Australian Government | acma Australian Communications and Media Authority

Regulation of space-based communications systems

Information paper

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Introduction

Purpose

The purpose of this paper is to provide an overview of the domestic and international regulations that apply to the operation of a space-based communications system in Australia. This is intended to aid existing or prospective satellite operators understand their obligations when planning to operate a satellite system or other types of space-based communications systems in Australia.

Background

The ACMA is an independent statutory authority of the Australian Government within the Infrastructure, Transport, Regional Development, Communications, Sports and the Arts portfolio. It is tasked with administering Australia's media and communications legislation, and related regulations in the public interest.

The ACMA was created to bring together and regulate 4 key elements of the communications and media regulatory landscape – telecommunications, broadcasting, radiocommunications and online content.

Our role in regulating the space sector involves planning and licensing use of the spectrum by space-based radiocommunications systems. This includes a range of planning and licensing activities that are governed by both domestic and international regulations.

Domestic activities are conducted under the spectrum management functions conferred on the ACMA by legislation: the *Australian Communications and Media Authority Act 2005* and the *Radiocommunications Act 1992*.

Internationally, Australia is bound by treaty obligations set out by the International Telecommunication Union (ITU)[1] in a body of international law known as the Radio Regulations, which facilitates the rational, efficient and equitable use of the radiofrequency spectrum and satellite orbits. Among other matters, these regulations set out procedures regarding international frequency coordination and notification of satellite systems.

This process aims to manage interference between satellite networks or with other terrestrial services, and provides international recognition of the spectrum and orbital resources used by a satellite. Only national administrations can undertake this process – the ACMA is the Australian administration for these purposes.

Australian domestic satellite planning arrangements are largely guided by the Radio Regulations, whereby the allocation of radiofrequency bands for use by satellite services in Australia broadly aligns with international allocations specified in the regulations.

The licensing of radiocommunications services is a domestic responsibility of national administrations. Under the *Radiocommunications Act 1992*, a space-based radiocommunications system such as a satellite network may not be operated in Australia

[1] The International Telecommunication Union (ITU) is the United Nations specialised agency for information and communication technologies.

unless authorised by a relevant licence issued by the ACMA. Before issuing a licence, we generally require a satellite network to have undergone the ITU's process of international frequency coordination and notification.

Legislative environment

Radiocommunications Act

In performing our spectrum management functions, we must act in accordance with the *Radiocommunications Act 1992* (Radiocommunications Act). The object of the Act is to promote the long-term public interest derived from the use of the spectrum by providing for the management of the spectrum in a manner that:

- facilitates the efficient planning, allocation and use of the spectrum
- facilitates the use of the spectrum for:
  - commercial purposes
  - defence, national security and other non-commercial purposes (including public safety and community)
  - supports the communications policy objectives of the Commonwealth Government.

The Radiocommunications Act is the primary legislation applicable to radiocommunications services operating to, from and within Australia.

ACMA Act

Section 9 of the *Australian Communications and Media Authority Act 2005* (ACMA Act) sets out the spectrum management functions of the ACMA. Satellite coordination and notification work is considered a spectrum management function under the ACMA Act. We retain discretionary powers with respect to the assessment of applications and management of the coordination and notification process.

A key role of the ACMA is planning and managing the radiofrequency spectrum in Australia. This involves considering and balancing competing demands for spectrum to promote the long-term public interest from its use.

With respect to space and satellite activities, our responsibilities include:

- Managing domestic access to the radiofrequency spectrum through the development and maintenance of a regulatory framework for satellite services in Australia, and through licensing of space services.
- Representing Australia's space spectrum management interests internationally, including filing and coordination of Australian satellite systems with the ITU.
- Monitoring trends in the spectrum needs of space-based communications systems and developments in emerging space-based technologies and applications with a view to supporting the introduction of new services.

Rockets, launches and space objects

Our role in regulating the space sector is limited to use of the radiofrequency spectrum. The Australian Space Agency is responsible for the regulation of space activities concerning high-power rockets, space launches, and objects in space and their return to Australia.

Regulation of Australian space activities administered by the Australian Space Agency includes the requirement to obtain authorisation to launch a satellite from Australia or overseas, as well as a requirement to register a satellite with the United Nations.[2] Further information on these matters is available on the Australian Space Agency website.

Spectrum planning

The ACMA's spectrum management framework comprises planning, licensing and allocation, and compliance and enforcement activities supported by regulatory decision-making frameworks.

Spectrum planning is the aspect of spectrum management that determines the general service and application-level uses of the spectrum. It defines the technical and operational rules for issuing licences to specific spectrum users and for licensees to utilise the spectrum.

Our spectrum planning framework information paper explains the role of the spectrum planning framework, the various documents that make up the framework and how they interact with each other and with other aspects of the overall spectrum management system.

Forward work plan

As part of our spectrum planning activities, each year we publish our plans to manage spectrum in the Five-year spectrum outlook (FYSO). The FYSO describes the priorities for the next 5 years and our detailed work plan for the coming year.

We also have a program of work to review our frequency coordination requirements.

The FYSO and review work program should be referred to for information on future projects that may result in updates to planning and licensing arrangements for space-based communications systems.

[2] These requirements are separate to those managed by the ACMA for space-based communications systems.

Licensing of space-based communications systems

We facilitate access to spectrum through planning, licensing and allocation activities. We also undertake compliance and enforcement work to ensure the spectrum management framework is adhered to. The ACMA, in accordance with the Radiocommunications Act, issues licences for communications with space objects, as well as for space research and radio astronomy applications.

All space-based communications systems require a licence issued by the ACMA that authorises use of the radiofrequency spectrum in Australia. In Australia, both transmitting and receiving frequencies are required to be licensed. The type of licence (or licences) required for the devices in the system depends on the type of system being operated – this is covered below in the section Radiocommunications licensing for space-based communications systems.

In addition, a telecommunications carrier licence may also be required for systems providing a telecommunications carriage service between 2 or more points in Australia.

Further information on radiocommunications and telecommunications carrier licensing is provided in the following sections.

Satellite systems used to provide broadcasting services to Australia are subject to the requirements of the *Broadcasting Services Act 1992*. Requirements vary depending on whether the satellite system is providing a commercial or narrowcasting service. If further information on the regulatory requirements for satellite broadcasting systems is needed, please contact the ACMA Customer Service Centre.

Radiocommunications licensing

The Radiocommunications Act prohibits the operation of a radiocommunications device in Australia, unless authorised by a licence issued by the ACMA. Our licensing arrangements authorise use of the spectrum by particular persons or devices, within the parameters set out by the planning framework. Parts 3.2–3.4 of the Radiocommunications Act define 3 types of licences: spectrum, apparatus and class licence.

Spectrum licences authorise the use of a specified frequency range anywhere within the geographic and frequency boundaries of the spectrum space. While the technical framework for the spectrum band may be optimised for a particular use, licensees are free to operate radiocommunications devices in this spectrum space for any service that satisfies the conditions of the licence and technical framework for the band. Spectrum licences are generally tradeable in full or in part. They are most commonly used to authorise wide-area wireless broadband services such as mobile phone and fixed wireless broadband services. Spectrum licences are issued using a price-based method, through auction, tender or pre-determined or pre-negotiated price, for a period of up to 20 years.

Apparatus licences are a type of individual licence that may be issued to a person to authorise the operation of a radiocommunications device. Most commonly, they authorise the licensee to use a specified device in a specified frequency range, generally at a specified location and for a particular type of service. Apparatus licences are the most common type of licence issued by the ACMA.

Area-wide apparatus licences (AWL), introduced in 2020, are a type of apparatus licence that permit licensees to operate several radiocommunications devices at specified frequencies within a geographic area. An AWL may be used to authorise a variety of different services subject to any conditions on the licence that the ACMA considers appropriate. An AWL may provide analogous technical and operational flexibility to a spectrum licence, and may assist the ACMA to authorise new and emerging technologies in use cases where spectrum licensing may be inappropriate.

Class licences provide a standing authorisation to access certain parts of the spectrum that are open to all users. They are made as legislative instruments, authorising anyone who complies with the conditions of the licence to operate a particular radiocommunications device without needing to apply to the ACMA or obtain an individual licence. Conditions of class licences may include:

- the types of radiocommunications devices that may be used
- the purposes for which they may be operated
- technical parameters that govern their operation.

Class licences authorise users to operate devices (such Wi-Fi networks, Bluetooth devices and some satellite user terminals), provided the device complies with the licence conditions. Class licences establish parts of the spectrum as 'commons', do not involve licence fees and provide users with no protection from interference.

We maintain a public register of radiocommunications licences, which includes frequency registrations for most apparatus and spectrum licences.

Radiocommunications licensing for space-based communications systems

As for all other types of radiocommunications devices, a space-based radiocommunications system may not be operated in Australia without a licence. In general, there are 2 broad approaches for licensing of space systems in Australia: individual earth station licensing and space system licensing. The selection is determined by the intended service type and frequency band.

A key requirement, irrespective of which approach to licensing is used, is that the satellite system must normally be filed with the ITU by the ACMA or equivalent national administration of an ITU member state.

Individual earth station licensing

Individual earth station licensing requires operators to obtain apparatus licences for each of their earth station transmitters and receivers individually: an earth licence or AWL for the uplink and an earth receive licence for the downlink.[3] This licensing option is generally

[3] The option of an area-wide licence (AWL) for satellite services is limited to the 26 and 28 GHz bands. In the 3400–4000 MHz band, an AWL may authorise operation of earth station receivers in certain circumstances described in RALI MS 47.

adopted for gateway earth stations and earth stations supporting space science services. It is also typically used in frequency bands shared with other types of wireless services.

Under this approach, a separate licence is not required for the space stations on board a satellite.

Other options available for earth station licensing include an amateur apparatus licence for communication with an amateur satellite or short-term temporary licensing under a scientific apparatus licence.

There are specific procedures to be followed when seeking these licences, which can be found in our business operating procedures for earth and earth receive apparatus licences. These detail the procedures for the submission, processing and assessment of applications for these licence types.

Space system licensing

Space system licensing involves a combination of apparatus and class licences. This type of licensing is available in certain frequency bands specified in the Radiocommunications (Communication with Space Object) Class Licence 2025 (the Space Object Class Licence).

In these bands, operators must licence the space stations on board a satellite with a space licence for the downlink and a space receive licence for the uplink. Once these licences are obtained, the earth stations in the operator's network are automatically authorised collectively under the Space Object Class Licence.

Satellite operators seeking this type of space system licensing arrangement must first be included in either the Radiocommunications (Australian Space Objects) Determination 2025 or the Radiocommunications (Foreign Space Objects) Determination 2025.

Space system licensing is typically used for satellite systems with numerous or ubiquitous earth stations. It provides an efficient means of licensing many earth stations, avoiding the need to obtain a licence for every earth station in a satellite system. This licensing option is generally adopted for satellite services providing satellite telephony, satellite internet-of-things or satellite-based internet services.

The process for obtaining *space* and *space receive* apparatus licences is detailed in an ACMA business operating procedure.

Satellite direct-to-device services

A satellite direct-to-device (D2D) service is a recent advancement in communications technology that provides direct connectivity between a mobile phone and a satellite network. This enables a mobile phone to communicate with satellites when it is outside the coverage area of both terrestrial cellular and wi-fi networks.

D2D services are divided into 2 delivery models: D2D in MSS (mobile-satellite service) spectrum and D2D in IMT (International Mobile Telecommunications) spectrum.[4] MSS D2D

[4] These services are intended to operate in frequency bands allocated to terrestrial mobile broadband services, known internationally as International Mobile Telecommunications (IMT) services. For more information on IMT, see https://www.itu.int/en/ITU-R/Documents/ITU-R-FAQ-IMT.pdf.

services operate in bands already allocated for satellite use and can generally be authorised under existing licensing arrangements.

IMT D2D services, however, use bands allocated to terrestrial mobile broadband services and raise unique regulatory considerations because these bands are not allocated for satellite use under domestic or international rules. Consequently, IMT satellite services operate internationally on a 'no-interference, no-protection' basis, requiring operators to cease or modify transmissions if harmful interference occurs.

In September 2024, we published a regulatory guide for industry confirming that an IMT D2D service proposing to use bands allocated to terrestrial mobile services can be operated under Australia-wide spectrum licences without the need for further approval from the ACMA.

There is no requirement for authorisation of the space stations operated in an IMT D2D service, as they are outside the geographic scope of spectrum licences and the provisions of the Radiocommunications Act.

For further details, refer to our Regulatory guide: Operation of an IMT satellite direct-to-mobile service.

Optical communications

We recognise the growing interest in the use of spectrum in the infrared optical range for satellite communications. The infrared portion of the electromagnetic spectrum is part of the spectrum between microwaves (300 GHz) to below visible red light (around 430 THz) (wavelengths of 1 millimetre to 700 nanometres).

The Radiocommunications Act regulates emissions up to 420 THz. As such, earth stations using infrared communications require authorisation under our radiocommunications licensing scheme (that is, an earth licence for the uplink segment and an earth receive licence for the downlink segment). Systems using visible light operating at frequencies above 420 THz are outside the scope of the Act and hence are not subject to regulation administered by the ACMA.

In 2021, we reviewed our pricing arrangements in frequencies used for optical communications to decrease the licensing costs of these systems. For services operating above 100 GHz, only the minimum fee is charged, which is currently $42.88 per year.[5]

Temporary authorisation for technology trials and research of optical infrared systems is available under scientific licensing.

Telecommunications carrier licensing

Telecommunications carrier licences permit the owner(s) of a network unit to supply carriage services to the public subject to obligations set out in the *Telecommunications Act 1997* (Telecommunications Act) and the licence itself, and any additional conditions that are imposed by the minister. There are 4 categories of network unit defined by the Telecommunications Act of which Category 3 (designated radiocommunications facility) includes satellite-based facilities.

[5] For current rates, see our apparatus licence fee schedule.

The Telecommunications Act facilitates the establishment of an open market access regime for providers of both telecommunications infrastructure and services. It removes the distinction between carriers on the basis of the technology they use and ensures that any licensing requirements do not place unnecessary regulatory barriers on the choices carriers may make about available technologies.

For some satellite services (for example, those using satellite-based facilities used to supply carriage services between 2 or more points in Australia), a carrier licence may be required.

Obligations of carriers include protection of consumer information, interception requirements, data retention and emergency call provision.

Satellite filing and coordination

Role of the ITU

The ITU is a specialised agency of the United Nations that facilitates global cooperation in the use of information and communication technologies. The legal framework of the ITU comprises the Constitution, Convention and Administrative Regulations (of which the Radio Regulations are a part). Together, these instruments aim to facilitate the rational, efficient and equitable use of the radiofrequency spectrum and associated orbits and prevent instances of harmful interference. A complete overview of these regulations is beyond the scope of this document – further information is available on the ITU website.

Under the ITU Radio Regulations – an international treaty to which Australia is a signatory – national administrations of ITU member states[6] may file satellite systems[7] with the ITU. The Radio Regulations specify the international process of coordination and publication of technical parameters for satellite systems.

In Australia, satellite operators seeking international recognition of a new satellite system are required to provide technical information about the system to the ACMA. After review and approval, we submit this information to the ITU, a process commonly referred to as 'filing'. Once filed, the ITU publishes the information, enabling administrations of other ITU member states to assess the proposed system and determine whether it may cause interference to their terrestrial or satellite systems. This information submitted to and published by the ITU is referred to as an 'ITU satellite filing'.

Publication of the satellite system typically starts a process known as satellite frequency coordination.

The purpose of a satellite filing and satellite frequency coordination is to gain international recognition of the spectrum and orbital resources used by a satellite system. This process leads to the ITU recording the technical data and frequency assignments of the system in its Master International Frequency Register (MIFR). This operates as a first-in-time system,[8] whereby any new satellite system must coordinate[9] with administrations identified by the ITU before it can be recorded in the MIFR.

Satellite operators may approach any national administration, including the ACMA, to undertake this work. Each national administration may set its own policies about which satellite operators it will accept.

[6] At the time of writing, there were 194 member states of the ITU including Australia.
[7] A satellite system is defined in the ITU Radio Regulations as any group of cooperating earth stations and/or space stations using one or more artificial earth satellites.
[8] The intent of this process is to identify the national administrations with whom coordination is to be addressed – not to state an order of priorities for rights to spectrum at a particular orbital position.
[9] The requirement to coordinate varies across different types of services and frequency bands.

Role of the ACMA

In Australia, satellite filing work is considered a spectrum management function under the ACMA Act.[10] In undertaking this work, we also consider the international regulatory framework of the ITU, other treaty-level agreements, and Australian law. We undertake satellite filing work on a cost-recovery basis.

Before operating a satellite network in Australia, the technical details of the network must be filed with the ITU. The ITU only deals with administrations of ITU member states in the satellite filing process, not with satellite operators. As part of its spectrum management function, the ACMA acts as the Australian administration responsible for the ITU's international process of management of frequencies for satellite communications.

Our policies and procedures regarding the assessment and submission of satellite filings to the ITU are described in the Australian satellite filing procedures. This document sets out:

- the ACMA's application and assessment process for a new or modified ITU satellite filing
- procedures for approved applicants and the ongoing obligations of satellite operators.

The satellite filing submitted to the ITU by the ACMA remains the responsibility of the ACMA (for the Commonwealth of Australia) as only administrations of ITU member states can submit, modify or suppress information related to satellite systems with the ITU, and exchange coordination information with other administrations.

We may, in accordance with the provisions of the Australian satellite filing procedures, provide for the exclusive use of an ITU satellite filing to a satellite operator. However, this does not confer a right to operate a satellite in Australia. As for all other types of radiocommunications, a satellite system may not be operated in Australia without a licence issued by the ACMA. A satellite filing (either filed through Australia or another country) is a prerequisite that must be in place before an apparatus licence can be issued.

Following the ACMA's submission of the satellite system information to the ITU, other national administrations may advise the ACMA of existing and planned services that may be affected by the proposed satellite network. We assist the satellite operator to coordinate their proposed satellite network with these countries. Finally, we notify the ITU of the satellite network's final technical parameters and seek inclusion of the network in the Master International Frequency Register (MIFR). This provides international recognition of the satellite network, which grants protection from interference following deployment into space.

Satellite operators typically have 7 years to deploy the satellite system and commence communication activities, starting from the date when details of the network are first filed with the ITU. This is known as 'bringing into use' (BIU). If a satellite network has not been brought into use after the allotted time, the filing expires and is permanently deleted.

During the 7-year BIU period, the spectrum resources required by the proposed system are effectively quarantined, thereby constraining use by an alternative service. This limit allows

[10] The filing of a satellite system falls within the spectrum management functions of the ACMA under paragraph 9(j) of the ACMA Act in that it is incidental to or conducive to the performance of the management of the radiofrequency spectrum as set out in paragraph 9(a) of the ACMA Act, which is done in accordance with the *Radiocommunications Act 1992*.

operators a reasonable timeframe to deploy a satellite system, while ensuring that scarce spectrum resources are not withheld indefinitely.

Proponents of new satellite systems must apply to the ACMA to commence the ITU satellite filing process. Our decision to approve an application is based on several criteria, including compliance with national and international regulations, compatibility with domestic spectrum planning arrangements, and the Australian benefit that will be derived from the satellite network's use of the radiofrequency spectrum. For further information on our assessment process for new satellite networks, please see the Australian satellite filing procedures.

International engagement

The ACMA, Australian industry and other government stakeholders participate in international radiocommunications forums to promote and protect Australian interests in spectrum management. This includes spectrum harmonisation and international frequency coordination for space-based communications services.

The peak international forum is the quadrennial ITU World Radiocommunication Conference (WRC), which reviews and revises the ITU Radio Regulations, the international treaty governing use of the spectrum and satellite orbits.

Other forums within the ITU and regionally within the Asia-Pacific Telecommunity (APT) consider issues with a technical focus that are of significance to Australian spectrum management, including ITU-R study groups and working parties, and the APT Wireless Group (AWG).

The Department of Infrastructure, Transport, Regional Development, Communications, Sport and the Arts leads Australia's participation in WRCs and the APT Conference Preparatory Group for the WRC.[11]

The ACMA provides expert technical, regulatory and strategic advice to the department, and leads Australia's engagement in technical radiocommunication forums. We coordinate the 6 Australian Radiocommunication Study Groups (ARSGs) – groups of experts in the work of their respective ITU-R Study Groups – that help to form Australian positions on issues considered at the international level.

We also undertake informal bilateral and multilateral engagement with peer regulators from around the world. This engagement is invaluable in coordinating international activities and sharing information from other spectrum managers on issues of common interest.

[11] For more information, see International radiocommunications | Department of Infrastructure, Transport, Regional Development, Communications, Sport and the Arts.

Contact us

We welcome enquiries on the issues set out in this information paper.

We also encourage satellite operators who wish to submit an ITU satellite filing or obtain a licence to operate in Australia to contact us for advice in the early stages of system development.

For further enquires:

- email satellite.coordination@acma.gov.au
- or mail:

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