



20 October 2023

The Manager  
Space Systems Section  
Australian Communications and Media Authority

**Re: Consultation on ACMA's Review of Australian satellite filing procedures**

CSIRO welcomes the opportunity to provide input to the Australian Communications and Media Authority (ACMA)'s consultation on the Review of Australian satellite filing procedures. ACMA could consider implementing the changes outlined below. CSIRO has developed these changes in consultation with other major Australia based astronomy institutions: Curtin University, the Australian National University (ANU), the Australian Astronomical Optics (AAO) and the Square Kilometre Array Observatory.

Much work is currently ongoing at international bodies such as the ITU-R, and UN COPUOS via the IAU CPS, the Center for the Protection of Dark and Quiet Skies ([cps.iau.org](https://cps.iau.org)), to find ways to stem the pollution of the skies by electromagnetic radiation, reflections off satellites from terrestrial transmitters, as well as sunlight reflected off surfaces of satellites.

CSIRO is an active contributor to these international discussions, as the provider of radio astronomy facilities to the Australian research community via the Australia Telescope National Facility. Radio astronomy relies on detecting faint radio signals from celestial objects to gain insights into the universe. Unwanted radio frequency interference from satellites pollutes the received signals, making it difficult for scientists to study and understand our cosmos.

The Australian Federal Government and the Western Australia Government have made significant investments in establishing the Australia Radio Quiet Zone Western Australia (ARQZWA), providing protection from radio frequency interference (RFI) from terrestrial transmitters at Inyarrimanha Ilgari Bundara, our Murchison Radio Observatory (MRO).

The radio-telescopes hosted at the MRO have been identified by astronomers worldwide as having unparalleled capabilities for astrophysical science. They currently include the Australian Square Kilometre Array Pathfinder (ASKAP), a \$188M telescope comprising 36 antenna dishes, the Murchison Widefield Array (MWA), a >\$50M instrument comprising >4000 fixed antennas, and EDGES, a precision instrument consisting of a single antenna and high-end receiver apparatus with proven cutting-edge capability, having already been recognised for helping to characterise early formations of the universe.

The Australian component of the Square Kilometre Array (SKA-Low), which will be the world's largest radio-telescope, has commenced construction earlier this year. It will span an area 65 x 75 km, with up to 132,000 antennas distributed along 3 thin spiral arms. This large-scale international investment is also situated within the ARQZWA under expanded MRO boundary arrangements.

To date, approximately \$500 million have been allocated nationally to projects associated with Australia's hosting of the SKA, while the corresponding international investment in SKA-Low is expected to be around \$1 billion over the period to 2030. The SKA project is managed by the SKA Observatory (SKAO), an Inter-Governmental Organisation (a treaty body), headquartered in the United Kingdom. Current SKAO Members

are Australia, Italy, the Netherlands, Portugal, China, South Africa, Switzerland, and the United Kingdom with several other countries aspiring to membership or engagement with SKAO in the future.

Satellites have only very recently emerged as a significant threat to the pristine and protected radio environment at the MRO due to the absence of effective regulation in terms of unintended radio emissions and optical reflections, aggravated by their unprecedented proliferation.

The below paragraph could be added to section 3.5 Australian benefit as follows:

### *3.5.3 Consideration of dark and quiet skies best practises*

*Australia is a global leader in astronomical research with world leading radio astronomical facilities built from public funds and in operation at many sites across the country. These facilities service the global astronomical community at no cost. To protect these investments of national and international significance, and recognising the vast increase in satellite numbers, satellite filings must demonstrate that best practises to mitigate the impact of the satellites on both the radio environment and the visible night sky are implemented. Specifically, this includes ensuring that the emission of unintended electromagnetic radiation by satellites remains below ITU-R RA.769 levels throughout the electromagnetic spectrum as well as out of band emissions in allocated radio astronomy service bands, except for at the satellites' allocated transmission frequencies, and ensuring the brightness of sunlight reflected off the satellites remains fainter than magnitude 7 (the limit of naked-eye visibility) at astronomical observatory sites.*

We would be pleased to provide further detail on the activities referenced in this letter. For more information, please contact [REDACTED].

Yours sincerely

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Dr Douglas Bock  
Director, CSIRO Space and Astronomy

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