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The Manager, Wireless Broadband
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Re: Comments and Views of Lockheed Martin – Australia Pty Ltd on ACMA Consultation No. IFC 22/2020, Replanning of the 3700–4200 MHz band – Options 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 22/2020 on Replanning of the 3700-4200 MHz band. Our comments below expand on our comments filed in response to the Discussion Paper for the Planning of the 3700–4200 MHz band¹, and respond to the options in the current proceeding to make spectrum available for Wireless Broadband (WBB).

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. For nearly 20 years, LMA has been operating 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. The Uralla facility also provided long term support for the Space Based Augmentation System (SBAS) Test Bed on behalf of Geoscience Australia. Lockheed Martin’s interests in this proceeding are not only with regard to satellite services in the band, but also the protection of needed uses 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.

At the Uralla facility, 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. LMA’s Uralla facility has been a critical component part of a global

¹ See Comments and Views of Lockheed Martin – Australia Pty Ltd on ACMA Consultation No. IFC 27/2019, dated September 12, 2019.

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 also 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 accepting and using the satellite to provide services, whether broadband or otherwise.

The Uralla site's location in Australia and authorized FSS capability in the 3700-4200 MHz band enable LMA to provide support to satellite missions from commercial operators around the world. There are only a limited number of earth stations around the world that are capable of supporting essential services, such as TOSS. Once the satellite reaches the geostationary orbit, use of the telemetry links continues to be necessary during in-orbit testing and for TT&C when the satellite is used during regular operations. Additionally, over the mission life of any given satellite, LMA's Uralla site has been and can reasonably be expected to be needed to provide technical and operational support to active spacecraft. For example, at 3789.50 MHz, LMA is currently authorized to operate under license 1988277/1 in support of providing TT&C for the Intelsat IS-18 satellite. Additionally, in support of the Galaxy-30 satellite, ACMA recently authorized TOSS support under license 10990070/1 near 4200 MHz and IOT support under 11001316/1 for operations in most of the 3700-4200 MHz band.² LMA anticipates supporting multiple future missions that will require C Band TOSS and TT&C services under additional authorizations. In order to support its TT&C, TOSS and IOT operations, LMA's Uralla earth station facility needs continued, reliable, and predictable access to the 3700-4200 MHz band.

Many FSS networks around the world already 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. If a part of the 3700-4200 MHz band would not be available in Australia and a satellite's telemetry links operate in that part of the band, LMA would be unable to support that satellite severely impacting our operations. Similarly, if the customer requirement included IOT service, LMA would be unable to test the transponders that operate in that portion of the band, and we may be unable to fulfill the contractual agreements using Uralla. In addition to this proceeding, in the 3.6 GHz proceeding three years ago, LMA highlighted these requirements to enable the viability and reliability of the Uralla facility, by ensuring that its spectrum access was not adversely impacted in 3600-3700 MHz for TT&C, IOT, and TOSS applications in the FSS. There, as in this band, LMA noted that the TOSS requirement, in particular, makes the protection requirements at all azimuths and for elevation angles down to about five degrees. During TOSS, satellites are not in a geostationary orbit – TOSS lasts for a period which can run for several months

² While these are the current active licenses for TOSS and IOT, LMA generally seeks licenses for about six months for each mission, after which they expire. There have been numerous other licenses for C Band services out of Uralla that have since expired for the 3700-4200 MHz band.

after launch depending on the type of propulsion used on the spacecraft, therefore the earth station supporting TOSS requires full-azimuth capability throughout the period of the orbit raising to geostationary orbit.

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, support the growing demand for space based services transmitted through its Uralla facility in rural New South Wales, serve commercial satellite services worldwide, and further advance Australia's role in space leadership. The challenge is that 5G services, such as WBB, have to date been incapable of co-frequency, co-coverage sharing with any incumbent services. 5G proponents have been completely resistant to spectrum sharing conditions; yet, protection of earth station operations 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 or IOT contracts may not be able to be conducted. Wireless broadband systems located within the vicinity of a telemetry receive earth 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").³ As a result, WBB operations into the FSS downlink band at 3.7-4.2 GHz would require band and/or geographical segmentation in one form or another to meet the requirements of each service.

With regard to radio altimeters operating above 4200 MHz, LMA supports the objective to protect those services in the adjacent band. However, LMA is of the view that 200 MHz or 300 MHz may not be an adequate spectral separation of WBB to these critical services. We note that the ITU for Region 2 under WRC-23 agenda item 1.2 is only considering spectrum up to 3800 MHz for IMT.

In the proceeding, ACMA indicates that it preliminarily prefers option 3 that eliminates FSS in the lower portion of the band (3700-3800 MHz) in Metropolitan and Regional areas for Wide-Area WBB services and permit Local-Area WBB services on a shared, coordinated, first-in-time basis throughout Australia with FSS in the 3800-3900 MHz (or 3800-4000 MHz) band. LMA notes that this option would result in the potential for harmful interference into the Uralla earth station when providing service to satellites that have this frequency range already hardwired and would limit growth of satellite services to a smaller segment of the band. In option 2, FSS access is retained throughout the 3700-4200 MHz band and Australia-wide; however, WBB would be permitted in the 3700-3900 MHz (or 3700-4000 MHz) band on a shared, coordinated first-in-time with incumbent services. LMA views Option 1 - that would eliminate FSS access to the 3700-3900 MHz band (or

³ 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).

potentially the 3700-4000 MHz band) - is less desirable. As a result, LMA favors a modified version of ACMA's preferred option 3 as discussed below; the modifications would also apply to options 1 and 2 if ultimately adopted.

In the 3.6 GHz proceeding, 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 licensing. LMA urges that a similar approach with an appropriate protection zone be implemented in this case to address the Uralla facility whether it be associated with ACMA's preferred option 3 or options 1 or 2 to be applied to the 3700-3900 MHz band (or 3700-4000 MHz band). In addition, for any WBB implementation option, LMA requests that in order to fulfill IOT or telemetry requirements (TOSS or TT&C) within and throughout the 3700-4200 MHz band, WBB operations within Australia should be required to accept the power flux density limits in Article 21 of the ITU Radio Regulations without any further protection obligations by the IOT or telemetry service provider. For example, LMA or the associated satellite operator should not be required to seek a spectrum access agreement in any part of the 3700-4200 MHz band from any WBB operator if the emissions from the satellite comply with Power Flux Density limits in Article 21 of the ITU Radio Regulations.

Therefore, LMA prefers a modified version of ACMA's preferred option 3 – it would make spectrum available for WBB while continuing to enable viable use of the 3700-4200 MHz band for Uralla's TT&C, IOT, and TOSS operations by excising Cell No. NU7K4 from WBB implementation, providing protection to Uralla facilities, and accepting compliance with the ITU power flux density limits as a functional substitute for coordination agreements with WBB operators for satellite downlinks.

Conclusion

LMA appreciates the opportunity to provide its comments and views on the ACMA consultation on replanning the 3700-4200 MHz band. As a general matter, Lockheed Martin is also actively engaged in exploring 5G and its potential applications to support our own objectives and platforms.

LMA stands prepared to address any further points.

Respectfully submitted,

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Lockheed Martin Space

Lockheed Martin Government Affairs
on behalf of Lockheed Martin – Australia Pty Ltd