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The Australian Competition & Consumer Commission,
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Attn: Chris Xie, Director, Mobiles and Consumer Engagement, Infrastructure Division

Reference – Allocation limits advice for 3.4 – 4.0 GHz band allocation in remote areas

The Australian Radio Communications Industry Association (ARCIA) represents the radio communications industry in Australia, often referred to as the two-way radio industry or in more modern parlance the 'wireless communications industry'. The clients of our members are a critical part of the Australian economy and are represented in virtually every industry sector in Australia, as well as multiple public interest areas. Our association is recognised by the Australian Communications & Media Authority (ACMA) as being the peak industry body that represents this segment of spectrum users and we work with the ACMA in several of their spectrum management roles.

It is recognised by both the ACMA and Department of Communications that ARCIA represents the 65,000 apparatus licence holders that make up the private enterprise communications market in Australia, the existing market is used by many multiple sectors with Land Mobile Radio (LMR) and Signal Controlling and Data Acquisition (SCADA) amongst the most prevalent applications. The LMR market is already utilising low-speed data for many applications and like many other communications mediums, voice is no longer the primary communications format.

Many of the potential users of Enterprise mobile broadband systems will come from within the existing user groups within the LMR and SCADA technologies and are spread across almost all industry sectors and locations. With this background it is important that the ACCC in its deliberations becomes aware of the differences between Wide-Area Wireless Broadband (WA-WBB) services which are primarily provided by the public carrier networks, and the Local-Area Wireless Broadband (LA-WBB) services which are often referred to as Enterprise networks. The spectrum needs for these are very different, and the spectrum licensing formats are totally opposite to each other.

The WA-WBB service providers seek to have large blocks of spectrum over very wide areas and then prepare their business case based on the number of potential users of the service and the coverage criteria that the users will see as being sufficient for their needs, spectrum licensing has been designed with these users in mind and the ACMA tend to value the 'Public benefit' of spectrum based on the this potential income. This has been a successful model to date as the enterprise markets have still been in the 'Very early adaptor' stages so WA-WBB has been the only apparent usage model.



With LA-WBB services the business case is based primarily on the productivity gains that the overall system installation will bring to the end user entity as an efficiency gain, if the business case presents sufficient return on investment the project will proceed. It is only at this time that there can be a decision to apply for spectrum, it is effectively a component of a larger investment and that is not based purely on spectrum availability, but heavily dependent on it. For this reason, the LA-WBB markets will operate better under an Apparatus licensing framework as the spectrum is only required for the limited area of the system operation rather than the large geographic areas that are usually part of spectrum licensing auctions. It also means that when the spectrum auctions are advertised and implemented the LA-WBB users are highly unlikely to even be aware of the auction, let alone be in a position to be part of the bid as the spectrum on its own is of no interest to them. This is a critical factor that the ACCC must consider in evaluating the request from the ACMA, will the needs of potential LA-WBB system users be protected by unlimited spectrum licensing in any area, not just in remote areas?

Enterprise users share many characteristics

Enterprise users are typically more demanding in regard service level and performance than the levels carriers typically design for their public networks, they typically require higher upload and download transfer speeds, higher levels of reliability in terms of signal quality and higher levels of availability. Enterprise networks are designed and optimised specifically with their business requirements in mind and often exist in areas poorly served by public carriers. Where the public carriers design system characteristics that are at levels deemed acceptable to retail or non-critical usage, enterprise systems are usually focused on efficiency and safety. Where a public carrier might work on a 95% availability level for their service, a business critical user is more likely to require an availability level above 99%. That small percentage difference equates to around 2 minutes per hour, a small amount of time to wait for most users, however, in a safety situation like a mine the loss of the network data with semi-autonomous vehicles would mean a safety breach and a complete shut-down and re-start. At a rate more than \$50,000 per hour a typical two-hour stop would cost in excess of \$100,000 because of a few seconds data interruption.

New Technology

Many new technology options are available with NBIOT, SENSORS, WIFI 6, 5G, BTLE amongst the most common, private enterprise will invest in new technology such as LA-WBB if there is a return on investment over time. New devices are becoming available incorporating multiple technologies in one device, this will allow enterprise to choose either public or private networks depending on location/demand. Many new entrants are lowering the cost of entry for Enterprise users. Enterprise expects that spectrum will support new technology options and will be available for long periods of time

New technology such as NBIOT or IOT have large potential in sectors such as food production, agriculture and manufacturing, a recent report from the Agri-tech working group of the Australian Broadband Advisory Council referred to some of the issues for agriculture and the availability of existing WBB networks is a major impediment to investment and efficiency gains. Enterprise networks can offer realistic solutions to these problems and improve efficiency for agriculture; however, these locations are often poorly served by public carriers and perhaps the users may prefer to install and manage their own networks.



It is reasonable to expect that spectrum will be available to support new technology options and will be accessible for long periods of time in the locations it is required for operation. Just earlier this year the Australian Government through the Department of Communications outlined their 5G Innovation Incentive program, a real boost to the potential for wireless broadband in many applications. Should the ACMA go ahead with unlimited spectrum allocations widely across regional and remote areas it would defeat the purpose of the Commonwealth initiative. The recent report from the ABAC Agri-Tech Expert Working Group also refers to the connectivity issues experienced by the agricultural sector and specifically mentions the potential for 'Second tier providers' to potentially meet the needs of the sector. There is specific mention of the need for access to suitable spectrum to permit second tier providers or enterprise systems to be established, this should be in mid-band spectrum segments such as the 3.4-4.0 GHz bands. If the ACMA were to offer unlimited licenses this would preclude this option to a significant industry segment.

ARCIA Principals

ARCIA believes that spectrum should be used for the benefit of Australian economy with access available to all classes of user, the spectrum availability should be transparent and not oriented towards any one particular usage format. As outlined by the ACCC Chair at an ACMA Radcoms conference a few years ago, not just be valued on the contribution to Treasury funds but on the overall public benefit, that being to reflect all types of use and licensing.

Spectrum should be harmonised to maximise the benefit of globally available products in order to gain the best possible benefits for the Australian economy and 4/5G spectrum should be available for public and private uses across all markets, with private being dealt with by the Apparatus or other modern spectrum sharing system. The ACMA should foster spectrum allocation methods to allow Enterprise users to choose the most beneficial technology to suit their particular needs.

Response to the questions raised in the discussion paper -

1. What are the likely intended uses of 3.4–4.0 GHz band spectrum in remote Australia?

It is the aim of our Association that there should be spectrum held available for use in Private LTE/5G services. At present the 'Early adopters' of the technology are installing their own private LTE systems to give efficiency gains throughout their operations. These early adopters include mining and resource companies who see significant benefits in being able to operate and control their own communications networks, including wireless broadband. One important factor that has significant impact is that the wireless broadband system has to have an exceptionally high degree of reliability for market segments that rely on personnel safety as one of their primary concerns. If a mining company are running a wireless broadband system for semi-autonomous operations, then they are totally reliant on the communications system reliability for safety. If there is a short break of even just a few seconds in the data access for the system the plant operations would have to shut down and re-start to be able to accurately map the locations and status of all equipment, to do this typically will take more than two hours and with typical operating costs in excess of \$50,000 per hour even a short break in data access will cost hundreds of thousands of dollars. It is not acceptable to try and just re-start operations without a full check, this could breach personnel safety and cause injuries and equipment damage. With this operating requirement these types of users will not commit their operations to the third-party services such as those offered by the public carriers, the public access systems are not designed to provide reliability and latency that meets a 'business critical' operating format.



New markets will open as the supply of products increases and the cost of entry reduces, there will also be new technologies to further increase market opportunities. The Agri-Tech review highlights that agriculture sectors such as food production, dairy farming, broadacre farming are all looking for technology to improve returns and minimise labour costs. This indicates that there will be many new markets and so the concept of not permitting spectrum licensing over large areas would potentially be counter-productive towards these new opportunities.

2. If you intend to acquire the spectrum to deploy wireless services:

- (a) In what geographic areas do you intend to use the spectrum?
- (b) Do you expect your intended use is likely to change in the future? If so, please provide examples of how that might change.
- (c) What do you consider is the optimal allocation of 3.4–4.0 GHz spectrum to support your likely intended uses? What is the minimum allocation necessary?
- (d) Is your demand for the spectrum for current use, or more likely to arise in the future?

We can only respond to this question in a general overview format, our Association as such will not be applying for or licensing spectrum, however, we represent the Land Mobile Radio suppliers and users around Australia and they supply, install and maintain equipment that is primarily covered under some 60,000 apparatus licenses issued by the ACMA each year. What we can report is that the level of interest from many market segments is beginning to increase and we see demand for private or Enterprise LTE/5G services increasing significantly over the coming years. We would also point out that this trend will become evident in all market areas around Australia and we continue to lobby the ACMA to recognise this and make suitable 3.4 – 4.0 GHz spectrum available in ALL market areas.

3. Is there likely to be demand for the spectrum from entities that do not propose to use the spectrum but rather, intend to provide access to the spectrum to other users? If so, what is the extent of demand from these entities and in what geographic areas?

We do not believe that this is likely to be the case, we would expect that the bulk of the use will be for dedicated private LTE/5G systems where the end user either licences the spectrum or has a management arrangement applicable only to their own system and locations. The public carriers might believe that they can meet any potential requirements and for general public consumption that may be the case, however, for business critical use there must also be facilities for private enterprise to have access to licensing options for their type of network design.

4. How is demand likely to be impacted by the:

- (a) apparatus licence arrangements;
- (b) likely format of the administrative assignment process; and
- (c) licence duration?



From the perspective of the market for private LTE/5G services they will only be viable if licensed under the apparatus license format as the spectrum requirements will be for limited geographic coverage over the users operational areas, not across large state or regional areas. It is essential to understand the drivers for private LTE/5G services is based on a business case for investment into equipment efficiencies by the end user, as such spectrum is an essential part of that investment but is not the driving force in the investment. In almost every case the investment decision will be made based on the efficiencies and cost savings that the equipment/system will provide to the business, once that model of investment has been accepted there is then the realization that a spectrum license is but a part of the overall purchase requirement for the investment, it is a decision based at a later stage of the process and is not a primary driver of the decision. With this background it can then be seen that the ability to have access to spectrum on a needs basis at later stages will mean that there has to be a portion of the spectrum that is not 'locked away' for long periods by speculative spectrum licenses. Although the public carriers will claim that third-party authorisations or providing their own facilities in the required locations will meet the users needs this is not correct. Third-party authorisations have not been accepted by the public carriers who wish to retain total control of spectrum (or they offer the facility at rates above those applicable in major urban centres), and the business-critical users cannot rely on the public carriers systems which are designed for retail users and do not have the resilience levels required for critical operational continuance. Existing apparatus licence conditions will meet most private LTE/5G operating requirements, especially with renewals of up to twenty years being available, spectrum availability is a critical part of the business case for investment, but it is not the primary factor.

5. What are the relevant downstream markets that are likely to be impacted by the 3.4–4.0 GHz band allocation in remote areas? Please clearly define the geographic dimensions of these markets, the providers of services and the end-users in these markets.

In many respects these markets are still being defined, certainly the resources industry has been an early adopter of the technology, and this has been a significant investment in efficiency by the mining industry in remote areas. There will be more developments as other industries begin to have reference locations for services, at present some of the mining companies are hesitant to share too much information as it is a small and very competitive market so cost savings are maintained 'in-house' as much as possible. We can see that across the world there are now new markets coming online for private LTE/5G services and although many of these may not be represented in remote areas of Australia, many will be evident in regional areas as well as across the general populated areas of Australia. The present trend of making wireless broadband spectrum available only through spectrum licenses in most populated areas is effectively providing a non-competitive advantage for the public carriers against those businesses and industries who would benefit from having their own wireless broadband services. Philosophically we believe that it is time for the ACMA to recognise the needs and cease providing preferential allocations to the public carriers for spectrum.

With respect to the question on the sizes of potential geographic dimensions it is impossible to forecast, some may be as small as several hundred square metres whilst others could be up to several hundred square kilometres, hence the holding of spectrum for ad hoc allocations is the only way to meet these potential demands.



6. Are there any relevant markets in which the services could be provided by different types of network deployment?

There have been multiple attempts to meet these needs with Wi-Fi and although some have had limited success the fact that Wi-Fi is a common access technology it means that resilience and operational security can be compromised. From a business efficiency perspective private LTE/5G services are proving to be the most suitable and also provide a scalable platform for future growth and technology updates. We would contend that private LTE/5G services are in fact alternative forms of opportunity than the public carriers wireless broadband systems and in many cases are more attractive.

Many deployments will use multiple technologies, this is the reality of Enterprise. NO ONE technology can meet all needs. Enterprise will use the best of each to obtain a benefit. With new technology options arriving Enterprise will look to all models to meet their needs including SAS and self-managed.

7. Are there any relevant markets which consist of a single, or very small numbers of, end- user(s)?

Yes, the private LTE/5G markets are still in the very early stages and so the market has not had much chance to develop, in part this is because many potential users still believe that wireless broadband networks are very expensive to install and maintain, this belief being based on the information provided by the public carriers on the costs of their network developments. In reality, the cost of a small stand-alone LTE system is not prohibitive and when it is evaluated in comparison with a proper business case showing the return on investment it is viable as a productivity tool for many industry sectors.

In addition, in some of the more remote areas there is the potential for several users to join together and install a system on a co-operative basis where they all pay part of the investment and then jointly gain the benefits. In particular there are sectors of the agricultural industry that would gain operational efficiencies and so keep the costs of production lower resulting in the cost of produce to the public being less.

We believe that as the awareness of these types of systems becomes more widespread there will be a significant market for private LTE/5G systems around Australia, this is a trend that is now being seen in the European and North American markets.

8. Are there likely to be future relevant markets that have not been identified?

Again, as outlined in our previous responses, there are many potential markets that have not yet realised the potential that private LTE/5G has to offer, this is primarily because the methodology behind the ACMA making spectrum available for wireless broadband use has been aimed at the public carriers and they have deemed that the greatest public benefit from the spectrum is for licensing large blocks of spectrum over large geographic areas. Indeed, at the ACMA Radcoms conference in Sydney several years ago the ACCC Chair, Mr. Rod Sims, made the comment that the ACMA should recognise that “Public benefit should not just relate to the contribution to the Treasury funds, other benefits should also be considered”. With basically no spectrum being available for private LTE/5G services in the populated centres of Australia there has been little development or education on the potential for productivity gains that are possible.



9. Do you have any views on the state of competition in the relevant downstream markets discussed by the ACCC?

We know from experience that the public carriers will seek to maximise the amount of spectrum they hold under license, this is a pure competitive play in many instances and between the carriers this is understandable. The main issue comes up when these well resourced organisations have the funds to take up large allocations of spectrum in the remote areas with only a very small outlay on licensing, to compete with their peers is fine, but to take up the spectrum and so prevent other industries from gaining the benefits of wireless broadband for their particular industry or location it then becomes anti-competitive.

The reaction from the public carriers is that they will provide the services for the client, or alternatively they might permit sub-licensing of their spectrum if they deem the location and/or usage does not meet their investment criteria. Experience from some in our industry has shown that requests for sub-licensing were met with quoted licence access fees that were unrealistic, again anti-competitive behaviour in effect.

It must be recognised that Local Area wireless Broadband (LA-WBB) is a totally different market to Wide Area Wireless Broadband (WA-WBB) with different investment criteria, different coverage requirements and often different resilience and latency requirements. To judge the needs of LA-WBB under the same guidelines as WA-WBB is simply choosing to avoid the differences in needs and benefits from both, one may meet some of the requirements for the other but may not satisfactorily give the required outcome.

10. Are there any other markets that you consider relevant? How would the allocation of spectrum in the 3.4–4.0 GHz band in remote areas impact competition and investment in these markets?

We believe that our responses to previous questions have outlined our thoughts in this area.

11. To what extent, if any, would licence duration impact competition and investment in these markets?

If the entire spectrum available was permitted to be auctioned under spectrum licence conditions, it would then preclude any investment in private LTE/5G services for industry in those areas. Competition between the carriers would be the same as in other areas, although if only one carrier was able to take up the full spectrum available it would border on anti-competitive. The real risk is that the cost of licensing in those areas is only a very small fraction of the cost in the major population centres, a large organisation like a public carrier could simply take up the spectrum licence and then totally ignore the areas, the cost to do this would be infinitesimal in their operating costs.

The result for the Australian GDP would be much more if private industry has no access to install their own private networks and gain the productivity increases that feed our economy. Licence Duration is a key aspect, private enterprise seeks a return on investment as well as productivity/efficiency gains.

12. For an industrial end-user in a remote area, are the deployment models substitutable? That is, would wide area wireless broadband be substitutable for local area wireless broadband? Would these services be substitutable for private LTE, or 5G networks?

Neither wide-area wireless broadband under the present configuration for commercial public carriers networks, nor Wi-Fi in any of its present forms provide a suitable alternative for dedicated private LTE/5G networks. The reasons are quite simple –

- Wide area WBB is designed to meet the requirements of many consumer users and the network reliability and power back-up is designed to meet the most common requirement, this means that resilience of the networks is built to a price and not to a guaranteed performance level. In basic terms it means that overall availability of the network is designed to be around 95% as an acceptable standard, most users are happy with that level. For a business-critical user that 95% design level means that for 5% of the time (just over 2000 minutes per month) and over 5% of the indicated coverage area, the system is not guaranteed to operate. Our response to question 1 gives an indication of the potential cost to a business for service interruptions of much less than this, it would be crippling for any business to try and run-on service criteria such as this.
- With Wi-Fi the services could run to an extent, however, it would require very careful control of devices in the operational area as Wi-Fi is an open access technology so the more devices on a network the slower the performance of the data transfers. In addition, the coverage from each Wi-Fi node is quite small in a geographic context and there would need to be continuous monitoring of coverage of operating areas and addition nodes added as the business changes its operating footprint. The fact that it is an open protocol technology and operates in licence-free spectrum means that the user organisation has little or no control over the network access and operations.
- There is some technology such as IOT, Sensors, NB-IOT and others that require data from a network of networks where the appropriate technology is installed. Enterprise benefits with alignment to global technology options to lower the cost of entry.

13. Do you consider that substitutable spectrum exists for the 3.4–4.0 GHz band in remote areas to enable the provision of services in the relevant downstream markets? If so, what spectrum do you consider to be a substitute?

There is no other suitable spectrum available currently, ALL the other options are already licensed under spectrum licensing formats as parts of large spectrum blocks covering very large geographic areas. Suggestions by the ACMA that mmWave spectrum will become available might provide some alternatives, however, at this stage equipment is not readily available and because it is still being developed for commercial use it is much more expensive than equivalent mid-band spectrum alternatives. Secondly, the physics of the mmWave spectrum are such that coverage of systems at those frequencies will be dramatically less than the 3.4 – 4 GHz mid-band spectrum, so not only will the alternative equipment cost much more, there will need to be more equipment to provide similar coverage footprints. The above will mean the cost differential between mid-band spectrum and mmWave spectrum will be in the multiples, not marginally more expensive.



14. Does the availability of substitutable spectrum differ within the remote area? Are there areas within the remote area, where no substitutable spectrum exists?

Our response to the above question applies again, at this stage there is NO suitable alternative spectrum available.

15. Should the ACCC take into account the availability of spectrum in the 1800 MHz band in remote areas when assessing the need for allocation limits? If so, how?

We would agree that there should be consideration of this other spectrum when looking at the situation with the public carriers, however, in general terms there is not suitable spectrum available for systems such as we are outlining for private LTE/5G systems.

16. Do you consider that there is a risk that a single party may seek to acquire the entire, or majority, of spectrum available in any given areas? Please provide reasons and evidence for your views.

We would think that there is a degree of risk, because of the relatively low cost of spectrum in these remote areas any of the major players in the WBB arena could easily afford to just pay a licence fee for the whole amount of spectrum and not have any financial incentive to utilise it, basically keep it locked away so no other organisations would have access and be then able to control access, service levels and pricing.

17. Do you think that allocation limits are necessary for the 3.4–4.0 GHz band allocation in remote areas? Relevantly, would allocation limits promote competition and encourage investment in the relevant markets?

The whole thrust of this response is to try and educate the ACCC in understanding that competition does not just exist between the public carriers, there are other industries and other needs that are not in direct competition and should not be compared as such. We would contend that allocation limits should only be considered in relation to the major part of the spectrum under discussion with a guarantee that some spectrum segments remain available for allocation to smaller users for LA-WBB as a business efficiency investment. If 20% of the band were withheld from allocation the other 80% could then be allocated to spectrum licensing options, but probably with the proviso that no more than 60% of that available spectrum could be held by one licensee to ensure competition remains.

18. If so, what do you think the appropriate allocation limits should be? Do you think different allocation limits should apply to different geographic areas within the remote area?

Although we do not have any set parameters in mind, we would suggest that if 20% of the spectrum were held for apparatus licensing that would accommodate multiple private networks at any given location, with the limit on the remaining spectrum being that no more than 50% of the band being under one licence. Even from a technology perspective, with that amount of spectrum and the limited number of actual users in the area, there would be no technical reason to allocate all of the spectrum to one user. With this amount of spectrum the only reason for any organisation to licence the total amount would be to stop other organisations having access.



19. How long do you think any allocation limits should apply for?

We would suggest for a minimum of five years as it will take that long for potential users of private LTE/5G systems to develop the business cases to justify the investment, keeping in mind that the need for spectrum isn't considered until well down the track of preparing and evaluating the business case. Private LTE/5G networks are developed on business efficiency and are NOT developed on the availability of spectrum

20. Are there other factors that the ACCC should consider in assessing the possible allocation limits to apply?

We would suggest the underlying theme of this submission gives several alternatives that should be considered, with the primary one being that spectrum is a part of a private LTE/5G network, but it is not the initial investment consideration.

In closing we believe that it is important for the ACCC to take a step back from the traditional view of wireless broadband and the spectrum allocation methods that have applied until now. The world is beginning to see dramatic changes in WBB usage and systems like the CBRS in the United States where multiple systems operate on licence-free spectrum are bringing new product developments and applications to market. For the Australian economy to gain the benefits there must be suitable spectrum available and it must be accessible to all market sectors, by continuing to adhere to historical spectrum allocation methods will limit the ability for this to happen. The ACMA query on whether limits should apply to spectrum allocation highlights the fact that they would consider a bulk spectrum allocation on a 'Fire sale' mentality.

Yours sincerely,

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