



TELSTRA CORPORATION LIMITED

Spectrum Sharing

Overview and new approaches

Public submission

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EXECUTIVE SUMMARY

The global success of mobile services rests on a foundation of exclusively licensed spectrum as it provides the certainty needed for long-term intensive network investment and a high quality of service. In Australia, the spectrum licence construct, with its strong exclusionary rights in favour of the licensee (often described as a property right), is critical for providing the certainty we need to continue to make large investments in mobile network infrastructure and deliver the high quality service that our customers have come to expect and demand.

Insofar as existing spectrum licences are concerned, we make the observation that the rights to exclusively use that spectrum must not be diluted by a regulator subsequently introducing sharing systems that would dynamically allow other users to enter that spectrum. Considering the substantial investments involved, it is paramount that spectrum licensees are able to manage any sharing of their spectrum on their own terms. This is also critical for new allocation and licences in the future that are intended to enable similar large scale investments.

We note that there are pre-existing mechanisms under the Radiocommunications Act to facilitate subleasing (i.e. third-party authorisation) of spectrum licences. If there are requests from third parties to access licensed spectrum, the licensee can consider such requests and if it is in the commercial interest of both parties, access can be arranged through the third-party authorisation mechanism.

While the concept of spectrum sharing is gaining momentum with imminent commercial launches under the Citizens Broadband Radio Service (CBRS) scheme in the US, the actual benefits of dynamic spectrum access (DSA), its economic impact on incumbents and new entrants alike, and its ability to meet user expectations, is currently unproven. We support further exploration of dynamic sharing in Australia, but only after proper cost/benefit analysis and considering the lessons from experiments with sharing in other administrations. Any consideration of spectrum sharing in Australia must also be limited to geographies/frequencies that are not spectrum licensed at present and would not be appropriate for spectrum licensing in the future.



01 Introduction

We welcome the opportunity to provide our comments to the Australian Communications and Media Authority (ACMA) in response to its *Spectrum Sharing, overview and new approaches* (Discussion Paper) consultation. Spectrum underpins delivery of many of the services that we provide our customers. We are committed to providing our customers with world-class services, and for this we depend on the spectrum resource being effectively managed so that we have the flexibility and certainty required to provide services that are reliable, cost effective and use the latest technologies.

Our submission is structured as follows:

- Section 2 outlines the stability and certainty benefits that traditional sharing approaches provide;
- Section 3 outlines our qualified support for new and innovative DSA options; and
- Appendix 1 contains our specific responses to the questions posed in the Discussion Paper.

02 Benefits of traditional sharing approaches

2.1. Traditional sharing approaches enable robust, reliable services

As the consultation observes¹, all access to spectrum is on some form of shared basis, which can broadly be grouped into one of two categories; centrally uncoordinated access (e.g. Wi-Fi, which has technical controls and characteristics to enable sharing without central coordination) and centrally coordinated access. The latter is where licensing and assignment frameworks are developed and optimised to accommodate multiple uses/users within a given frequency range, geographic space and/or time period. Unsurprisingly, the former works well where devices are low power and/or indoors, which enables a finite number of channels to be regularly reused in very close proximity such as neighbouring tenants in multi-storey apartment buildings. On the other hand, the latter works well where high powered transmitters are used in an outdoor setting.

Importantly though, it is only through coordinated access that interference can be successfully managed to a point where it is possible to create robust and reliable services such as satellite-based marine emergency/distress services or mobile networks with the reliability to support essential services such as Triple Zero emergency calls. The delivery of these highly reliable services is only possible because coordinated access to a band manages the risk of interference between legitimate licensed devices in neighbouring geographies or frequencies.

Over the years, a great deal of time and effort has been invested into the various coordination mechanisms such as Radiocommunications Assignment and Licensing Instructions (RALIs) and Radiocommunication Advisory Guidelines (RAGs) to ensure efficient and effective coordination of a proposed device planned to operate within the 'radio-space' of another device. Robust and enduring coordination processes that are well understood by radio device operators actually facilitates sharing because it enables radio planners to analyse candidate deployment sites and select optimal locations and frequencies to maximise radio coverage while minimising interference between parties.

¹ Discussion paper, Page 1



In comparison to traditional sharing, new sharing techniques do not currently guarantee the same level of reliable service. While we see a role for DSA in limited circumstances as discussed in section 3, we agree with the ACMA's assessment that "more broadly, it remains the case that facilitation of spectrum access through the application of traditional techniques will continue to be most appropriate in the majority of circumstances for a long time yet."²

2.2. Traditional sharing approaches enable investment certainty

Many types of radiocommunications services rely on significant capital investment. Examples include satellite services and mobile phone networks where capital investment commences with the research and development to design equipment followed by further capital investment in hardware and its deployment. Entities willing to invest the funding required for these services seek certainty of access and tenure without the risk of interference to their spectrum.

Insofar as existing spectrum licences are concerned, we make the observation that the rights to exclusively use that spectrum must not be diluted by a regulator subsequently introducing sharing systems that would dynamically allow other users to enter that spectrum.

There are pre-existing mechanisms under the Radiocommunications Act (the Act) to facilitate subleasing (e.g. third party authorisation). If there are requests from third parties to access spectrum held under a spectrum licence, the licensee can consider such requests and if it is in their commercial interest, access can be arranged through the third party authorisation mechanism. We have previously proposed to the Department of Communications and the Arts³ that if the Act was amended to enable spectrum and apparatus licensees to sub-licence their spectrum, this would be simpler and more transparent than the existing third party provisions in the Act and would better facilitate a market-led approach to sharing.

The ongoing success of mobile services rests on a foundation of exclusively licensed spectrum as it provides the certainty needed for long-term heavy network investment and high quality service. The spectrum licence construct, with its strong exclusionary rights in favour of the licensee, is critical for providing the certainty we need to make large investments in network infrastructure into the future in order to deliver the high quality service that our customers have come to expect and demand. In regard to future allocations, it is important that exclusive spectrum rights continue to provide the investment certainty required by the industry.

² Discussion paper, page 3

³ submission on the Exposure Draft Bill (28 July 2017) – see:

<https://www.communications.gov.au/sites/g/files/net301/f/submissions/2017-07-28-miller-brian-telstra-submission-spectrum-review-transition-2017-07-28.pdf>



03 New approaches to sharing

3.1. International developments

Generally speaking, we believe licensees are best placed to make decisions about spectrum sharing and this will most likely occur where there is both a commercial incentive and the sharing of spectrum can occur without harmful interference. We note the ACMA's intention to continue monitoring international regulatory and technical developments in DSA and encourage the ACMA to do so.

To date, international developments have been few and far between, reflecting the “technology limitations, spectrum availability factors and an inability for those models to meet user expectations/requirements”⁴. While the United States and some European countries have trialled spectrum sharing techniques in a limited number of bands, real world experience at any kind of scale is limited at best. For example, after several years of trials and highly debated revisions to its rules, with some mobile operators continuing to express reservations, the FCC has only just authorized the first Spectrum Access Systems (SAS) providers for the CBRS to enable commercial deployments beginning in September 2019⁵. Similarly, in Europe, licensed shared access regimes are only now exiting their trial phases and entering the commercial deployment phase.⁶

The actual benefits of DSA, its economic impact on incumbents and new entrants alike, and its ability to meet user expectations, remains to be seen. Australia should maximise the benefit of lessons from other regulators that are experimenting with sharing, while having regard to the differences in our regulatory system and market. The imminent commercial use of sharing techniques in the United States and Europe do offer a good opportunity for the ACMA to gather real world data on the benefits, pitfalls and effectiveness of dynamic spectrum sharing.

3.2. Augmenting base-load capacity

There are two use cases for sharing: the first is to use it as a base service and the second is to augment a base level of service in order to improve and provide additional capacity.

As a base service, DSA is unlikely to deliver the desired customer experience or certainty for investment (when continuity of service and a minimum level of performance is important). From the perspective of a lower-tier spectrum user in a sharing scheme, there is ongoing risk of disruption of service to their customers (assuming it is the only spectrum in use), degrading customer experience. There would be real concerns with being able to provide a commercial service that is fit for purpose and delivers on performance representations, compliant with the Australian Consumer Law. From the perspective of a higher-tier user wishing to roll out services such as a mobile network, investment certainty is undermined as the potential difficulty in having to uproot opportunistic lower-tier users (possibly with established customer bases) creates anxiety about rollout delays regardless of the strength of the legal rights to the spectrum.

Sharing makes more sense when spectrum that is not ordinarily available (e.g. spectrum used itinerantly for defence purposes) is made available through a dynamic sharing scheme to augment the capability of service providers with existing spectrum holdings. During periods when the spectrum is not used by

⁴ Discussion paper, page 8

⁵ <https://www.natlawreview.com/article/35-ghz-cbrs-band-becomes-reality>

⁶ <https://www.etsi.org/newsroom/news/1625-2019-07-etsi-specifications-on-licensed-shared-spectrum-successfully-implemented-in-the-netherlands-for-the-entertainment-industry>



higher-tier owners it can be used by lower tier providers to enhance the experience offered to their customers, and at other times their existing spectrum holdings can ensure continuity of service.

We note that temporal sharing relies on unused spectrum space ('white space'). There is minimal opportunity for sharing heavily utilised licensed spectrum where there is no or limited amount of spectrum to share. For example, in case of spectrum licensed to mobile services in populated areas, the spectrum is already heavily utilised on a 24x7 basis.

We support further exploration of dynamic sharing in Australia, but only after proper cost/benefit analysis and considering the lessons from experiments with sharing in other administrations. Any consideration of spectrum sharing in Australia must also be limited to geographies/frequencies that are not spectrum licensed at present and would not be appropriate for spectrum licensing in the future.

3.3. Cost/benefit analysis

As part of the consideration for the introduction of DSA, we strongly recommend a cost-benefit analysis is performed. Among other things, the administrative process, licence types and updates to IT systems that will have to be developed to support a DSA scheme are likely to incur substantial initial cost. For example, depending on how the solution is developed, it may have ongoing administrative costs or ongoing maintenance of an environmental sensing capability (ESC) as required for the CBRS scheme in the United States. It would be prudent to establish that demand for DSA services justifies the initial and ongoing costs, and one pragmatic way to ensure this would be to assume cost-recovery for the development of the necessary processes and systems from the beneficiaries of the scheme, for example through licence fees. Initially though, we recommend sharing be trialled in a sandbox environment (for example, the ACMA could conduct trials in bands that have limited or no impact on ongoing commercial services) to minimise the costs.

3.4. Challenges and impediments to DSA implementation

DSA poses significant challenges. As mentioned in section 3.3, new administrative process, licence types and IT systems will have to be developed to support a DSA scheme. Furthermore, DSA requires higher technical capability of devices, integrity of databases and timely data updates in order to be effective.

For example, as Australia seeks to push the limits in terms of the use cases, locations and bands where spectrum can be shared, disputes (or contention events) will inevitably arise between parties attempting to share spectrum in these new, innovative ways. These disputes will require resolution, and DSA systems will need to have the ability to record and track sufficient information to be capable of supporting mediation and dispute resolution activities.

Considering commercial deployments of dynamic spectrum sharing regimes are at infancy, the viability of the systems to efficiently manage spectrum use and avoid interference on a significant scale remains to be seen.



ATTACHMENT A: Answers to specific questions

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?***

While we see a role for non-traditional sharing schemes in limited circumstances, more broadly speaking we see traditional techniques as being the most appropriate mechanism for spectrum access in the majority of circumstances for the near future.

It would be prudent to establish that demand for DSA services justifies the initial and ongoing costs. Initially though, we recommend sharing be trialled in a sandbox environment (for example, the ACMA could conduct trials in bands that have limited or no impact on ongoing commercial services) to minimise the costs. Please refer to section 3 for further details.

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

We are not aware of any that are not already discussed in the Discussion Paper.

3. ***What are the (potentially new) use cases that might benefit from secondary or tertiary access to spectrum and who benefits?***

We have no comment on any specific use cases.

We believe Australia should adopt a wait-and-see approach. The imminent commercial use of sharing techniques in the United States and Europe do offer a good opportunity for the ACMA to gather real world data on the benefits, pitfalls and effectiveness of dynamic spectrum sharing.

4. ***What are the potential challenges/impediments to the introduction of DSA in Australia—technical, industry capability, licensing and regulatory frameworks?***

Please refer to section 3.4.

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?***

We have no specific comments to make on this question. Please refer to the body of our submission for more details.

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?***

In any sort of DSA, the incumbent use needs to be predicted or measured in some way. For example, in the case of the CBRS example, sensor networks are deployed to provide real-time information on tier 1 use and inform the access controller accordingly. While this has been



deemed appropriate in the US environment, considering the relatively smaller Australian market, the infrastructure cost may not be justifiable.

As part of the consideration for the introduction of DSA, we strongly recommend a cost-benefit analysis is performed.

We are not aware of any other or lower cost alternatives. For further comments please refer to section 3.3.

7. Under a multi-tier DSA approach:

- > **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?**
- > **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?**

We have no specific comments to make on this question. Please refer to the body of our submission for more details.