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September 12, 2019

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**Re: Comments and Views of Lockheed Martin – Australia Pty Ltd on ACMA Consultation No. IFC 27/2019, Planning of the 3700-4200 MHz band – Discussion Paper**

Lockheed Martin Corporation, on behalf of Lockheed Martin – Australia Pty Ltd (“LMA”), provides these comments in connection with the Australia Communications and Media Authority (“ACMA”) Consultation No. IFC 27/2019 on Planning of the 3700-4200 MHz band.

Lockheed Martin is a global leader in the development of satellite technologies, both as a manufacturer of satellite buses and designer and developer of a variety of sophisticated payloads for both government and commercial customers. Lockheed Martin’s space engagement encompasses global communications and global positioning, deep space exploration, weather and remote sensing, military space, national security, and advanced technology development. Further, LMA operates an earth station complex at Uralla, New South Wales that supports In-Orbit Testing (IOT), Transfer Orbit Satellite Services (TOSS), and Telemetry, Tracking, and Commanding (TT&C) for recently-launched and in-orbit satellites from around the world.

At its Uralla, New South Wales earth station complex, LMA utilizes two 14.2 meter earth station antennas that operate on frequencies that include the 3700-4200 MHz fixed-satellite service (FSS) receive band. In this frequency band, LMA currently is authorized to operate under licenses 1988277/1, 10679223/1, and 10682559/1.[[1]](#footnote-1) Since its inception nearly 20 years ago, LMA’s Uralla facility has been a critical component part of a global network of earth station facilities used to control satellites through launch and transfer orbit to the satellites’ intended locations in the geostationary arc. LMA’s Uralla facility is essential to providing communications during a satellite’s initial in-orbit testing, which is a necessary technical and contractual step prior to the owner/operator seeking to use the satellite to provide services for which it is intended, and the Uralla site’s location in Australia and the 3700-4200 MHz band FSS capability it possesses enable LMA to provide support to satellite missions from commercial operators around the world.

In order to support its TOSS and IOT operations, LMA’s Uralla earth station facility needs continued, reliable, and predictable access to the 3700-4200 MHz band. In its 3.6 GHz proceeding two years ago, LMA highlighted these requirements to ensure the viability and reliability of the Uralla facility, by ensuring that the spectrum access was not adversely impacted in 3600-3700 MHz for TT&C, IOT, and TOSS applications in the FSS. There, LMA noted that the TOSS requirement in particular makes the protection requirements at all azimuths and for elevation angles down to about five degrees. ACMA recommended, and subsequently took, the decision to excise the area around Uralla (specifically, Cell No. NU7K4 under the Hierarchical Cell Identification Scheme or HCIS) from the spectrum reallocation declaration for wireless broadband (WBB) licensing.

In the current proceeding, ACMA seeks comments on making the 3700-4200 MHz band, or parts thereof, available for new services, such as WBB. The FSS industry has long provided critical services supporting a wide range of applications in the conventional C-band FSS frequencies (which include the companion uplink band at 5925-6425 MHz), and C-band satellite services continue to be in high demand. Within areas subject to heavy rain (as much of the Asia-Pacific region is), C-band is relied upon to providing high performance satellite services. In addition to in-band operations, protection of users in adjacent-band spectrum (including radioaltimeters operating in the 4.2-4.4 GHz aeronautical radionavigation service band) that have co-existed successfully for decades with the “extremely weak” signals from C-band satellites must also be considered.

LMA offers that it is unclear that an additional 500 MHz of “mid-band” spectrum for WBB is the best use case, given the impact on satellites and the spectrum already available for wireless broadband use today (including the more than 30 GHz of additional WBB spectrum being considered at WRC-19 and under other ACMA proceedings). Wireless broadband operations into the FSS downlink band at 3.7-4.2 GHz would require band and/or geographical segmentation in one form or another. Despite all of these interests and activities, there seems to be no accounting being made of what the real requirements in this band for more spectrum may be and of how efficiently, if at all, the spectrum already allocated or targeted for WBB use is being used. Given the general incompatibility of WBB with most other services, LMA urges validation prior to making more spectrum available for WBB in this band.

Many FSS networks around the world have telemetry links within the 3700-4200 MHz band, and these capabilities are hardwired; an operating satellite has no ability to relocate its telemetry carriers to another portion of the band or to another band. As in the 3.6 GHz band, telemetry links also make use of the 3700-4200 MHz band during TOSS operations. The satellites are generally not in a geostationary orbit during this period, a period which can run for several months after launch depending on the type of propulsion used on the spacecraft, therefore the earth station supporting TOSS requires full-azimuth capability (i.e., operation at all azimuths and at elevation angles down to 5 degrees, just as in the 3.6 GHz band). There are a limited number of earth stations around the world that are capable of supporting these essential services. Once the satellite reaches the geostationary orbit, use of the telemetry links continues to be necessary during in-orbit testing and when the satellite is used for during regular operations. Over the mission life of any given satellite, Lockheed Martin’s Uralla site can be requested to provide technical and operational support to active spacecraft.

Protection of earth stations that support TOSS, IOT, and provide regular TT&C in the 3700-4200 MHz band is critical. If these earth stations receive interference at a level that degrades or prevents their functioning (whether harmful or unacceptable), control of the satellite could be lost. Wireless broadband systems located within the vicinity of a telemetry receive station would unquestionably cause harmful interference. The protection criteria for FSS telemetry receive links in the 3700-4200 MHz range are found in the publications of the International Telecommunication Union (“ITU”).[[2]](#footnote-2)

Until such time as a rational analysis concludes that WBB needs access to this spectrum, in addition to the many gigahertz of WBB spectrum that are likely to be available to WBB in bands up to 50 GHz and beyond, LMA supports “Spectrum scenario d” (which specifies “No change to current arrangements—incumbent use only”). WBB has proven itself to be incapable of co-frequency, co-coverage sharing with any incumbent services, and WBB proponents have been resistant to having limitations incorporated into arrangements for spectrum to which they are seeking shared access. These two factors heighten the importance of assessing and validating spectrum requirements before planning for any additional spectrum allocations for WBB use.

If rational analysis concludes that WBB does require access to spectrum in the 3700-4200 MHz, LMA urges ACMA to take a similar approach for LMA’s Uralla facility that was taken for the 3.6 GHz band with respect to Cell No. NU7K4 under the HCIS, and carve out a protection zone for the critical TT&C, IOT, and TOSS operations that LMA conducts in the FSS through the Uralla facility’s earth stations. LMA notes with favor that its Uralla facility is included in ACMA’s new Radiocommunications Assignment and Licensing Instruction (RALI) for the management of interference to Earth stations in earth station protection zones (ESPZ) – for the bands 3600-4200 MHz. *See* RALI: MS 44, Frequency coordination procedures for the earth station protection zones (Effective 2 August 2019).[[3]](#footnote-3) As long as this protection (essentially a zone of 160 km around the Uralla facility with no WBB) is maintained, LMA is assured of its ability to continue to operate the facility and serve the worldwide FSS community.

Finally, LMA concurs with ACMA, there are sensitive aeronautical and aviation service uses of spectrum in the 4200-4400 MHz band, including aeronautical radionavigation and aeronautical mobile services. If any consideration is given to WBB in the portion of the 3700-4200 MHz band immediately adjacent to the aeronautical service spectrum above 4200 MHz, ACMA must first conduct sharing and compatibility studies and conclude that the WBB operations will not interfere with or otherwise constrain the aeronautical operations. Interference to the aeronautical operations cannot be tolerated, and the WBB industry’s aversion to any constraints on its flexibility of operation must be taken into account when considering whether it would be appropriate to introduce WBB access to spectrum adjacent to the 4200 MHz band edge of the 3700-4200 MHz band – there would need be guard bands of some significant size to protect aeronautical operations.

Conclusion

LMA appreciates the opportunity to provide its comments and views on the ACMA consultation on planning for the 3700-4200 MHz band. LMA recognizes that wireless services and the role of space are dually important to the Australian economy and future. LMA’s longstanding operations, and potential future expansion to support the growing demand, at its Uralla facility in rural New South Wales serve commercial satellite services worldwide to further Australia’s role in space leadership.

LMA stands prepared to address any further points that require discussion as this consultation moves forward.

Respectfully submitted,

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1. While these are the current active licenses, for TOSS and IOT, LMA generally seeks licenses for about six months after which they expire. There have been numerous other licenses that have since expired for the 3700-4200 MHz band. Further, LMA expects to seek further licenses for the Uralla earth station facility to support upcoming TT&C, IOT, and TOSS requirements. [↑](#footnote-ref-1)
2. *See, e.g.,* ITU-R Recommendation S.1432-1, Apportionment of the allowable error performance degradations to fixed-satellite service (FSS) hypothetical reference digital paths arising from time invariant interference for systems operating below 30 GHz (2006). [↑](#footnote-ref-2)
3. RALI: MS 44 specifically notes that the Uralla facility is protected from 3600-4200 MHz. [↑](#footnote-ref-3)