

**Australian Communications and Media
Authority's (ACMA)**

Spectrum sharing

Overview and new approaches

Information Paper

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Response by Pivotel

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1. Introduction

- 1.1 Pivotal is pleased to provide a response to the Australian Communications and Media Authority (ACMA) discussion paper on spectrum sharing.
- 1.2 The Pivotal group comprises Pivotal Group Pty Limited and its wholly owned subsidiaries including Pivotal Satellite Pty Limited, Pivotal Mobile Pty Limited and Pivotal Communications Pty Limited (together "Pivotal").
- 1.3 Pivotal operates a mobile and satellite telecommunications network pursuant to a carrier licence issued by the Australian Communications and Media Authority in accordance with the Telecommunications Act 1997 (Cth) (Telco Act). It has points of interconnect in the Australian major capital cities and points of interconnect internationally in Auckland, Amsterdam, Los Angeles and New York.
- 1.4 Pivotal maintains a mobile carrier license and operates ground infrastructure in Australia, making it the fourth mobile carrier in the country. It is the only Australian carrier with direct connection to all four major mobile satellite networks: Iridium, Inmarsat, Thuraya and Globalstar. Pivotal is also a registered satellite service provider in New Zealand.
- 1.5 The company's suite of satellite and mobile technologies enable remote connectivity via satellite phones, satellite data modems, personnel and asset trackers, docking kits, machine to machine data terminals and specialist maritime communication.
- 1.6 Pivotal's 4G mobile network, EcoSphere®, extends its carrier network to deliver complementary terrestrial wireless services to rural and remote Australians. EcoSphere® is an innovative low-cost purpose-built cellular network to bring the digital economy and IoT to the bush. Using innovative small cell technology and a unique network architecture ecoSphere® can cost effectively delivery wide area cellular and IoT coverage to mining, agriculture and pastoral properties using satellite or terrestrial backhaul complemented by satellite point to point IoT and high-speed data services.
- 1.7 Pivotal is currently building two EcoSphere® networks totalling 16 base stations in Western Australia as part of a DPIRD co-funded initiative between Pivotal and the West Australian Government with strong local community advocacy and support in the Mt Barker and Wickepin regions of WA. These networks are planned to be commercially operational in Q4 2019,

2. Pivotel's General Comments

- 2.1 As highlighted in the ACMA's 'Spectrum sharing' information paper, spectrum is an increasingly scarce and finite resource. Pivotel welcomes the opportunity to comment on opportunities for optimising access to this critical resource for providing effective communication services for all Australians.
- 2.2 As highlighted in the introduction, Pivotel operates both a satellite and mobile network. Access to relevant spectrum is critical for both services and Pivotel has met with the ACMA on a number of occasions to discuss spectrum access and possible alternative approaches.
- 2.3 In this submission Pivotel will focus primarily on access to suitable spectrum for its mobile operations. EcoSphere® is designed to build small cell, low power, mobile sites in regional and remote locations specifically targeting areas that are not covered by the three existing large operators. The area of Australia's landmass that does not have access to mobile coverage has been quoted as 68%.
- 2.4 It is well known the most appropriate spectrum for covering regional and remote Australia (RRA) with GSMA standardised mobile technology is in the sub 1GHz range, specifically 700MHz, 850MHz, 900MHz bands. Unfortunately, these bands have all been licensed on a national basis and are currently held by the incumbent operators (and TPG).
- 2.5 Pivotel has a commercial arrangement in place with VHA to access their spectrum in places where they do not require access. Whilst this arrangement is beneficial and somewhat supports Pivotel's ambitions in providing place based solutions to specific user needs, it is not without its challenges some of which has been discussed in our private meetings with the ACMA.
- 2.6 Pivotel therefore advocates for a standardised industry wide approach to spectrum sharing where there is more certainty regarding access and usage of relevant spectrum.
- 2.7 The ACMA may be aware of the recent Regional Connectivity Program (RCP) whereby the Federal Government has made \$60m in funding available where the objective of the Regional Connectivity Program is to use a 'place-based' approach to target investment to provide economic opportunities and enable full participation in the digital economy for regional communities and businesses. This approach will focus on the priorities of a particular location, taking account of bespoke solutions rather than a 'one-size-fits-all' approach¹.
- 2.8 There are many examples of the lack of appropriate connectivity solutions in RRA. In order to support the RCP and address current connectivity challenges, it is essential that operators like Pivotel have access to appropriate spectrum in order to deliver the economic and social benefit that will flow from these targeted solutions.
- 2.9 Other countries are making substantial advances in this regard and its imperative that Australia, with its geographic scale and connectivity shortfall in RRA, takes a lead role in advancing spectrum sharing so that all Australians can benefit and help bridge the digital divide between cities and the bush.

¹ Reference: Regional Connectivity Program, discussion paper, August 2019, Page 4
<https://www.communications.gov.au/have-your-say/regional-connectivity-program>

3. Issues for comment

1. Given current momentum in international markets and opportunities for other sharing models offered by 5G technologies, is it timely to develop a more detailed consideration of spectrum sharing opportunities in Australia?

As highlighted above Pivotal's view is it is very timely to review and consider appropriate spectrum sharing approaches. There is no doubt there are substantial benefits to spectrum sharing as there are large swathes of spectrum under-utilised or not being utilised at all. With respect to mobile services spectrum, this is particularly so in regional and remote Australia (RRA) where:

- Bands 5 and 28 (850 & 700 MHz) are allocated under spectrum licences that cover the whole of the Australian land mass.
- Band 8 (900 MHz) has been allocated pre-spectrum licences as Apparatus Class licences but again provides a nationwide allocation to Telstra, Optus and VHA.
- Pivotal is not aware of any LTE suitable <1 GHz spectrum that can be allocated on a geographic region basis.
- The effect of the above national allocations is that at least 68% of the land mass has spectrum allocated that is not used.

2. Are there recent developments in sharing techniques that industry and the ACMA should be aware of?

In its information paper the ACMA appears to focus primarily on dynamic spectrum access (DSA) techniques and highlights one example where this is being employed in practice, namely the CBRS use case in the US. The CBRS model uses an automated spectrum access system (SAS), fixed sensor network and databases to dynamically manage access hierarchies. This is a relatively costly and complex approach which may be appropriate in certain instances, however Pivotal's view is Australia would initially at least, be better served through the use of a simpler and more cost effective approach.

Pivotal is a strong advocate of the approach taken by Ofcom in the UK in relation to 'Access to licensed mobile spectrum' which recently announced 'a new licensing approach to provide localised access to spectrum bands that can support mobile technology'².

'Where spectrum is licensed on a national basis to mobile network operators and is not being used in every location, we think it is appropriate to enable access to this spectrum for new users. If we agree, following discussion with the incumbent licensee, that the new user is unlikely to interfere with their network or constrain their future plans, we will issue a local access licence.'³

² Ofcom: Enabling wireless innovation through local licensing, Shared access to spectrum supporting mobile technology, 25 July 2019
https://www.ofcom.org.uk/_data/assets/pdf_file/0033/157884/enabling-wireless-innovation-through-local-licensing.pdf

³ Ofcom: Enabling wireless innovation through local licensing, Shared access to spectrum supporting mobile technology, 25 July 2019, page 4, paragraph 1.11
https://www.ofcom.org.uk/_data/assets/pdf_file/0033/157884/enabling-wireless-innovation-through-local-licensing.pdf

Ofcom states they anticipate this spectrum is only likely to be available to share in remote areas (like the 68% of RRA not covered by existing mobile networks) and will make the licences available for 3 years or more. This approach is on a 'use it or lose it' basis and Ofcom has the ability to issue a local access licence whereby the obligation is on the incumbent provider to raise a 'reasonable objection'.

This approach is simple and cost effective and provides access to spectrum in areas where it is not being utilised allowing RRA to benefit from innovative area specific solutions as envisaged under the RCP. We would recommend a longer licence period than the 3 years suggested by Ofcom with a minimum of 5 years and preferably 10 year licences.

Pivotel's view is this is a far simpler approach than a DSA approach however Ofcom also considers it may transition to DSA arrangements at some time in the future.

Pivotel also acknowledges that the current legislative framework prohibits the allocation in the above manner and has discussed this shortcoming with the Department of Communications and the Arts (DoCA) to determine if there are any mechanisms to address this.

In relation to the value of this spectrum Pivotel considers the 'locked up' 68% or more of sub 1 GHz spectrum to have high value in terms of community benefits (especially in agriculture, remote communities and safety), but virtually no economic value, as demonstrated by the lack of use by the incumbents. Given that Australia's largest mobile network claims to reach 32% of the land mass and >99% of the population, with little or no further coverage extension planned (unless co-sponsored by external parties), we can infer that spectrum value is proportionate to population coverage and therefore the value assigned by the incumbent to the remaining spectrum area is minimal.

Finally, Pivotel would support an 'open access' network whereby the incumbent holder of the spectrum would gain access at pre-established commercial rates, providing enhanced coverage without having to invest in its own infrastructure. This would alleviate some concern incumbent spectrum holders may have in relation to a potential future need to extend their network and could be delivered via a national roaming approach or Mobile Operator Core Network (MOCN) technology. A recent example of MOCN technology in New Zealand where Spark, Vodafone and 2degrees have agreed to jointly provide connectivity in rural New Zealand whereby they deploy one Radio Access Network (RAN) to connect to their core network architectures from just one cell site and one set of antennas to operate.⁴

3. What are the (potentially new) use cases that might benefit from secondary or tertiary access to spectrum and who benefits?
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The main use case for sub 1GHz spectrum that Pivotel is aware of and would be interested in is the build of 'defined area or Private LTE' networks. Pivotel's focus is on regional and remote communications to deploy LTE/4G mobile network infrastructure in areas that are not-served or under-served by the main three mobile operators. These 4G services are complemented by satellite services that are able to provide voice and data (including IoT) services to virtually any location in Australia.

⁴ <https://www.thercg.co.nz>

EcoSphere® forms the basis of Pivotal's 'defined area' coverage solutions. It is an innovative, custom designed, fully managed, 4G/ LTE-M and satellite connectivity solution for enterprises operating outside of the cellular network footprint. The focus on LTE is driven by the technology's ability to support both low and high bandwidth use cases, in agriculture, mining, remote towns and communities, tourism sites etc.

EcoSphere® provides for high bandwidth which can support applications like video monitoring and the need to use tablets on and around the farms, mines, etc. This is in addition to the ability to support multiple IoT devices gathering management information. LTE's NB-IoT solutions have been slower to reach the market than the proprietary solutions such as LoRaWAN and Sigfox, but we believe that ultimately the ability to deliver services of all bandwidths through a single technology platform will be the more cost-effective solution overall.

One key advantage of 4G/LTE solutions is that they operate in licensed spectrum bands where the operator has control over interference sources and can therefore predict performance with confidence and with an expectation that it will be maintained over time. In order to facilitate LTE deployments Pivotal needs to access spectrum, preferably in the sub 1GHz bands defined above. This provides the ability to operate over a wider geographic area and service larger areas delivering greater social and economic benefit to specific solutions.

Pivotal operates EcoSphere® at a limited number of sites and is planning to increase the number of services over the coming years. Currently Pivotal has 28 LTE base stations in operation or due to be in operation by the end of 2019 with an anticipated additional 50 base stations by the end of 2020.

<p>4. What are the potential challenges/impediments to the introduction of DSA in Australia—technical, industry capability, licensing and regulatory frameworks?</p>
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On the assumption that a CBRS-like arrangement is being considered for DSA, we consider that the major challenges will be that of agreeing implementation timetables with the tier 1-3 users and the complexity and cost of establishing a SAS. One possible approach might be to implement the system in a limited geographic area before adopting a nationwide approach.

However, Pivotal's view is that a DSA is probably more suited for areas of higher spectrum density where this finite resource is at a premium. Pivotal's major challenge is access to sub 1GHz spectrum in regional areas where, despite not being utilised in approximately 68% of Australia's landmass, there is no straightforward mechanism to gain access to this 'fit for purpose' resource: the propagation advantages of low band (<1 GHz) spectrum are well known and of great benefit in low density environments.

Unavailability of low band spectrum forces the use of high band spectrum resulting in smaller coverage areas and higher costs. This is the case with Pivotal's two agricultural networks in WA co-funded by the WA Government Department of Primary Industry and Regional Development (DPIRD). These networks could have been built more cost effectively had sufficient low band spectrum been available.

5. Facilitating spectrum access (e.g. monitoring, control, reporting, assignment) logically necessitates involvement from both government and industry. Are there any early thoughts on what an appropriate industry/government balance might look like? How might the ACMA facilitate shared spectrum access? How might the ACMA address this?

As mentioned in the response to Question 2 above, Pivotal supports an initial simple approach to spectrum sharing as opposed to a more capital intensive dynamic sharing approach. Whilst this approach still involves a level of coordination and support from relevant stakeholders, Pivotal believes the Ofcom approach will deliver the intended benefits in the short term with minimal overhead. In the future there may be demand for a more dynamic approach especially in more dense urban areas however this can be managed in the short term via the existing spectrum access regime.

Pivotal is primarily concerned with access to mobile spectrum in the sub 1GHz band and supports a 'use it or lose it approach' whereby unused spectrum will become available for 'defined area or Private LTE' network builders. In this case the incumbent operators and owners of the relevant spectrum are the Tier 1 users and the 'defined area or Private LTE' become Tier 2 users. This spectrum should only be allocated to mobile network solutions and as mentioned above Pivotal supports an 'open network' approach whereby all mobile network operators have the potential to access the additional coverage without having to invest themselves and duplicate infrastructure in areas where it is uneconomic to do so.

6. What is the relevance of DSA examples such as the US Citizens Broadband Radio Service (CBRS) arrangements to the Australian spectrum environment? Are there other or lower cost alternatives to help inform access control and assignment systems of incumbent usage in a timely manner?

See response under Question 2 above.

7. Under a multi-tier DSA approach:
- 7.1 Tier 1 (highest priority or incumbent) users would be expected to share spectrum with lower tier users when not being utilised. Are there any specific licensing and/or regulatory arrangements that might incentivise the tier 1 users to release unutilised spectrum for lower-tier access?
- 7.2 Tier 2 and 3 users need to vacate spectrum (regardless of their service type or communication urgency) for tier 1 users to operate seamlessly. Do we see potential services/service types in Australia who would fit the criteria of second or third tier users? What are the incentives to adopt a conditional (lower priority) spectrum than an unconditional (full access) spectrum?

As noted above, Pivotal is of the view that there are other and simpler spectrum sharing options that could be utilized prior to implementing DSA solutions. However, with respect to Question 1.7.1: one way to encourage release by tier 1 users in a DSA regime would be some form of value benefit – perhaps in the form of lower fees or credits that could be used at licence renewal times. Tier 1 users should also be free to negotiate commercial access rights directly with lower tier users all the while understanding that the fallback for lower tier users may be the regulated, managed DSA framework. Regarding Question 1.7.2: any relatively time-agnostic services such as meter reading, OTA firmware upgrades, could accommodate the priority access requirements of a tier 1 user. Store and forward communications might also benefit, particularly if the worst-case prohibited use period were known.

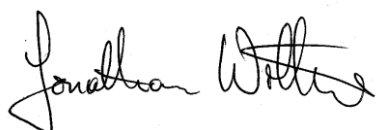
Closing remarks

Pivotel appreciates the opportunity to provide input to the Australian Communications and Media Authority (ACMA) discussion paper on Spectrum sharing. For any questions in relation to this submission please contact:

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Yours sincerely

A handwritten signature in black ink, appearing to read 'Jonathan Withers', with a stylized flourish at the end.

Pivotel Group Pty Limited