

10 June 2022

The Manager
Wireless Broadband, ACMA

SUBMISSION ON THE REVIEW OF THE 1.5GHZ BAND DISCUSSION PAPER

UNSW Canberra holds 27 Fixed Point to Point (PTP) and 8 Fixed Point to Multipoint (PMP) licences in the 1.5 GHz band, for use in stratospheric scientific balloon operations associated with astrophysical research. The radio communications involve uplink and downlink with the balloon-borne equipment, using our main ground station in Alice Springs, and subsidiary ground stations in Longreach and Newman. These operations are sponsored by NASA, and have been carried out under the umbrella of a Treaty between USA and Australia since 1995. The facilities are also used in similar collaborative balloon campaigns with the Japanese Space Agency JAXA, and the French Space Agency CNES. There have been five multi-million dollar balloon campaigns in Alice Springs in the last twelve years involving these three space agencies.

UNSW Canberra, acting on behalf of NASA, provides the comments below in response to the Discussion Paper on “Review of the 1.5 GHz band”, dated May 2022. Also attached in the Appendix, is a letter of support from Mr. Robert Salter, telecommunications expert for the company Peraton that is contracted by NASA for their worldwide stratospheric balloon operations.

What are the ongoing requirements for incumbent services in the 1.5 GHz band? Are there any viable alternative options?

The equipment on every balloon flight is space-qualified, including that used in tele-communications. The telemetry characteristics are in-line with those regularly used by NASA in USA, Europe and New Zealand.

We have investigated the use of other bands, and each has proved to be unsuitable for either stratospheric balloon transmission, and/or for ground station reception.

What planning scenarios should be considered in the 1.5 GHz band?

- ***1427-1518 MHz:*** We stress that the remote areas over which the stratospheric balloons transmit, must not be spectrum-licenced, as apparatus licenced operations would not be permitted to overlap spectrum-licenced space. Any spectrum-licenced areas should be limited to metro & regional areas, at most. Furthermore, we have a preference for an FDD arrangement, which would leave some mid-band gap in which there would be lower incumbency and therefore serve to support further development of wideband downlinks from stratospheric balloons.
- ***1518-1525 MHz:*** We strongly support Scenario 4 over Scenario 5. Our operations in the 1518-1535 MHz band need to continue.

What services/applications should be accommodated? Is there or will there be equipment readily available for these services/applications?

Stratospheric balloon downlinks must continue to be supported. The associated downlinks have been operating for four decades, and are under-pinned via the Treaty between USA and Australia.

How much spectrum is required (distinguishing between the minimum viable and the desirable) to provide the service?

The existing links already licenced need to be maintained. Furthermore, additional spectrum is likely to be required for support of newer wideband systems, requiring in the order of 15-30 MHz. Balloon-borne payloads are competitive with satellite-borne payloads where they have the capability of transmitting large volumes of astrophysical scientific data for a shorter exposure time. Science needs for downlink of data has grown exponentially. Current optical, infrared, and other experiments are generating petabytes of data, and downlinking minimal datasets to verify operation and calibration of the science instruments. While in line-of-sight, it is critically important to adjust parameters on the science experiments. Having bandwidth to be able to process and confirm settings on the experiments is critical to defining mission success. Increased bandwidth also allows for multiplex of data signals. For example, a science payload with two video signals and a science megabit data flow, can now multiplex all three signals, and use new digital technology to fold all three signals (~25 MHz of bandwidth and appropriate channel guard/etc.) into a single 15.8 MHz bandwidth signal.

Which frequency ranges should be made available for these services/applications?

The existing links should be preserved: these range between 1440 MHz and 1525 MHz. Furthermore, ~15-30 MHz in the middle of the band ~1470 MHz will be required to support modern wideband downlinks.

Which geographic areas should be made available for these services/applications? Is there a clear geographical delineation?

The area of operation of our stratospheric balloons is restricted to remote areas of Australia by the Civil Aviation Safety Authority, to avoid metropolitan and coastal areas that are densely populated.

On what basis should access be provided? For example, should access be granted on an exclusive or shared basis, coordinated or uncoordinated?

We understand the needs for spectrum and the economic and technical advantages that go hand-in-hand with the distribution of spectrum and services. Our operations are carried out in remote areas of Australia and we request spectrum protection of our ground stations, for reception of Point to Point Lower L band allocations. Nearby transmissions in band can create interference issues with signals transmitted from hundreds of kilometres away.

What licensing mechanisms are appropriate?

The existing operations are licensed as Fixed Point to Point and Fixed Point to Multipoint apparatus licences, as State-wide licences (in each of NT, QLD and WA). This arrangement has worked well to date, so we see no reason to change it. However, we believe that supplementary apparatus licensed arrangements could be considered for any new frequencies or bandwidths. For example, Fixed Receive licences at the ground station location, and/or Scientific Assigned licences, given the inherent scientific nature of the operations.

Comment is sought on the coexistence scenarios identified, including ACMA's preliminary thinking on these scenarios. Are there any other coexistence scenarios that ACMA should consider?

We agree with ACMA's preliminary thinking on coexistence between WBB and services between 1427 and 1518 MHz. In particular, we support the statements:

- *“Different arrangements could also be considered in different areas or frequency ranges. For example, exclusive access arrangements for WBB could be implemented in metropolitan and regional areas, while a shared approach is implemented in remote areas. Such arrangements are currently in place in the 1800 MHz and 2 GHz bands. Considering most existing fixed service licences are located outside metropolitan areas, this could allow the introduction of WBB services in certain areas while reducing the effect on incumbent services.”*
- *“The remote area location of these [stratospheric balloon] services may mean ongoing protection could be achieved with limited impact on the deployment of new WBB services.”*

We confirm that these stratospheric balloon downlinks rely on the 1.5 GHz band, and do not have any viable alternatives to relocate to as such, we strongly advocate for WBB access to remote areas being on a shared basis, and for the stratospheric balloon downlinks to be provided ongoing protection.

With respect to MSS services in 1518-1525 MHz, we support ACMA's first

option: *“existing and new incumbent services continue operating in the band, and support is provided for MSS operation on a ‘no-protection’ basis”*. This aligns with the ACMA’s planning Scenario 4.

In conclusion, we stress the importance of the need for stratospheric scientific balloon missions to continue to be supported – both existing links and future development of wide-bandwidth links – within the 1.5 GHz Band. We appreciate ACMA’s consideration of our mission requirements, and look forward to working further with ACMA on this matter.



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APPENDIX



Australian Communications and Media Authority

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To Whom It May Concern:

The Columbia Scientific Balloon Facility (CSBF) is a US Government owned, contractor operated facility that specializes in launching high altitude scientific payloads for NASA and other international collaborations. CSBF performs operations, launching these balloons worldwide, and includes use of the Balloon Launching Station, a facility in Alice Springs, Australia managed by the University of New South Wales (UNSW) and Commonwealth Scientific and Industrial Research Organisation (CSIRO) under Dr. Ravi Sood.

This launch site has been utilized since 1981 by the CSBF, and has supported multiple launches of scientific payloads, returning an enormous amount of scientific data for multiple science disciplines. Cosmic Ray studies, Gamma Ray Emission Studies, Infrared Telescopes, SuperNova observations, etc...Investment in the facility includes a world-class staging facility specifically to support the large scientific payloads and support flight systems.

Licenses for RF emission have been held by UNSW/CSIRO for years, and the infrastructure to support these high bandwidth links have remained largely unchanged, apart from the science payloads always requesting higher data rates due to the maturation of digital technologies. Major infrastructure to support these RF Links are currently maintained and utilized on a worldwide basis by the CSBF, and we recognize the ever-shrinking spectrum available. Significant costs would be incurred to move our existing allocations from L-band to other available spectrum bands.

We support and request continued issuance of the allocations necessary to support high altitude balloon operations. We acknowledge the continuing support that the Commonwealth of Australia provides for both NASA, Australian, and international investigators on high altitude balloon platforms and the major science returns that are possible with this platform. We note the economic benefits to the local area, experienced by local businesses, lodging, restaurants, travel, etc.

We look forward to future campaigns in Alice Springs Australia, and the benefits that this science platform imparts to our shared greater understanding of the world, galaxy and universe..

Sincerely,

A black rectangular box redacting the signature of Robert Salter.

Robert Salter

Flight Project Manager II, CSBF / Peraton