MOBILE NETWORK ACROSS AUSTRALIA

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LARGEST COVERAGE

Enjoy Australia's largest mobile network covering more than *2.3 million square kilometres* of land – vastly more than any other mobile network in Australia.

Telstra also offers the largest 4G coverage area of any other mobile network.



MORE RELIABLE SPEEDS

Enjoy a faster data experience in more places with the largest 4G coverage area of any other mobile network.



FEWER DEAD SPOTS

Telstra has invested in more coverage sites across city & country (*>8,000 sites*) so you can enjoy greater and more reliable coverage with fewer dead spots.



FEWER DROP OUTS

Enjoy a more reliable connection across our national network that works better in more buildings and provides the nation's lowest mobile call drop-out rates.

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WE OFFER AUSTRALIA'S LARGEST MOBILE COVERAGE

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LARGEST COVERAGE
We cover over 2.3 million sq km of Australia – vastly more than any other mobile network in Australia.

NOT JUST METRO COVERAGE
We provide coverage to over 600 towns & communities, 7,500km of highway and 4,500km of railway not covered by other mobile networks.

LARGEST 4G COVERAGE AREA
Enjoy 4G coverage in more areas across Australia compared to any other mobile network.



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WE OFFER FASTER SPEEDS IN MORE PLACES WITH AUSTRALIA'S LARGEST 4G COVERAGE AREA

IT'S HOW WE CONNECT

FASTER IN MORE PLACES
Enjoy a faster data experience in more places with the largest 4G coverage area of any other mobile network.

NOT JUST FAST IN METROPOLITAN AREAS
Our 4G speeds reach 90% of the Australian population including more than 300 regional towns.

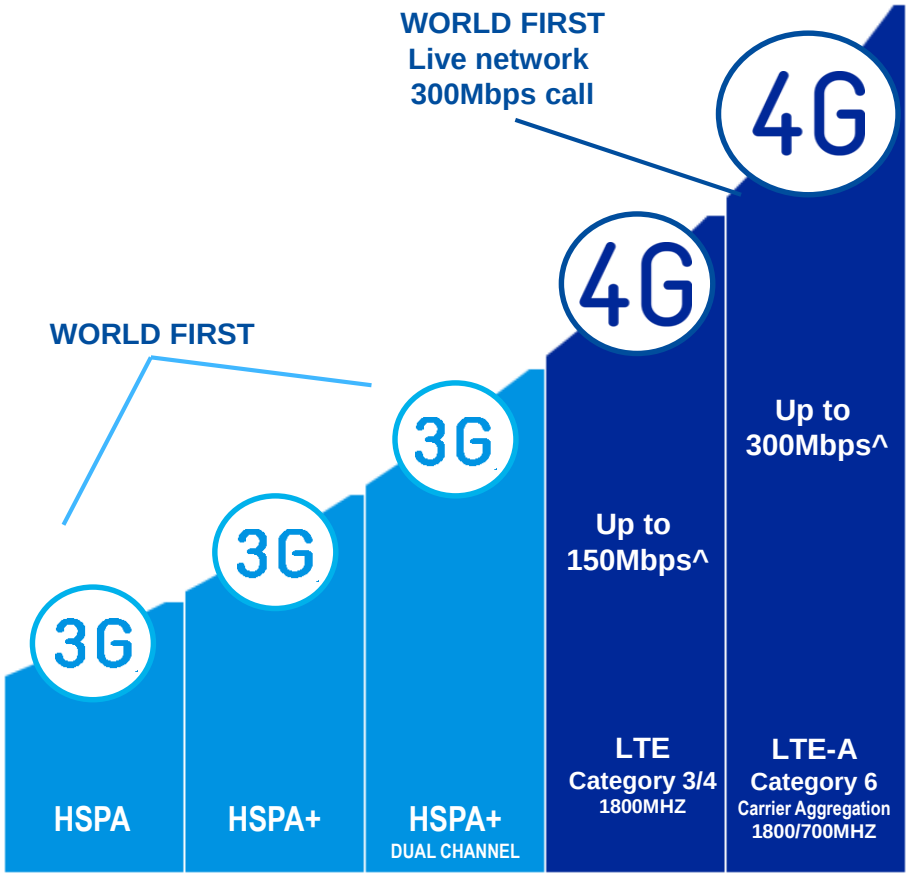
MORE RELIABLE SPEEDS ON THE GO
We not only provide the largest 4G coverage area – our 4G is backed by our fastest available 3G speeds



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THE SPEEDS WE OFFER ACROSS OUR MOBILE NETWORK TRULY SETS US APART FROM OTHERS



TOTAL 4G (4G AND 4GX)

Available across 90% of the Australian population. UNMATCHED!

In 4GX areas, typical download speeds are 2Mbps to 75Mbps for 4GX category 4 devices, and 2Mbps to 100Mbps for 4GX category 6 devices.

In all other 4G area typical download speeds are 2Mbps-50Mbps.

3G - HSPA+ Dual Channel

1.1Mbps-20Mbps. Available across 85% of the population. UNMATCHED!

3G - HSPA+

550kbps-8Mbps. Available across 97% of the population. UNMATCHED!

3G - HSPA

550kbps-3Mbps. Available across Telstra's entire coverage footprint covering **99.3%** of the population. UNMATCHED!

^ Peak technology speeds. Actual speeds will be lower and are dependent on device capability
The Telstra mobile network offers 4GX in all capital CBDs and selected regional areas and is progressively rolling out to more places. In other coverage area's around Australia, you'll automatically switch to our fastest available 4G, which is offered in all capital CBDs and associated airports, many surrounding suburban areas and in over 300 regional areas or our 3G.
NOTE: Speeds are typical download speeds. Speeds may vary due to factors such as location, distance from the base station, local conditions, concurrent users, hardware and software configuration and download source/upload configuration. Go to telstra.com/coverage to check current coverage and speed available in your area

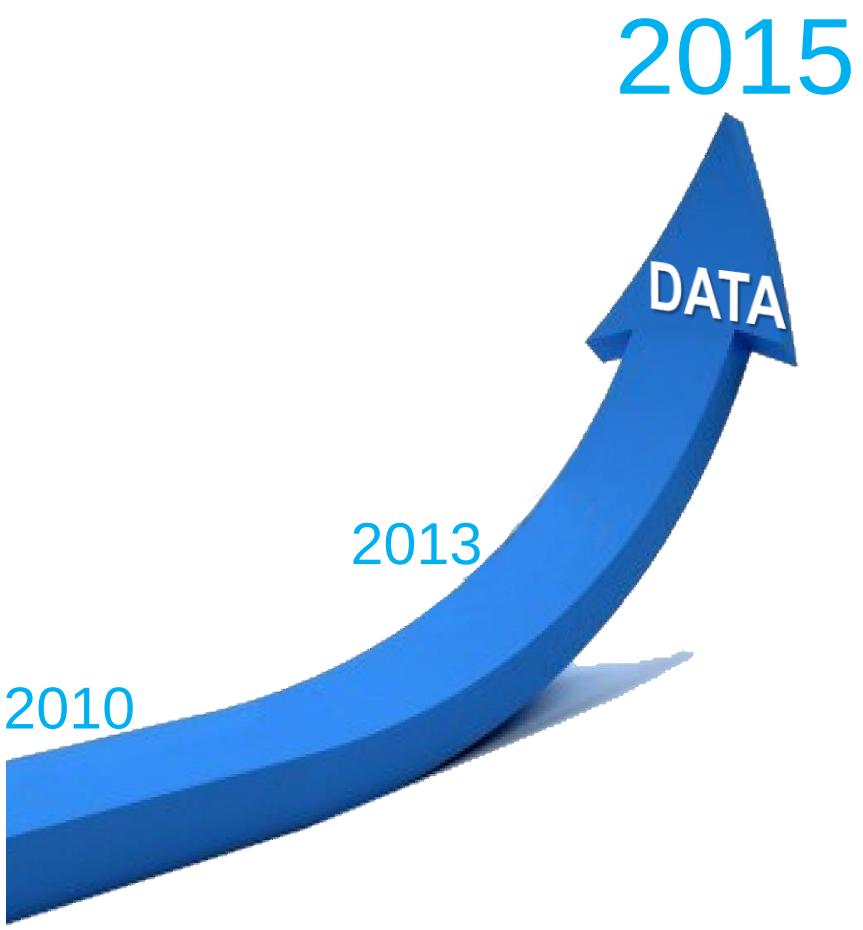
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CURRENT TRAFFIC GROWTH INDICATORS

SMARTPHONES AND TABLETS CONTINUE TO DRIVE HUGE GROWTH IN MOBILE DATA

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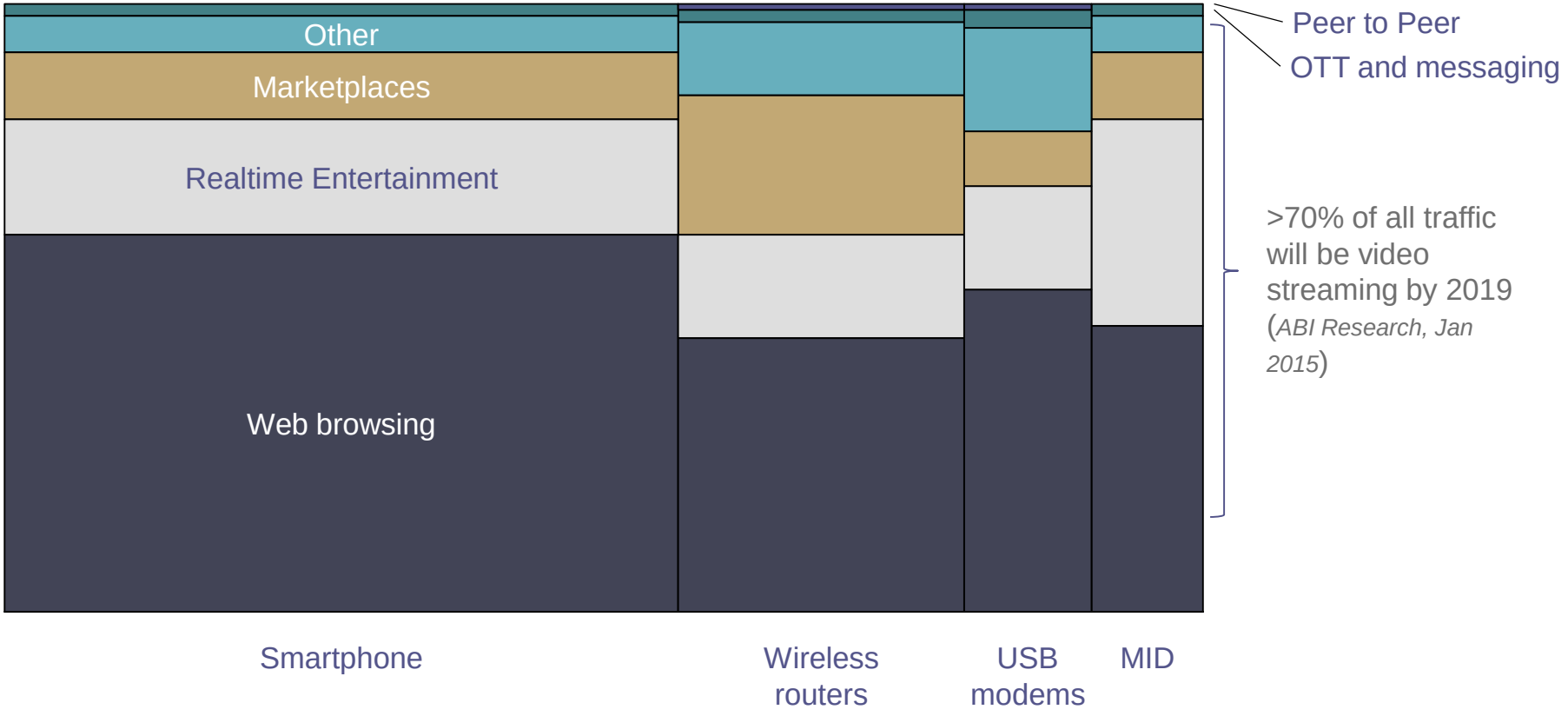
- In 2015, customer traffic is still growing by a massive 50% per annum, compared to that of 2014.
- More than 75% of all Australians now use a smart-phone.
- 4G LTE demand is exploding – 50% growth in the number of 4G devices on our network in just the last six months.
- We are currently meeting this growth with a mix of capital investment and technical innovation.

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AUSTRALIANS ARE USING MOBILE DATA FOR A GROWING VARIETY OF APPLICATIONS

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Telstra mobile data 2014



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THERE ARE THREE OPTIONS TO MEET FUTURE CAPACITY DEMAND

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Density	Technology	Spectrum
More base-stations/km² (including small-cells)	Increased bits/sec/km²	More Hz/km²
• Densification is *not* a low-cost solution – with potential impact on network economics • Recent (US) AWS-3 auction implies a willingness to spend $43b, rather than pursuing network densification?	Technology change takes considerable time to take effect: • Existing users don't immediately migrate to new technology devices (minimum 3-4 year t/o) • New technologies must operate in parallel with older systems for many years (>10 year life-cycle) • Spectrum re-farming is an inherently gradual process	• ITU-R study cycle is ~5-8 years – comprising: a new agenda item + sharing studies period • National planning and implementation may be a further ~2-5 years *Conclusion*: Total lead-time for accessing new spectrum could be as much as ~7-13 years

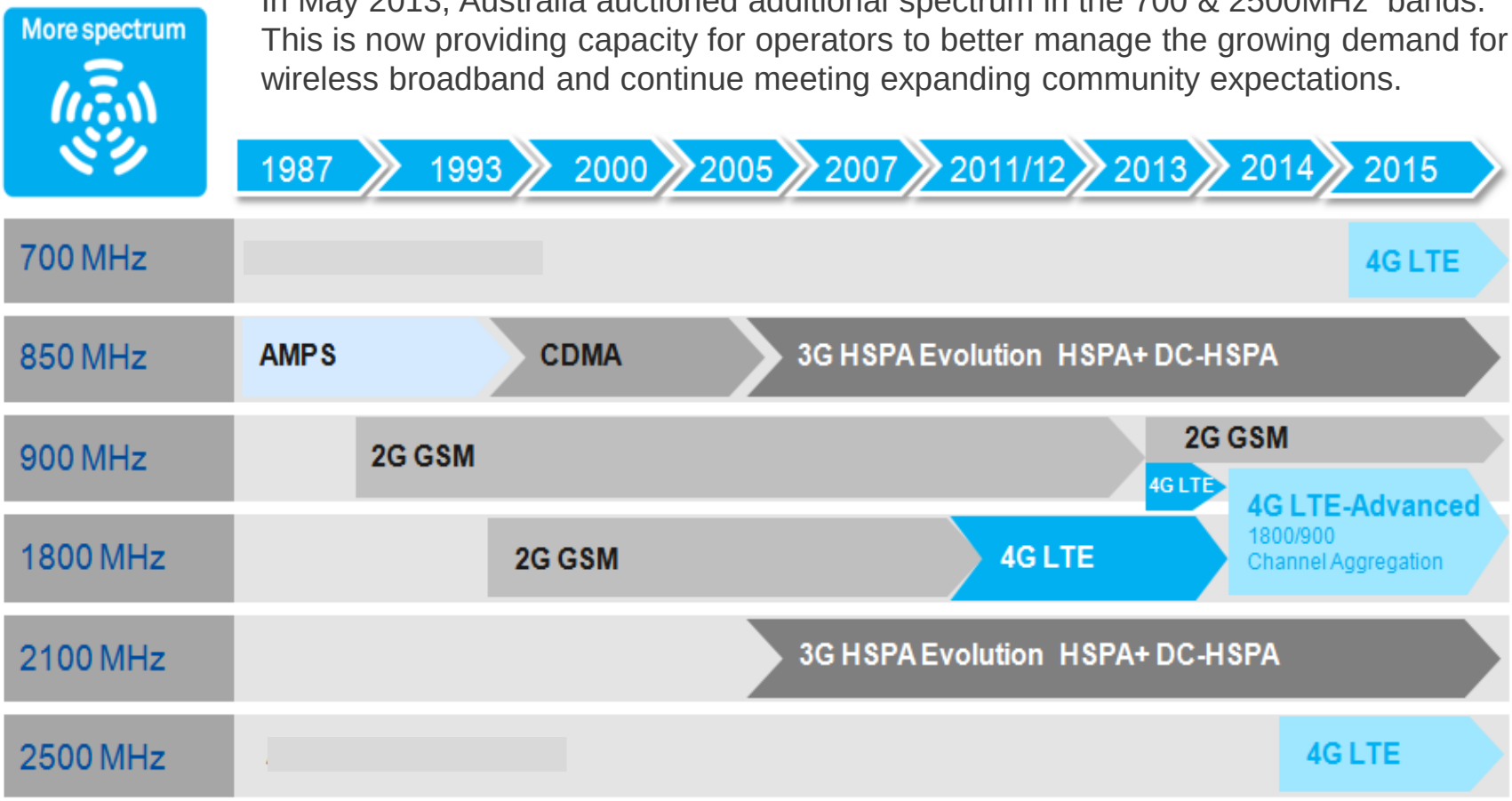
Can any national economy WAIT for another ITU-R *study cycle*?
Will other countries surpass those who wait?

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CURRENT SPECTRUM USAGE
DELIVERING CAPACITY & PERFORMANCE

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In May 2013, Australia auctioned additional spectrum in the 700 & 2500MHz bands. This is now providing capacity for operators to better manage the growing demand for wireless broadband and continue meeting expanding community expectations.



Total: ***40 MHz 90 MHz 240 MHz 360 MHz 500-590 MHz***

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SOME COUNTRIES DEPLOYED FEWER BANDS
LEGACY SYSTEMS CONTINUE TO OPERATE

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In some countries, only the bands 900, 1800, 2100 MHz are used by mobile systems:

⇒Total mobile spectrum bandwidth of only ~320 MHz

Other services continue to use the bands that were identified for IMT by ITU-R:

- Land mobile/fixed links still operate in 850 MHz band
- Fixed links in parts of 1800/2100/2200 MHz bands
- Fixed links also in 2500 MHz band

⇒ ITU-R *identification* does *NOT* mandate a country to immediately replace existing systems with IMT

- national sovereignty and local circumstances & needs will always prevail

So, which spectrum bands should you consider to encourage further economic growth ?

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FUTURE IMT SPECTRUM NEEDS

FUTURE SPECTRUM ESTIMATES

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- **Australia** has previously estimated a total requirement by 2020 of **1081 MHz** (*Report **ITU-R M.2290***)
  - *implies a looming shortfall of around 500 MHz by 2020?*
  - *potential implications for national economic growth?*
- **Bangladesh** recently presented an analysis to APT Wireless Group (see: **AWG-18/INP-21**), based on a novel 'diffusion' model, indicating a need for **1380 MHz** by 2020

- Various countries have presented their estimates to APT (ref: **AWG Report 39**):

	ITU-R WP-5D Rep. M.2074	Australia	China	Japan	India	Bangladesh
Lower	1340 MHz	1100 MHz	1490 MHz	1825 MHz	+300 MHz	1380 MHz
Upper	1960 MHz		1810 MHz		+500 MHz	

- All indications suggest a critical need for ***~500-800 MHz extra spectrum by 2020*** ….

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BASKET OF CANDIDATE BANDS OFFERING *FLEXIBILITY* TO *R3* ADMINISTRATIONS

- 1427 – 1518 MHz – a prospective 'downlink' band:
  - **Supplementary Down Link (SDL) applications:**
    - **Additional downlink capacity** – to relieve existing IMT FDD/TDD bands (eg. 1800/2100 MHz), ***OR***
    - **LTE-Broadcast** services – stadiums, concert halls, public events, converged TV, *and*
  - **Possibly supported by *1350 – 1400 MHz* – '*uplink only*' band** – for back-channel usage
- 3400 – 3800 MHz – or some portion *(**3400-3600** or **3400-3700** MHz)* :
  - **Potential LTE/LTE-A *fixed* broadband service – a *'point-to-point'* wireless BB application:**
    - Deployed in outlying/rural regions that have no alternative broadband access, ***AND/OR***
  - **Possible TDD 'small cells' band to provide *additional capacity* layer:**
    - Typically deployed in urban regions – but also for *fixed wireless broadband* in rural areas.
- 2700-2900 MHz – a potential *alternative* to the C-band?
  - **Potential LTE/LTE-A fixed broadband service – a *'point-to-point'* wireless BB application:**
    - Deployed in outlying/rural regions that have no alternative broadband access , ***AND/OR***
  - **Possible alternative TDD 'small cells' band to provide *additional capacity* layer:**
    - Typically deployed in urban regions – but also for *fixed wireless broadband* in rural areas.

Which bands best meet future needs, in a *local* context??

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SPECTRUM OPTIONS FOR REGION 3

700 MHZ BAND NOW BECOMING SEMI-GLOBAL
OVER 40 COUNTRIES* HAVE COMMITTED

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APT-700

- More than *75 user devices* now on the market;
- *Eight LTE networks* already deployed across four countries – including Telstra & Optus in Australia;
- LTE-Advanced (carrier aggregation) also to be deployed soon;
- Excellent urban *building penetration & rural range;*
- Most European nations also expected to adopt this same plan.

Can other APT countries afford to ignore this band?

3GPP Band 28/44

**Refer: http://www.gsacom.com/apt700/index.php*

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SOME BANDS WILL NOT BE AVAILABLE IN SOME COUNTRIES – need *FLEXIBILITY* to choose bands…

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Options for Region 3 countries:

- Global support for **1427-1518 MHz** is clearly emerging
  - most likely to be '*downlink capacity*' band to supplement 1800/2100
  - Could become 1428-1518 MHz
- Some countries also support **1350-1400 MHz** – as a companion '*uplink only*' band

- Growing support for **3400-3700/3800 MHz** – countries with little FSS …?
  - Most likely for urban capacity (eg. small cells), and/or
  - to meet rural 'fixed' wireless broadband needs.

⇒ ***Total of 390-430 MHz***

OR, for those countries ***where FSS will remain important***, then you might consider to:

- Actively promote **2700-2900 MHz** instead – as an alternative *regional* preference ….
  - Most likely for urban capacity (eg. small cells), and/or
  - to meet rural 'fixed' wireless broadband needs.

⇒ ***Total of 290-330 MHz***

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THANK YOU

QUESTIONS?



FUTURE MOBILE SPECTRUM IN ASIA PACIFIC

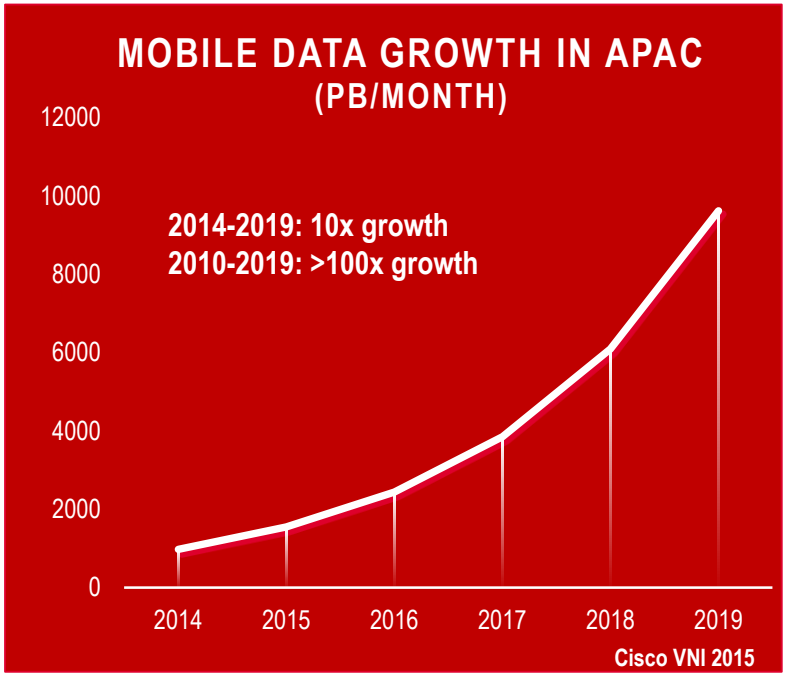
Creating a sustainable future for mobile broadband

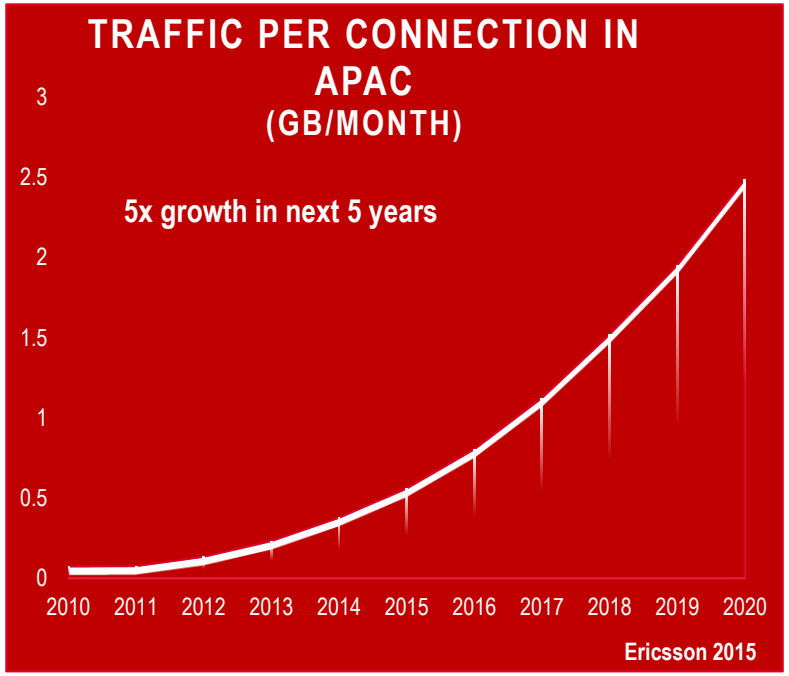
Peng Zhao , Senior Policy Manager,

Government & Regulatory Affairs, GSMA

March 25th 2015

MOBILE REVOLUTION IN APAC





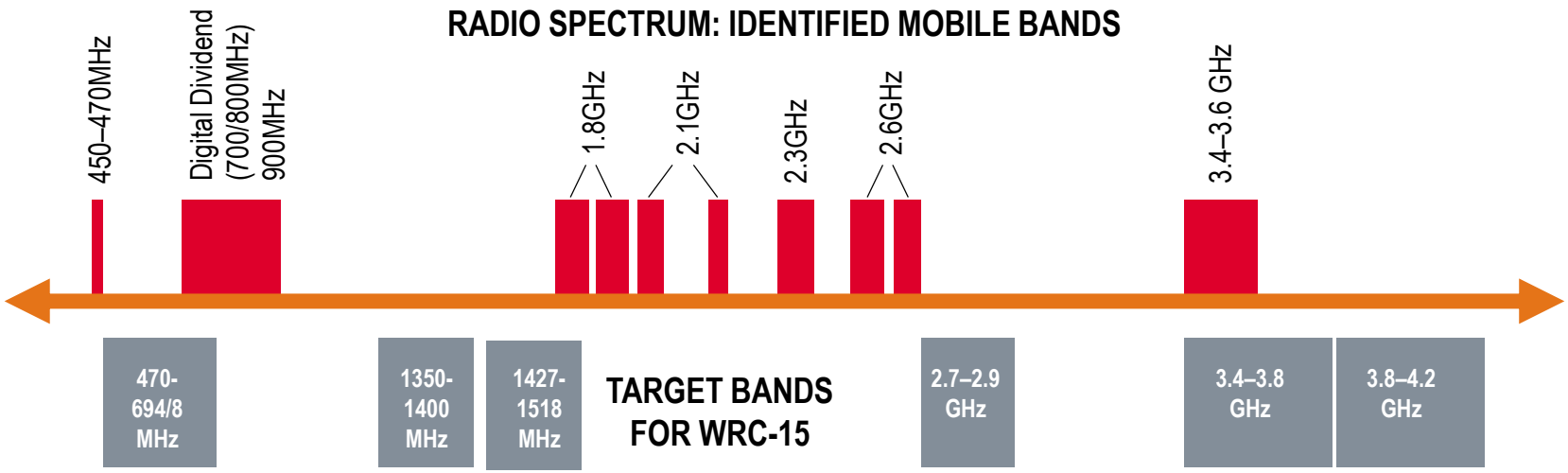
- **GSMA findings show 600-800MHz more mobile spectrum needs be allocated by 2020**
  - This accounts for new tech (e.g. LTE-A), small cells and Wi-Fi offload which operators use increasingly
- **This needs to be identified at WRC-15 to meet data demand in 2020-2025**
  - Can take around a decade to ready new mobile allocations for licensing then launch services
  - Existing unlicensed mobile spectrum will be essential to support data rises for the next 5-10 years

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SOURCE: ERICSSON MOBILITY REPORT 2015 & CISCO VNI 2015

NEW BANDS FOR MOBILE

- **GSMA had agreed widespread mobile operator support for 4 new mobile allocations**
  - Sub-700MHz UHF (470-694/8MHz)
  - 2.7-2.9GHz
  - L-Band (1350-1400MHz & 1427-1518MHz)
  - C-Band (3.4-4.2GHz)
- **Takes 5-10 years to ready new bands**
  - Existing bands will support growth in next 5 years
  - The bands will be needed to meet demand in 2020-2025
- **Bands can be harmonised regionally/ globally to drive lower cost devices**
  - Supporting others risk creating fragmentation



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JTG STUDIES SUPPORT GSMA BANDS*

WRC-15 CANDIDATE BANDS IN THE DRAFT CPM TEXT ARE:

Band	Frequency ranges	
UHF	**470 - 694/698MHz**	
L-band	**1350 - 1400 MHz** **1427 - 1452 MHz** **1452 - 1492 MHz**	**1492 - 1518 MHz** 1518 - 1525 MHz 1695 - 1710 MHz
S-band	**2700 - 2900 MHz**	
C-band	3300 - 3400 MHz **3400 - 3600 MHz** **3600 - 3700 MHz** **3700 - 3800 MHz** **3800 - 4200 MHz** 4400 - 4500 MHz	4500 - 4800 MHz 4800 - 4990 MHz 5350 - 5470 MHz 5725 - 5850 MHz 5925 - 6425 MHz

* GSMA target bands in **bold**

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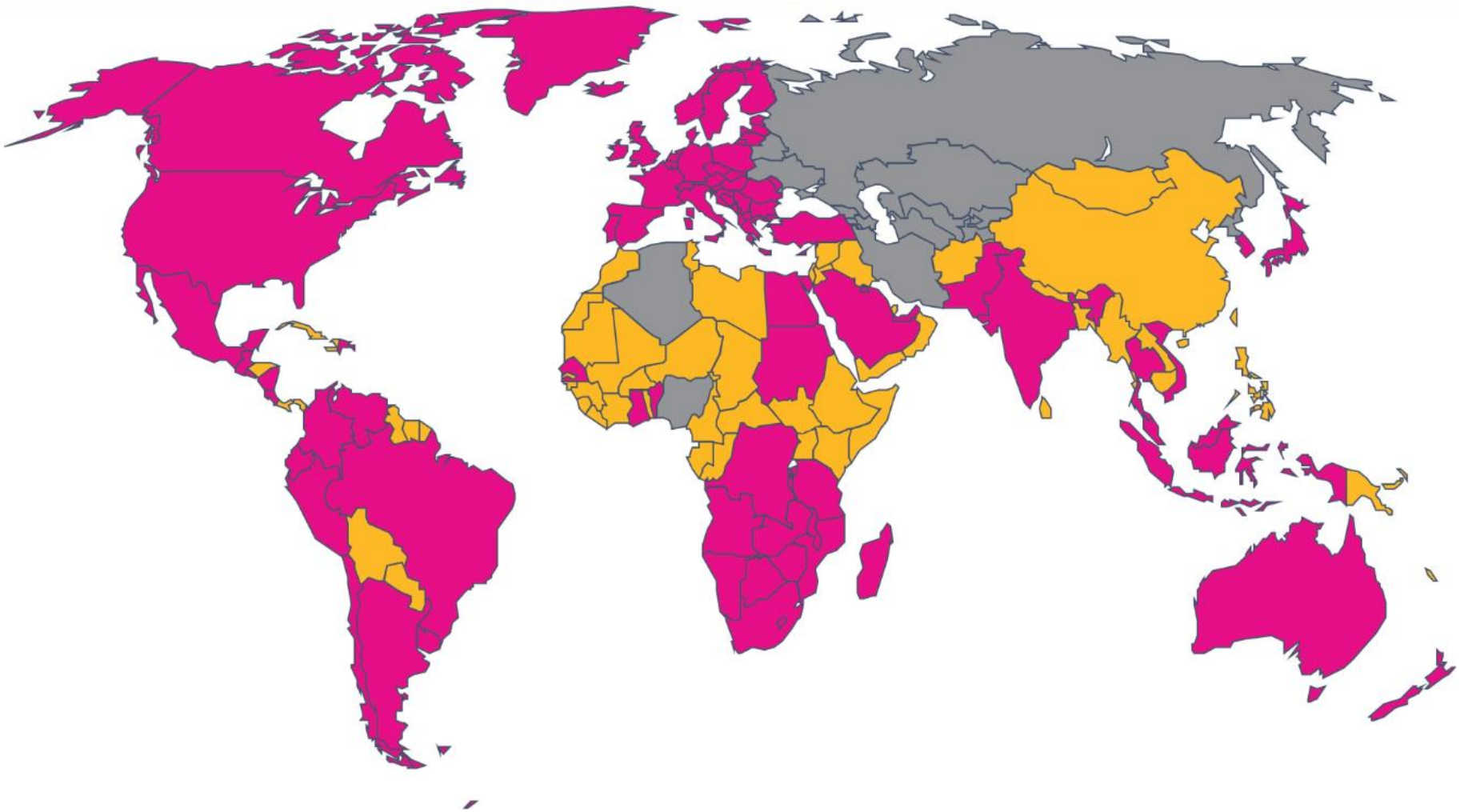
SHARING CONSIDERATIONS

BANDS MUST BE SHARED TO INCREASE OVERALL SPECTRUM EFFICIENCY

- **We encourage regulators to look at ways of sharing bands**
  - Most bands are not allocated exclusively for one service in the Radio Regulations
- **Sharing is demonstrably possible if we consider realistic scenarios and not the worst case**
  - Possible by segmenting bands or geographic sharing
  - Opponents to our bands typically argue that sharing isn't possible based on unrealistic scenarios (e.g. huge exclusion zones)
- **Numerous incumbents are emphasising highly unrealistic scenarios**
  - **Sub-700MHz (470-694/8MHz):** some argue co-channel sharing requires 274-1000km exclusion zones premised on one country putting TV transmitters on its borders pointing directly at neighbour - more realistic scenarios showed 14km exclusion zones adequate
  - **L-band (1350-1518MHz):** some argue exclusion zones would be 500km wide and require a 7.8MHz guard band BUT this was premised around 1km tall LTE base stations. A study with more realistic heights found a 2km exclusion zone was adequate and a 3MHz guard

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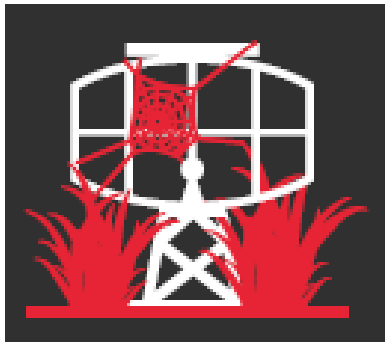
COMMITMENT TO MOBILE IN A PORTION OF L-BAND



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2.7-2.9GHz

GOOD CAPACITY BAND THAT ALSO MINIMISES NETWORK EXPANSION COSTS DUE TO POTENTIAL RE-USE OF 2.6GHz BASE STATIONS



CURRENT USAGE:

- Radars for aviation (military and civilian) and meteorological purposes
  - Small number of radars in fixed locations leaving band unoccupied in other areas
  - Significant potential to use the spectrum more efficiently

HOW TO ACCOMMODATE MOBILE *IN A PORTION*:

- All existing radar requirements can be met in the band while still freeing a portion*
- Mobile could operate in areas where radar is not used or band could be segmented
  - Studies show large exclusions zones are not necessary around radar stations
  - Co-channel: separation distance for an IMT suburban microcell and a radar receiver is around 15km
  - Adjacent channel: no separation distance required with a guard band of 20 MHz

EXISTING SUPPORT:
Pakistan, Sweden, Finland, UK, Norway, Spain, Senegal, Guinea, Ghana, Sudan, and 15 SADC countries.

ESSENTIAL CAPACITY BAND FOR COUNTRIES OPPOSED TO C-BAND

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*For more details on segmentation of this band, please see document APG15-4/INF-17

C-BAND (3.4-4.2GHz)

EXCELLENT CAPACITY BAND – SUPPORTS BEST POSSIBLE MOBILE EXPERIENCE

CURRENT USAGE:

- Mostly used for the Fixed Satellite Service (FSS) worldwide
- Already used for mobile broadband in some parts of the world



HOW TO ACCOMMODATE MOBILE *IN A PORTION*:

- Portion could be freed in future as FSS is increasingly moving to higher bands (e.g. Ka & Ku) which provide better value, better quality services
- Sharing studies prove satellite & IMT can use the band under the right conditions
  - When a C-band *portion* is assigned for IMT in city centres, and *full* FSS use continues in rural areas, a separation distance **of 5km** would typically be required*
  - Several markets already use the band for both including an LTE service in the UK

IN ASIA PACIFIC THE USE OF MOBILE IN THE BAND WOULD DRIVE 100k NEW JOBS AND DRIVE US$53BILLION IN GOVERNMENT REVENUES**

EXISTING SUPPORT:

- Existing IMT footnote for 3.4-3.6 GHz in 91 region 1 countries and 10 region 3 countries
- Japan and Korea support 3.4-4.2 GHz
- Common CEPT mobile proposal for 3.4-3.8 GHz
- Strong agreement for 3.4-3.6/7 GHz in Region 2

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*For more details on C-band co-existence, please see document APG15-3/INF-03 and APG15-4/INF-17

**See Frontier Economics' report: "Economic assessment of C-band re-allocation".

CONCLUSIONS

Creating a sustainable future for mobile broadband

Herman Schepers, Senior Director Spectrum Campaign, GSMA

March 25th 2015

PROGRESS ON MOBILE AGENDA ITEM IS VITAL

THE FUTURE OF MOBILE BROADBAND IS AT RISK WITHOUT MORE SPECTRUM

- **Mobile traffic is growing faster than anyone's expectations**
  - 2015-2020: 10x traffic growth currently expected
- **Unless significant progress is made on Agenda Item 1.1, it could fail in its goal**
- **Networks could slow, consumer prices may rise, socio economic benefits lost**
- **Region 3 has more to lose than other regions**
  - Has very high mobile spectrum requirements due to large, densely populated cities
  - Most telecom equipment and devices are made in Asia Pacific - so worst affected by slowdown
- **Flexibility is essential to allow countries to react to their evolving situations**
  - New bands won't be licensed to operators until governments see clear demand
  - Advanced markets who use the bands first drive lower-cost devices for those using later



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THANK YOU – ANY QUESTIONS?

FUTURE MOBILE SPECTRUM IN ASIA PACIFIC

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