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Vice President, Technology Policy & Regulation  
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August 10, 2017

Mr. Nevio Marinelli  
The Manager, Spectrum Planning Section  
Spectrum Planning and Engineering Branch  
Communications Infrastructure Division  
PO Box 78, Belconnen, ACT 2616

**Re: Comments and Views of Lockheed Martin – Australia Pty Ltd on ACMA  
Consultation No. IFC 9/2017, Future Approach to the 3.6 GHz Band**

Dear Mr. Marinelli:

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 9/2017, concerning ACMA’s future approach to the 3.6 GHz band. LMA’s principal interest in this proceeding stems from its need to continue its longstanding operation of two 14.2 meter earth station antennas utilizing frequencies in the 3.6 GHz fixed-satellite service (“FSS”) space-to-Earth frequency band at its Uralla, New South Wales earth station complex. We note that in the C-band, ITU studies have concluded that mobile broadband transmitters and FSS earth station receivers are unable to share spectrum in the same geographical area at the same time. As explained below, LMA supports options for this Consultation that will enable LMA’s Uralla facility to continue to provide critical support to the commercial spacecraft missions of satellite operators and manufacturers from around the world.

LMA’s preference among the options is to support no change (Option 1) to avoid disruption of existing infrastructure and sunk investment, with mobile broadband accommodated in alternative frequency bands. Should ACMA conclude that it must accommodate its growing mobile broadband requirements in this spectrum, LMA can accept Option 3b (which would enable spectrum licensing in metropolitan and some surrounding areas, but not in rural areas such as the area where the Uralla facility operates) – this would minimize impact on some existing satellite facilities and their user. As a distant last resort, LMA could accept a modified version of Option 3c (which would enable spectrum licensing in rural

areas, while guaranteeing the long-term protection of LMA's 3.6 GHz-band infrastructure and operations at Uralla).<sup>1</sup>

LMA's interest in this proceeding is much broader and more complicated than the operations of a single earth station facility. Since its initial investment in January 1999, 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. The 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 seeking to use the satellite to provide services for which it is intended; furthermore, this station provides continuing support for on-orbit satellites in case anomalies are encountered with the flight hardware, or in the event a customer's primary and backup control facilities become non-operational. The Uralla site's location in Australia and the C-band FSS capability it possesses enables LMA to provide frequent support to satellite missions from commercial operators around the world. LMA does not overstate or exaggerate in any way when it states that the safe and orderly use of the entire geostationary orbital/spectrum resource, and the protection of hundreds of satellite missions worldwide in multiple satellite services, depends on ensuring that control earth stations such as LMA's Uralla facility (and its sister facilities strategically located around the world) have access to the spectrum they need to provide their vital services.<sup>2</sup>

Comments on ACMA Options:

LMA understands that demand for additional spectrum for mobile broadband ("MBB") operations in Australia is growing, and that the MBB industry has long eyed spectrum in the 3.6 GHz range as well-suited for MBB use. Providing additional MBB spectrum while protecting incumbent services has been the subject of intense debates at the International Telecommunication Union ("ITU") over the last decade, culminating in studies that have consistently demonstrated the incompatibility of MBB with satellite services. As MBB continues its efforts to

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<sup>1</sup> Options 3b and 3c are described in ACMA's Options Paper, *Future Use of the 3.6 GHz Band* (June 2017) ("Options Paper"), from this Consultation. Option 3c as presented in the Options Paper includes some protection for the Uralla, New South Wales earth station facility, but expressly states that "the long-term viability of this site for earth station use cannot be guaranteed." Options Paper, at 4.

<sup>2</sup> In addition to the 3.6 GHz receive frequencies, LMA's Uralla facility utilizes spectrum in the 5.725-6.735 GHz FSS (Earth-to-space) range, the FSS bands at 14/10-12 GHz, and the broadcasting-satellite service uplink band in the 17 GHz range.

increase its spectrum access, ITU studies are now being conducted in higher frequency bands.

LMA maintains that a principled, rational, and balanced process of making additional spectrum available for MBB – a process that takes a hard but fair accounting of existing services and operations in the spectrum under review – is appropriate. It commends the ACMA for undertaking such an approach in the present Consultation, and for setting out a comprehensive and forward-looking range of options for consideration.

LMA's particular interests in continuing unfettered operations at the Uralla facility in New South Wales would dictate support for Option 1 (no change) from the Options Paper. However, should Australia not be able to accommodate MBB elsewhere, LMA considers the other options below.

LMA finds that its interests can be potentially accommodated with either Option 3b or a modified version of Option 3c from the Options Paper. Option 3b, where MBB spectrum licensing would occur in metropolitan and some surrounding areas (Areas 1 and 2 from the Options Paper), but not in the rural Area 3, would ensure that there is no change in the arrangements that currently apply for LMA's Uralla facility in rural New South Wales (in Area 3). Option 3b would thus enable satisfaction of MBB spectrum demands in locations where MBB is presumably needed most, but not disrupt the critical services that LMA provides to satellite operators and manufacturers around the world.

As an alternative, LMA could support a variation on Option 3c from the Options Paper. Under Option 3c as written, MBB spectrum licensing would occur in Area 3 (which includes the Uralla facility), as well as in the more populous metropolitan and surrounding territory represented by Areas 1 and 2. In the Options Paper, ACMA states that Option 3c, which is ACMA's preferred option, includes a number of mitigation approaches for the protection of incumbents in Area 3.<sup>3</sup> Included in these approaches is one that involves "[e]xcluding the area immediately surrounding the earth station facility at Uralla, New South Wales (represented by the HCIS identifier NU7K4) from being re-allocated for the issue of spectrum licenses."<sup>4</sup> ACMA states that this mitigation approach "would enable the facility to continue operating under existing license arrangements." It goes on to say that suitable coordination criteria would also be developed so spectrum licenses could manage interference into the earth station receivers operated at the Uralla site.<sup>5</sup>

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<sup>3</sup> Options Paper, at 51.

<sup>4</sup> *Id.* at 51-52 (emphasis omitted).

<sup>5</sup> *Id.* at 52.

If this were all ACMA had to say about the Uralla site's continued operations in the 3.6 GHz band under Option 3c, LMA would be generally accepting of the option. LMA has indicated that the remote location of the Uralla facility is "separated from the nearest town with a population of 25,000, has significant terrain shielding towards this town, and uses relatively large earth station antennas that facilitate technical coordination with potential future terrestrial services."<sup>6</sup> In its October 2011 Letter, LMA indicated further that while filtering is not a workable solution for interference mitigation, ongoing provision of its C-band services at Uralla can be successfully coordinated on a case-by-case basis with potential new terrestrial services.<sup>7</sup> In other words, although the Options Paper was short on details of the mitigation approach for managing interference from MBB into the remote Uralla site, the prospect for successful long-term co-operation has been noted.

Unfortunately, ACMA undercuts the discussion of Option 3c and the establishment of an exclusion area around the Uralla site as a mitigation approach with the following passage:

"[T]he long-term viability of [the Uralla] site for earth station use cannot be guaranteed, due to the increasing interest in using the broader 3400–3800 MHz band to deliver mobile broadband services and the facility being located reasonably close to significant population centres (Armidale and Tamworth). As such, this facility may be required to relocate to another location, such as one of the identified earth station protection zones, in the future."<sup>8</sup>

If there is no assurance of long-term viability of the critical earth station operations LMA provides in C-band from the Uralla facility, LMA cannot support Option 3c. The only choice for LMA then becomes Option 3b, as this option balances two Australian national needs - more MBB spectrum in metropolitan and some surrounding areas and a sound, growing space sector, and in this case a subsector that ensures connectivity of Australia with the rest of the world. As LMA discusses below, relocation of the Uralla facility to a location outside Region 3 is a complex and extremely expensive option that is not realistically viable.

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<sup>6</sup> Letter dated October 18, 2011, from M. Kimball (Lockheed Martin Uralla TT&C Station) and G. Creaser (Lockheed Martin Corporation) to The Manager, National Infrastructure, Government, and Space Section, Spectrum Infrastructure Branch, ACMA ("October 2011 Letter").

<sup>7</sup> *Id.* at Attachment 1, responses to Questions 8, 11, 13, and 18.

<sup>8</sup> Options Paper, at 52.

LMA maintains, however, that ACMA can provide assurance of the long-term viability of the Uralla site consistent with its objectives. If the establishment of an exclusion zone, to supplement natural terrain shielding toward population centers and protect radio line of sight from MBB to Uralla, is workable today (along with case-by-case coordination), it should be workable for the intermediate and long terms. The increased interests in MBB spectrum in the 3.6 GHz range that ACMA cites is undoubtedly much more pressing in Areas 1 and 2 than it will be for the foreseeable future in Area 3 generally or near Uralla specifically. Moreover, as the 3.6 GHz FSS range is a receive-only band subject to ITU power flux-density limits for the protection of terrestrial services, there is no need to consider protection of MBB from FSS earth stations.

If ACMA were to modify its discussion of Option 3c to provide assurance of long-term viability of LMA's critical earth station operations at Uralla, LMA would be in a position to provide general support for this option. This is so even though the details of the exclusion zone and the parameters for the case-by-case coordination with prospective MBB operators remain to be resolved.

For Cost and Logistical Reasons, Relocation of the Uralla Facility Outside of Area 3 Is Not Practical

As LMA informed ACMA in 2011, in frequency bands below 3.7 GHz, there are two massive 14.2 meter antennas in operation at the Uralla facility. These antennas also provide operations in bands at 14/10-12 GHz and at 17 GHz. Operation of the earth station complex involves extensive associated equipment.<sup>9</sup> In 2011, when these factors were coupled with the expectation that detailed technical analysis and mitigation techniques can be employed to solve potential interference issues, the conclusion LMA offered then was that mandatory relocation of the Uralla facility to a "satellite park" was not required.<sup>10</sup>

The difficulties LMA would face if it were required to relocate its Uralla facility to a site outside Area 3 are numerous, and the price tag would be prohibitively high.

First, relocation would need to be an all-or-nothing venture. LMA could not relocate only its 3.6 GHz operations and leave all others in Uralla. Many of the operations in conventional C-band downlink spectrum, and all uplink operations are conducted over the same 14.2 meter antennas at issue for 3.6 GHz, so all those operations would need to be relocated (and perhaps re-coordinated) to a site

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<sup>9</sup> See October 2011 Letter, at 2 and Attachment 1.

<sup>10</sup> *Id.* at Attachment 1.

beyond Area 3. Duplication of equipment is not an option, nor is duplication of the specialized Uralla staff that maintains and operates all of the Uralla equipment.<sup>11</sup>

Second, it may be difficult to convince or otherwise incentivize LMA's staff to relocate from the already-rural area in which Uralla is located to an even more remote area beyond Area 3. This difficulty would undoubtedly extend to the prospect of replacing and training staff that would decline to make the move, and be reflected as well in higher personnel costs for wages and allowances at the new location. All in all, higher personnel costs would be expected, and these must be accounted for – perhaps in a present value analysis.

Third, discontinuing operations altogether is not an option. LMA's Uralla facility operates as part of a specialized global network to support launch/transfer orbit operations and initial in-orbit testing. The only other commercial earth station facility with similar longitudinal capabilities is in Korea. The continued availability of a facility such as Uralla in Australia is essential to the long-term success of the commercial space industry not only in Australia and ITU Region 3, but around the world.

In terms of the projected costs of relocating the Uralla facility to a site outside Area 3, LMA has preliminarily determined that it would cost greater than \$20 million to procure, prepare, and equip an appropriate new site; establish landline and any necessary terrestrial communications links if not readily available; relocate and/or replace and train new staff (including expected higher salaries to attract personnel to the remote location); and physically relocate operations and shut-down Uralla operations.

LMA observes that the price tag above exceeds the \$20 million figure that ACMA identified as the tipping point for where the net economic benefit of relocating the Uralla facility to enable unrestricted Area 3 MBB service in and around Uralla would be outweighed by the benefit of protecting Uralla and reducing MBB service. In its 3.6 GHz Band Highest Value Use Assessment document, ACMA stated that, if the relocation "costs are conclusively in excess of \$20 million, the reduction in re-farming benefits from the spectrum being unable to service the

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<sup>11</sup> In this regard, the ACMA may have omitted a factor from the relocation discussion in its paper on highest value use assessments. There, the ACMA indicated that considerations were effectively limited to consideration of whether earth station licensees could relocate only their 3.6 GHz licenses or should relocate all of their C-band (3.4-7.25 GHz) licenses. See ACMA Quantitative Analysis, *Future Use of the 3.6 GHz Band, Highest Value Use Assessment*, at 37 (June 2017) ("Highest Value Use Assessment Paper"). In LMA's case, the inquiry would include all earth station licenses, as anything short of that would require duplicate staff and infrastructure at two sites.

protected area would have to reach over \$20 million in order for protection of this licence location to not be viewed as the welfare maximising solution.”<sup>12</sup> Estimating the relocation cost to be above the \$20 million threshold, ACMA concluded that “[t]his is considerably above any estimated upper bound value of the spectrum, making it likely that it would be net beneficial to protect Lockheed Martin’s FSS earth receive licences.”<sup>13</sup>

The relocation figures LMA now provides confirm ACMA’s projection that the costs are such that it is economically beneficial to protect LMA’s Uralla earth station receive licenses in the 3.6 GHz band. LMA notes, however, that the size of the MBB exclusion zone ACMA predicts for this protection may – due to natural terrain shielding and the antenna discrimination afforded by the large earth station antennas – actually be considerably smaller than ACMA anticipates in the Highest Value Use Assessment Paper. With further analysis, the coordination zone may be able to be less than the 150 kilometer radius anticipated by ACMA.<sup>14</sup> A shorter protection distance, coupled with the limited population areas and other factors, should enhance the economic benefits of protecting Uralla over the long term under ACMA’s preferred Option 3c.

### Conclusion

LMA appreciates the opportunity to provide its comments and views on the ACMA consultation regarding future use of the 3.6 GHz band. As indicated here, LMA recognizes the dual importance to the Australian economy and future of both MBB and the role of space, including commercial satellite services worldwide that LMA helps serve through longstanding operations at its Uralla facility in rural New South Wales. LMA is hopeful that the information and views presented here will enable ACMA to modify its assessment of Option 3c and adopt a refarming plan that guarantees the long-term protection of the Uralla facility from MBB interference. LMA believes that this is an achievable result (even though the details of protection need to be ironed out), and strikes the most appropriate balance between the interests and objectives of the MBB community and the space community in Australia and worldwide.

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<sup>12</sup> Highest Value Use Assessment Paper, at 64.

<sup>13</sup> *Id.* (emphasis added).

<sup>14</sup> See High Value Use Assessment Paper, at 64.

Letter to N. Marinelli  
ACMA  
August 10, 2017  
Page 8 of 8

LMA intends to continue to invest in the Australian space industry and would like to use the Uralla facility to provide Australia greater future access to satellite communications, remote sensing data, and for providing Australia with higher accuracy GNSS services via our Satellite Based Augmentation System (SBAS) testbed. LMA stands prepared to address any further points that require discussion as this consultation moves forward.

Respectfully submitted,

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