

Draft Spectrum Reallocation Recommendation for the 3.6GHz Band

Ericsson Australia Response





The Manager
Spectrum Licensing Policy Section
Spectrum Management Policy Branch
Australian Communications and Media Authority
PO Box 78
Belconnen ACT 2616

SpectrumLicensingPolicy@acma.gov.au

**Re: Draft spectrum reallocation recommendation for the 3.6 GHz band -
Metropolitan and regional areas of Australia**

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Ericsson Australia welcomes the opportunity to respond to the ACMA consultation on the publication ***Draft spectrum reallocation recommendation for the 3.6 GHz band - Metropolitan and regional areas of Australia.***

About Ericsson

Over the past 140 years, Ericsson has been at the forefront of communications technology. Today, we are committed to maximizing customer value by continuously evolving our business portfolio and leading the ICT industry.

We are a global leader in delivering ICT solutions. In fact, 40% of the world's mobile traffic is carried over Ericsson networks. We have customers in over 180 countries and comprehensive industry solutions ranging from Cloud services and Mobile Broadband to Network Design and Optimization.

Our services, software and infrastructure - especially in mobility, broadband and the cloud - are enabling the communications industry and other sectors to do better business, increase efficiency, improve user experience and capture new opportunities.

Ericsson has one of the industry's strongest patent portfolios with a total count of over 42,000 granted patents. R&D is at the heart of our business and approximately 23,700 employees are dedicated to our R&D activities. This commitment to R&D allows us to drive forward our vision for a Networked Society - one where everyone and everything is connected in real time - enabling new ways to collaborate, share and get informed.

Ericsson has been an active industry participant in Australia since the 1950s, delivering high-value professional services capability across Australia, New Zealand and the Asia Pacific region.



1

Introduction

Ericsson supports the ACMA's recommendation for the 3.6GHz band reallocation in metropolitan and regional areas of Australia. There is increasing demand for 'mid-band' spectrum to support mobile broadband services. Ericsson considers the 3.6GHz band to be of high value for mobile broadband and fixed wireless deployment, due to ongoing technical standardization efforts plus regional and global interest, leading to the development of healthy device and equipment ecosystems for 4G/5G. The increasing demand for these services with further developments in LTE and considering the introduction of 5G, provides the incentive to reallocate the 3.6GHz band.

The demand for Mobile broadband services continues to grow rapidly and with this it will continue for the foreseeable future. Further advancements of LTE and the emergence of 5G capabilities will provide new opportunities for growth in mobile broadband and other industries. This will drive demand for additional spectrum, to enhance existing networks and introduce 5G. As highlighted in Ericsson's Mobility Report¹ between 2016 & 2022 the total global mobile data traffic is expected to rise at a CAGR of 42% from the end of 2016 to the end of 2022.

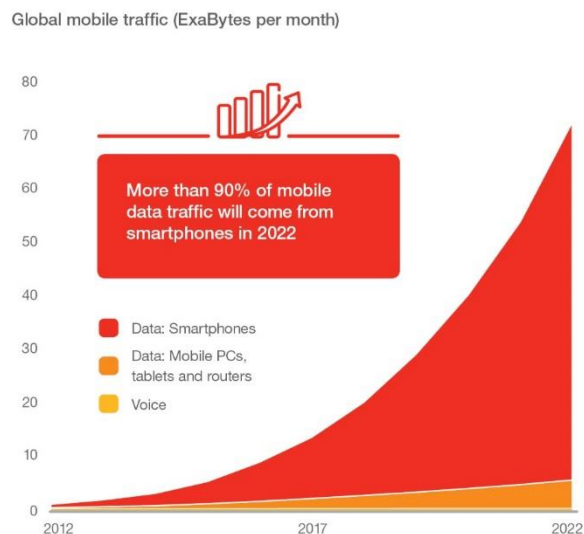


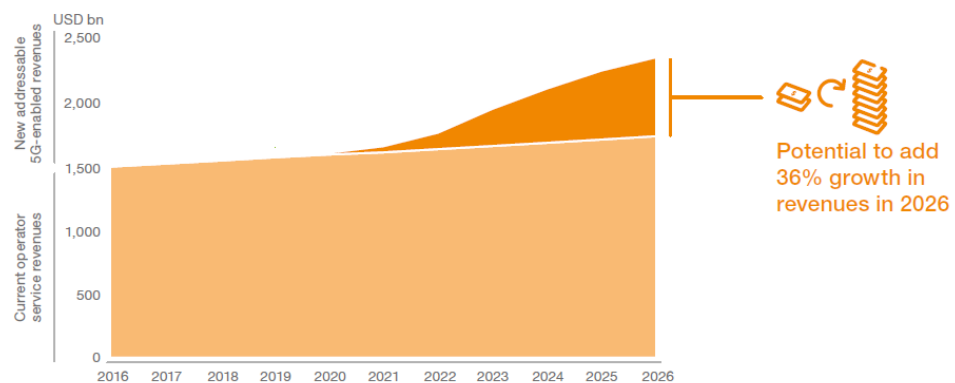
Fig.1 Global Mobile Traffic.

¹ [Ericsson Mobility Report – August 2017](#)



To meet this demand, cellular networks are evolving to deliver enhanced mobile broadband and communication services with high data throughput, quality of service, and low latency requirements. In addition, networks will also support new Internet of Things (“IoT”) services with robust requirements on characteristics such as scalability, reliability, availability, and latency. These services are designed to support new use cases coming from industries such as automotive, manufacturing, energy and utilities.

With the possibility to address new industries, the 5G enabled revenue growth opportunities globally are estimated to be USD 619 billion². This is an additional 36% revenue from 5G-enabled industry digitization market opportunities by 2026.



Source: Ericsson and Arthur D. Little

Fig. 2 5G Business Potential.

Acceleration of the 5G New Radio (NR) standardization schedule will enable large-scale trials and deployments of 5G in 2019. In March 2017, 3GPP approved acceleration of the 5G NR standardization schedule by introducing an intermediate milestone for an early variant called Non-Standalone 5G NR. This will enable early 5G deployments and support the requirements for enhanced mobile broadband services.

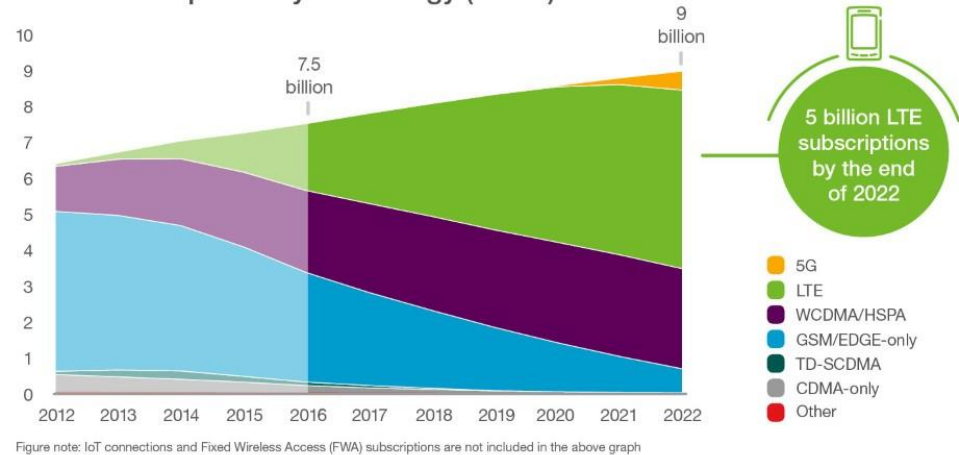
The forecasted number of 5G subscriptions³ globally will exceed half a billion by the end of 2022. There will be continued growth in other mobile technologies, with 5 billion LTE subscriptions by the end of 2022, and 9 billion mobile subscriptions.

² [The 5G Business Potential – Industry Digitization and the Untapped Opportunities for Operators](#)

³ [Ericsson Mobility Report – August 2017](#)



Mobile subscriptions by technology (billion)

*Fig. 3 Mobile Smartphone subscription by Technology.*

Significant R&D investments are being made to enable the industrial use cases mentioned above. However, to realize the full potential of such technologies, additional spectrum in both mid- and high-bands is needed. Mid-band spectrum, the 3.6 GHz band offers great promise for small cell deployment, wide area networks, and next-generation services.



2 Issues for Comment

The 3.6 GHz metropolitan and regional Australia license type

The ACMA proposes to recommend that any reallocation declaration or declarations made by the minister should state that metropolitan and regional areas of Australia in the 3.6 GHz band (as described in the Written Notice in Attachment A) should be reallocated by issuing spectrum licenses.

Ericsson supports the reallocation of the 3.6GHz band in metropolitan and regional areas of Australia by issuing spectrum licenses. By issuing spectrum licenses that have an appropriately long time frame before they expire that allows for a secure investment and certainty for operator & industry for the development of future MBB services. Providing clarity of the spectrum situation facilitates the development of required equipment and devices with a sound ecosystem.

3.6 GHz metropolitan and regional Australia frequency boundaries

In the metropolitan and regional areas of the 3.6 GHz band, the ACMA proposes to recommend the minister declare for reallocation the frequency range 3575–3700 MHz (125 MHz of spectrum).

Ericsson supports the reallocation of the 3.6GHz band, i.e. the frequency range 3575–3700 MHz (125 MHz of spectrum) in metropolitan and regional areas. This is essential to facilitate the initial deployment of 5G in Australia and is aligned to the development of 5G in other markets. Due to the increasing demand for 5G, additional ‘mid-band’ spectrum should be sought after also for Australian operators and one example could be in the range above 3.7 GHz and in the 4 GHz band of 4.4-5.0 GHz (Refer Appendix 1 - Mid Band Spectrum is increasingly being targeted for 5G around the world).

3.6 GHz metropolitan and regional Australia geographic boundaries

In the metropolitan and regional areas of the 3.6 GHz band, the ACMA proposes to recommend the geographic areas shown in Figure 3, and described by the HCIS identifiers in the Attachment C be included in the reallocation declaration or declarations.

Ericsson supports the proposed geographic boundaries. This is not suitable for actual allocation boundaries (note this is discussed in further sections).

3.6 GHz band reallocation period and deadline

In the 3.6 GHz band, the ACMA proposes to recommend reallocation periods of:

- two years for the Adelaide, Brisbane, Canberra, Melbourne and Sydney metropolitan areas (Area A)
- five years for the Perth metropolitan area (Area B)
- seven years for the regional area (Area C)



with a reallocation deadline of 12 months before the end of the two-year reallocation period for Area A.

Ericsson supports the earliest availability to enable initial 5G deployments. Refer to Appendix 2 – Early Deployments by 2020, for a brief insight into early deployment activities for 5G.

The 3300-3800 MHz will be the primary ‘mid-band’ for 5G/IMT-2020 deployments (in combination with ‘high-band’ or mmWave frequencies). For early deployments of 5G/IMT-2020 in Australia there is a need to ensure as large part as possible of this ‘mid-band’ band for 5G/IMT.

3.6 GHz band licence duration

In the 3.6 GHz band, the ACMA’s preliminary view is that spectrum licences should commence as soon as possible after the auction, and expire on 13 December 2030, in line with the existing spectrum licences in the 3.4 GHz band.

It is extremely important to ensure that the minimum duration of spectrum licenses is sufficient to ensure adequate and secure investment by operators with equipment in the licensed spectrum so that maximum benefit from the spectrum is achieved. It is, however, an important longer term strategy to reduce fragmentation in the overall ‘mid-band’ spectrum.

3.6 GHz band allocation methodology

The ACMA proposes to use an ESMRA auction format to allocate spectrum in the 3.6 GHz band.

No Comment.



Box 1: Minimum bid requirement

As noted, the ACMA would propose to use an ESMRA auction with generic lots and an assignment round. However, in such an auction format bidders face a frequency-based exposure risk—bidders would be exposed to winning amounts of spectrum they may consider to be insufficient and uneconomical. To help mitigate against this risk, the ACMA is considering whether to allow bidders to express a minimum bid requirement (MBR). This MBR feature allows a bidder to reduce demand from the minimum requirement to zero if the price exceeds the bidder's specified price point. There is no risk that the bidder will win an uneconomic quantity. Ofcom is proposing to use a similar facility in its forthcoming 3.4 GHz band allocation. One of the key issues associated with an auction format that enables bidders to express a minimum requirement is that it is very possible that there will be unsold spectrum. The ACMA proposes to have a follow-up clock auction of any spectrum unsold after the initial clock round and prior to the assignment round.

The ACMA considers the main risk associated with the MBR is that it may introduce strategic bidding and complexity. For example, bidders may be able to use the MBR to impose externalities on competitors without facing appropriate risk for their strategic behaviour. However, the ACMA would take this risk into consideration in setting a maximum MBR and try to minimise the likelihood of such strategic behaviour.

At this stage, 5G standards are not yet set, and so it is not possible to conclusively determine what quantum of spectrum the MBR cap would need to be set at in order to completely mitigate the frequency-based exposure risk. For example, the ACMA considers that bidders' demands in the 4G/LTE context feature increasing returns to scale between 2 x 5 MHz and 2 x 10 MHz, and subsequently show decreasing returns to scale beyond 2 x 10 MHz. As such, bidders are only 'exposed' in the 4G context when acquiring a single 2 x 5 MHz lot.

Given that 5G technology makes it possible to utilise large contiguous bandwidths, it is possible that the nature of the demand for spectrum will be different relative to 4G. Potentially this means that bidders could consider larger portions of spectrum to be insufficient.

Question: The ACMA welcomes stakeholders' views on the desirability of having an MBR feature for the 3.6 GHz band auction, should it be conducted, and if so what might be an appropriate MBR?

Ericsson supports the efforts to ensure spectrum is allocated in the most efficient way, to enable to most benefit from 5G deployments. Ideally in the mid-band spectrum approximately 100-200 MHz per operator would be available for 5G. Considering a minimum amount of spectrum the 3.6GHz band of approximately 20MHz would possibly reduce the risk of uneconomical lots of spectrum being allocated.

No further comments.

3.6 GHz band lot configuration

If the 3.6 GHz band is reallocated, the ACMA proposes to divide spectrum in the 3.6 GHz band in 25 lots, each with 5 MHz bandwidth.

Ericsson supports the ACMA's proposal to use 25 lots of 5MHz in the 3.6GHz band. This supports more flexible deployment strategies, which may have combinations of both LTE and NR (5G). In addition, it provides the ability to purchase and deploy spectrum in a way that suits the business drives, i.e. minimum blocks of 25MHz may be more restrictive.



As 3300-3800MHz will be the primary 'mid-band' for 5G/IMT-2020 deployments, it is important to consider the possibility that spectrum below and/or above the 3.6GHz band (3575-3700MHz) may become available for 5G/IMT use in the future. If this occurs, having a flexible 5MHz lot deployment would be more beneficial in extending the band.

3.6 GHz band lot configuration—geographic area

If the 3.6 GHz band is reallocated, the ACMA proposes to offer the lots in seven defined areas, made up of six metropolitan areas and one regional area, as described in Attachment E.

The seven areas proposed by the ACMA creates numerous boundaries. In addition to the seven areas, each area has potentially 25 x 5MHz lots of spectrum to be auctioned. The expected technology used is TDD, hence there will be significant interworking / co-ordination issues to work out if the spectrum is not purchased in uniform lots across the areas.

As the boundaries are sufficiently rural, the impact of potential 'dead zones' due to interference at boundaries between different spectrum lots will be minimized (or have less impact). Prior to the auction it will be essential to establish appropriate technical instruments to ensure the interference conditions are clearly understood and able to be implemented.



3 Appendix 1 - Mid Band Spectrum is increasingly being targeted for 5G around the world

Mid-band spectrum is increasingly important in the mix of spectrum that should be available for 5G⁴, and many nations around the globe have opened proceedings to make 3 GHz band spectrum available for 5G services. For example, China, the European Union, Ireland, Japan, Russia, South Korea, the United Kingdom and USA⁵ have all recently taken steps to make 3 GHz spectrum available for 5G. At the WRC-15, the 3.6GHz band was highlighted in addition to what was already decided in WRC-07, and is now identified to IMT in all three ITU Regions, among others, as bands for 4G mobile broadband and potentially also 5G. There is considerable momentum for the use of bands in the 3.3-3.8GHz range for early or initial deployment of 5G.

Globally harmonized spectrum remains integral to the continued growth of the mobile industry and should be the touchstone for selecting spectrum for 5G, because globally harmonized spectrum allocations result in a broader ecosystem for technology, equipment, and engineering expertise, leading to economies of scale, lower costs for deployment, more rapid roll-out of new services, and enhanced competition among suppliers to global markets. The broader ecosystem spurs innovation at the application level and creates a platform for transformation.

⁴ [‘Ministry of Industry and Information Technology released 5G system in the frequency band 3000-5000MHz frequency planning’](#), November 14 2017; FierceWireless (June 7, 2017), [China issues plan to use 3300-3600 MHz, 4800-5000 MHz for 5G](#);

European Commission, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee, and the Committee of the Regions, [5G for Europe: An Action Plan](#), at 5 (Sept. 14, 2016);

Commission for Communications Regulation, [Results of the 3.6 GHz Band Spectrum Award](#), ComReg 17/38 (May 22, 2017);

[Forward Thinking for Spectrum: Getting Ready for 5G](#), GSMA-GSA Seminar, ITU World Telecom (Nov. 16, 2016);

[5G in China: Outlook and Regional Comparisons](#) (July 2017);

Cho Jin-young, [South Korean Government to Secure 40 GHz Frequency Width for 10 Years](#), BusinessKorea (Dec. 23, 2016) .

⁵ [FCC Commissioner Michael O’Rielly, A Mid-Band Spectrum Win in the Making, FCC Blog \(July 10, 2017\); FCC Opens Inquiry Into New Opportunities In Mid-Band Spectrum](#)



4 Appendix 2 - Early Deployments by 2020

There is considerable activity globally towards deploying 5G services by 2020. Leading markets are UK, USA, Korea, Japan. For the mid-band specifically, EU and notably UK, Korea and China will have 5G deployments in 2020 timeframe. This clearly highlights the 5G momentum currently. With the initial expected deployment for 5G in the 2020 timeframe, this indicates there will be early deployments from 2018 with commercially 'stable' 5G equipment. The following operators and markets have indicated their intent for early 5G:

Verizon⁶, AT&T⁷, T-Mobile USA⁸, Telia⁹, MTS Russia¹⁰, Korea Telecom¹¹, China¹², Vodafone UK¹³.

Implementation of 5G by 2020 means that deployments will start prior to WRC-19, and spectrum decisions are required now for those bands that will have commercial introduction during year 2020.

In general harmonization for 5G can be seen in three main frequency ranges:

- 3GHz & 4 GHz
- 26+28 GHz; The 28GHz is one of the first high frequency bands for 5G. The 26 GHz band (a 'pioneer' 5G band in Europe) will be implemented prior to WRC-19 decision
- 37 - 43.5 GHz
- Existing and new mobile spectrum addresses IoT needs

⁶ [Verizon to deliver 5G service to pilot customers in 11 markets across U.S. by Mid 2017](#)

⁷ [AT&T Plans to Bring 5G Evolution to Over 20 Metros by End of Year](#)

⁸ [T-Mobile Announces Plans for Real Nationwide Mobile 5G](#)

⁹ [Telia Plots 5G Launch in Stockholm and Tallinn by 2018](#)

¹⁰ [MTS and Ericsson to Trial 5G in Russia](#)

¹¹ [South Korea to launch first commercial 5G network in 2019; KT gets ready to show off 5G for PyeongChang 2018 Olympics; 5G Services KT will provide world's first 5G Experience](#)

¹² [Report: China will spend \\$411 billion on 5G from 2020 to 2030;](#)

¹³ [Vodafone 5G in the UK](#)

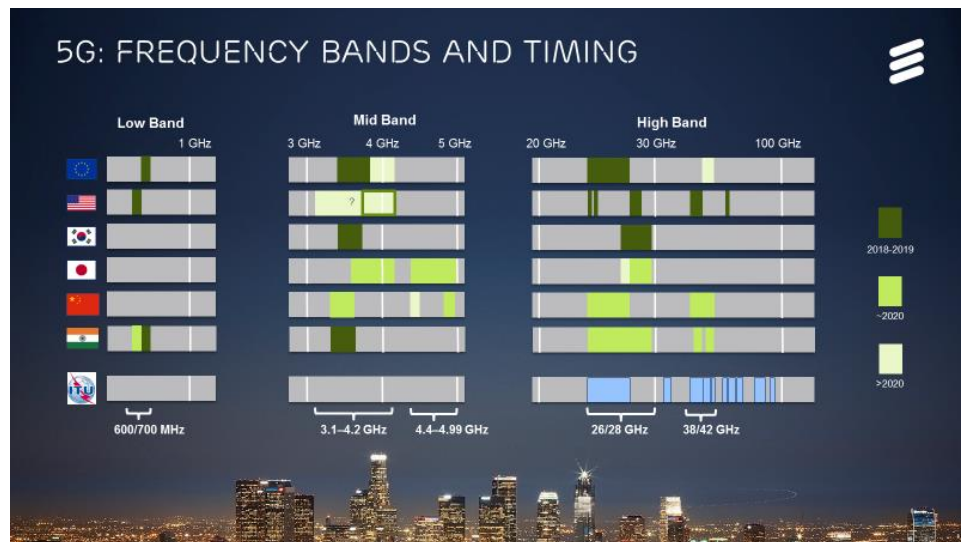


Fig. 4 Potential Spectrum Landscape and Timing