Motorola Solutions’ response to the ACMA’s discussion paper:

Planning of the 3700–4200 MHz band

Discussion paper

**Context**

Within Australia and internationally Motorola Solutions (Motorola) is a major supplier of radiocommunications equipment and services to governments, emergency services organisations, the mining industry, the energy industry, manufacturing sectors, transportation, tourism, telecommunications carriers and telecommunications service providers.

Motorola has been a leader in the field of two way radiocommunications for 85 years, excelling in the research and development, production, marketing and efficient operation of radiocommunications equipment and systems all over the world. Motorola’s brand is indeed synonymous with high quality radiocommunication products and services. As a world-wide operation with close operator links Motorola believes that its accumulated experience qualifies it well to comment on this discussion paper.

Motorola is a strong supporter of standards based technology and spectrum harmonisation with Australia’s major markets in Asia, Europe and the Americas. This support helps to ensure that up-to-date radiocommunications equipment is readily available. Use of standards based technology and spectrum harmonisation with other major markets reduces costs for manufacturers and service providers, maximises competition, and results in lower costs for consumers.

The primary commercial interest of Motorola is in the provision of solutions encompassing the design, manufacture and supply of communications equipment, systems and services for the Public safety agencies and other land mobile users. Motorola knows that issues relating to the allocation of radio frequency spectrum impact directly on the demand for its communications products and the issues discussed here are particularly relevant.

Radiocommunications are essential for agencies involved in the defence or national security of Australia, law enforcement or the provision of emergency services. Two-way radio also provides the communication infrastructure for a wide range of industries ranging from agriculture, mining & construction through to transportation & hospitality.

Motorola thanks the ACMA for the opportunity to comment on discussion paper on the “Planning of the 3700–4200 MHz band”. While some legacy C-band services are projected to extend into the future with a services to many industries and communities we note that many of these are unlicensed in Australia and that the number of licensed services is comparatively low for a population exceeding 20 million.

Motorola encourages ACMA to offer parts of 3700-4200 MHz for localized broadband systems using highly innovative sharing techniques such as CBRS. Similar approaches have recently been followed in Germany and UK. We believe that these approaches will greatly improve enterprise, industrial, and productivity levels. Indeed, many 5G (as well as 4G) services can be offered in these bands on shared basis with Fixed and Fixed satellite services. One only has to look at the success of the WiFi shared bands and ecosystem worldwide to see the promise of shared bands and localized uses of spectrum. Similar successes can be had in locally licensed and shared use of these bands.

Shared spectrum can offer localized broadband systems unique capabilities through highly customized levels of coverage, capacity and security that nationwide or public cellular systems cannot readily offer. By offering a part of 3700-4200 MHz (in particular 3700-3800 MHz) for industrial and enterprise use, ACMA will be wisely increasing nationwide spectrum utilization while improving productivity and connectivity for thousands of entities and users.

Motorola notes the changes in use globally, with the most common being a re-farming of the band for mobile and associated services such as Fixed Wireless Access (FWA). A revaluation of this segment of the band is timely and an opportunity to evaluate the value of new services and measures to either grandfather or phase out legacy FSS is also needed.

Motorola notes that there is currently no spectrum available for private networks using CBRS technology. This band would appear to present a good option for these technologies to provide services and systems in areas where there are no alternatives. Industries which would benefit from this approach would be mine-sites, large integrated agricultural enterprises and any other application operating over a moderately large area.

CBRS offers many advantages for Australia’s industrial and economic development:

1. INCREASED ACCESSIBILITY: CBRS and its increased accessibility is a game-changer for business enterprises. Currently, there is no publicly available broadband spectrum for use by private businesses. As a result, some organizations looking for private broadband coverage are required to lease through carriers – often requiring a multi-million dollar system. Other businesses turn to public LTE or WiFi to address their business data needs. While this has enabled workers to accomplish tasks on their mobile devices that previously required a computer or their physical presence on the job, network congestion, weak signals in certain locations and security remain critical issues.
2. CBRS introduces publicly available broadband spectrum for the first time – significantly lowering the barrier to entry for business enterprises. And unlike previous systems, it does not require an organization to purchase spectrum making it a much more cost-competitive option for broadband coverage. Organizations are able to design their own coverage, customizing the network to meet their unique needs. The system can easily be expanded or downsized to evolve with their business.
3. MORE EFFICIENCY: The economics of CBRS technology are more efficient than those of distributed antenna systems – networks of antenna nodes that provide wireless service within a geographic area or structure. In addition, the speed and consistency of service are considered potentially “more reliable than Wi-Fi”. While WiFi has revolutionized wireless networking, it does have its drawbacks. WiFi coverage and capacity can be limited, access points can be finicky and sign-on processes can be tedious. Ultimately, WiFi wasn’t designed for complex commercial operations. CBRS overcomes these limitations and provides a more efficient option for large commercial enterprises like airports and factories – providing comprehensive on-site coverage that can blanket every corner of your operation.
4. GROUND-BREAKING ADVANCEMENT: But perhaps the most ground-breaking advancement of this newly introduced access to private broadband spectrum is the ability to employ highly-reliable LTE networks that support the growing number of IoT devices. These devices, including smart meters, real-time surveillance systems and worker safety monitoring sensors, are increasingly becoming critical parts of business operations and they require constant, reliable broadband access. CBRS provides this, enabling organizations to embrace the potential of IoT.

Ultimately, CBRS makes it possible to create an affordable, private data network at a lower cost and without the reliance on a wireless carrier. Looking forward, CBRS and the infinite capabilities it will unlock will help to drive automation, workforce productivity, efficiency and safety – all critical concerns for today’s forward-looking organizations.

Motorola therefore supports the ‘alternative’ arrangements whereby an ‘area licence’ could be issued to support a private LTE network over such areas. This could be in incumbent spectrum where Dynamic Spectrum Access is possible or as a primary service in unencumbered geographical areas.

Our detailed responses are enclosed

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**Purpose and Scope**

In undertaking an analysis of the band the ACMA should take into account the age of FSS services and alternative bands now available to support these. The ACMA should also investigate the protection of these services. The 300km often mentioned by FSS operators is excessive. With terrain and clutter Motorola believe coordination could be achieved in many cases over a few kilometres. With FS systems these could be moved to a higher band over time or coordinated with. A ‘service value’ model could be used to determine whether an FS (or FSS) service is moved. The high value of a network to a large mine-site should be compared with the moderate or low value delivered by a single FS or FSS service.

Motorola encourages ACMA to offer parts of 3700-4200 MHz for localized broadband systems using highly innovative sharing techniques such as CBRS. Similar approaches have recently been followed in Germany and UK. We believe that these approaches will greatly improve enterprise, industrial, and productivity levels. Indeed, many 5G (as well as 4G) services can be offered in these bands on shared basis with Fixed and Fixed satellite services. One only has to look at the success of the WiFi shared bands and ecosystem worldwide to see the promise of shared bands and localized uses of spectrum. Similar successes can be had in locally licensed and shared use of these bands.

Shared spectrum can offer localized broadband systems unique capabilities through highly customized levels of coverage, capacity and security that public cellular systems cannot readily offer. By offering a part of 3700-4200 MHz (in particular 3700-3800 MHz) for industrial and enterprise use, ACMA will be wisely increasing nationwide spectrum utilization while improving productivity and connectivity for thousands of entities and users.

**Existing Licensing Regimes**

The three types of licence available today include the spectrum licence, apparatus licence and class licence. Spectrum Licences, with their rigid technical frameworks and long life represent a massive constraint to other services in an otherwise dynamic and demanding era of highly innovative developments.

Motorola believes that class license or license exempt is suitable for private broadband networks to support new services such as FWA, Private LTE and CBRS. As an alternative, recently discussed ‘area wide licence’ could also be an option.

**Current Use and Arrangements**

The current use of the band would appear to be mostly FSS and FS. There is also the ongoing issue of unlicensed FSS receivers, however Motorola does not believe these should be taken into account.

Both FS and FSS services seem reasonably sparse and as expected clustering around cities. With the exception of Sydney the FSS represent the usual C band transponders. Sydney seems to not represent this and may be an anomaly in how the service has been licensed.

It may be possible to develop coordination arrangements that provide these services some protection into the future by reducing coordination distances and protection levels however in an area such as a mine-site this may come down to ‘site management’ where the operator decides to relocate some services to allow a private network to use the spectrum.

**Domestic Considerations**

As large enterprises automate the demand for high capacity cellular services increases. These will provide high value services to these industries and in themselves be economically significant. Thus the legacy systems should be analysed and evaluate to ensure they are not blocking innovation through burdensome coordination requirement and, particularly in the case of fixed links, are actually still being used.

**Issues for comment**

The following responses are to the itemised questions posed in the ACMA in the Discussion Paper.

Q1. Are there any other international developments in the 3700–4200 MHz band that the ACMA should be aware of? Because of symmetry, the complementary band (uplink) in C-band is 5900 – 6400 MHz. There are proposals for this latter band which should be evaluated, as this band would no doubt affect the downlink in 3700 – 4200 MHz band.

**Answer:** The German regulator BNetzA has recently decided to implement the technical regulation of the 3700 – 3800 MHz spectrum: <http://www.bnetza.de/lokalesbreitband>

Also Sweden has followed this route by a submission of a rulemaking for localized (“municipal”) 5G/LTE NR in the band 3700 – 3800 MHz. This is envisioned to cover the growing demand for high reliability and flexibility in the communications demand for inter alia “Industry 4.0” and other private enterprise requirements and is partly inspired by the FCC in USA which licensed the Citizens Broadband Radio Service (CBRS) in a 150 MHz wide band of the 3.5 GHz band (3550 MHz to 3700 MHz), which is slightly lower than the slot 3700 – 3800 MHz.

In the United States, some of this spectrum will continue to be used by the United States government for radar systems, but will be available for others, where not needed by the Navy. In 2017, the Federal Communications Commission (FCC) completed a process to establish rules for use of this band for CBRS to deploy 5G mobile networks without having to acquire spectrum licenses.

MSI is of the opinion, that ACMA, as part of its new regulatory spectrum provisions, should consider this opportunity for the future vertical markets, in fact we take the view, that ACMA should investigate the entire C-Band expansion 3700-4200 MHz for this market, on a unlicensed basis. Our investigation show, that some chip-manufacturers already today cover this expanded range for a smooth and fast availability of products.

2. What are the future requirements of point-to-point links and FSS earth stations in the 3700–4200 MHz band? Does this differ by geographical area and/or segment of the band?

**Answer:** Motorola has no comment on this other than to note that there are comparatively a low number of FSS services in the band and that there are alternative bands for both FSS and FS.

3. If licensed point-to-point links and FSS earth stations are affected by replanning activities in the 3700–4200 MHz band, what alternative deployment options could be considered?

**Answer:** FSS have a number of bands to choose from (Ku, Ka, Q, V) however if coordination requirements were more reasonable the decision could be either a site management decision or resolved via the market.

FS may be relocated to other bands or to fibre in an area where a private network is deployed.

4. In the event arrangements are made for new services in the 3700–4200 MHz band, do stakeholders have any comments on the ACMA’s proposal to maintain the existing arrangements for Radiodetermination and LIPD devices, and the existing policy around TVRO systems?

Answer: Motorola support the ACMA’s proposals for Radiodetermination and LIPD systems but believe unlicensed TVRO systems should not be protected or considered in the planning process.

5. What are the future requirements for WBB services in the 3700–4200 MHz band and what arrangements should be considered? Does this differ by geographical area and/or segment of the band? For fixed WBB this is in the same category as P-P with regard to coordination. Rural and remote areas are most likely.

Answer: Motorola has outlined the future of private LTE networks above. Where these would be deployed depends on the industries themselves but notes in many cases these would be in regional or remote areas.

6. What WBB deployment scenarios should be considered for the 3700–4200 MHz band? Should use be limited to one scenario or should more flexible arrangements be implemented?

Answer: There are likely to be a number of scenarios for the deployment of ‘WBB’ however these could be accommodated through the flexible used of area wide licences.

7. What is the current and planned availability of fixed and mobile WBB equipment in the 3700–4200 MHz band?

Answer: Motorola produce equipment for a lower band in the US market which could be modified for use in this band.

8. Is there interest in the use of other new service types in the 3700–4200 MHz band?

Answer: ACMA has addressed the technologies that could be supported in this band.

9. What services/applications should be accommodated in the 3700–4200 MHz band? In the 3700-3800 MHz band, the new services mentioned in the paper. It should be possible to also introduce new FSS earth stations, subject to coordination with terrestrial services, including WBB if that is introduced.

Answer: Private LTE via CBRS technologies and WBB (FWA) are the best uses for this band.

CBRS provides many benefits to the Australian economy as summarised below:

* INCREASED ACCESSIBILITY: CBRS and its increased accessibility is a game-changer for business enterprises. Currently, there is no publicly available broadband spectrum for use by private businesses. As a result, some organizations looking for private broadband coverage are required to lease through carriers – often requiring a multi-million dollar system. Other businesses turn to public LTE or WiFi to address their business data needs. While this has enabled workers to accomplish tasks on their mobile devices that previously required a computer or their physical presence on the job, network congestion, weak signals in certain locations and security remain critical issues.
* CBRS introduces publicly available broadband spectrum for the first time – significantly lowering the barrier to entry for business enterprises. And unlike previous systems, it does not require an organization to purchase spectrum making it a much more cost-competitive option for broadband coverage. Organizations are able to design their own coverage, customizing the network to meet their unique needs. The system can easily be expanded or downsized to evolve with their business.
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* GROUND-BREAKING ADVANCEMENT: But perhaps the most ground-breaking advancement of this newly introduced access to private broadband spectrum is the ability to employ highly-reliable LTE networks that support the growing number of IoT devices. These devices, including smart meters, real-time surveillance systems and worker safety monitoring sensors, are increasingly becoming critical parts of business operations and they require constant, reliable broadband access. CBRS provides this, enabling organizations to embrace the potential of IoT.
* Ultimately, CBRS makes it possible to create an affordable, private data network at a lower cost and without the reliance on a wireless carrier. Looking forward, CBRS and the infinite capabilities it will unlock will help to drive automation, workforce productivity, efficiency and safety – all critical concerns for today’s forward-looking organizations.

10. Which frequencies ranges should be made available for these services/applications? 3700-3800 MHz .In addition, the whole of the band 3700-4200 MHz should remain available for the FSS.

Answer: The ability to use the whole 3700 – 4200 MHz would allow frequency to be used as a coordination tool.

11. Which geographic areas should be made available for these services/applications?

Answer: Area wide as required.

12. On what basis should access be provided? Should access be granted on an exclusive or shared basis, on a coordinated or uncoordinated basis, et cetera?

Answer: For high value services exclusive access would be best. However through the use of DSA (CBRS) it would be possible for multiple systems to operate in any one area.

13. What licensing mechanisms are appropriate (spectrum, apparatus or class licensing)?

Answer: Area wide licensing.

14. If arrangements for WBB specifically are implemented in the 3700–4200 MHz band, are the proposed interference management techniques with services in the 3.6 GHz band suitable? Are any other techniques proposed? Are there any other compatibility issues with the 3.6 GHz band the ACMA should consider?

Answer: CBRS would allow multiple high value systems to operate via area wide licenses. In the case of coordination with FS and FSS the current conservative coordination requirements need to be revisited to allow new systems to develop.

15. Should the ACMA consider extending existing apparatus and spectrum licence arrangements in the 3.6 GHz band into the 3700–3800 MHz band or another segment of the 3700–4200 MHz band?

Answer: No. Spectrum licences are restrictive and act to block innovation.

16. Is there any additional information available that would assist the ACMA in assessing compatibly of potential new WBB services in the 3700–4200 MHz band with WAIC and radio altimeter systems in the 4200–4400 MHz band?

Answer: No comment.