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The Role of the Australian Communication and Media Authority (ACMA) in GNSS
Protection and Regulation

Kirsten Musgrove

1. Introduction

The Australian Communications and Media Authority (ACMA) is responsible for regulating telecommunications and radiocommunications in Australia, including promoting industry self-regulation and managing the radiofrequency spectrum. ACMA also has significant consumer protection responsibilities.

ACMA was established in July 2005 under the Australian Communications and Media Authority Act 2005, and exercises powers under the Telecommunications Act 1997, the Telecommunications (Consumer Protection and Service Standards) Act 1999, the Radiocommunications Act 1992, the Spam Act 2003, and other related legislation.

ACMA falls under the Communications, Information Technology and the Arts portfolio. The responsible Minister is the Hon. Helen Coonan MP.

ACMA works closely with the communications industry to achieve active self-regulation, while ensuring industry compliance with licence conditions, codes and standards and monitoring the effect of regulations to ensure they are responsive to the community's needs.

1.1 Main Functions of ACMA

The main functions of ACMA are to:

- Represent Australia in international regulation of communications
- Manage access to the radiofrequency spectrum through radiocommunications licensing
- Resolve competing demands for spectrum through price-based allocation methods
- Investigate and help in resolving radiocommunications interference
- License telecommunications carriers and ensure compliance with licence conditions and carriage service provider rule
- Regulate industry compliance with mandatory standards and voluntary codes of practice
- Administer legislative provisions relating to powers and immunities of carriers in constructing telecommunications facilities
- Monitor compliance with consumer safeguards and service guarantees
- Administer universal service initiatives
- Report on telecommunications industry performance

- Maintain and administer the Telecommunications Numbering Plan
- Inform industry and consumers about communications regulation
- Regulate transmission of unsolicited electronic email (spam).

2. Regulation of the Radiofrequency Spectrum

Under the Radiocommunications Act 1992 (the "Act"), ACMA is, among other things, responsible for managing and regulating the radiofrequency spectrum. Access to the radiofrequency spectrum is facilitated by ACMA through licensing the operation of equipment, managing interference between services and ensuring industry compliance with mandatory standards.

3. Licensing of Radiocommunications Devices

Generally speaking all radiocommunications transmitters must be licensed. The only exceptions relate to emergencies where a person does not contravene section 46 or 47 of the Act by operating a radiocommunications device, or having a radiocommunications device in his or her possession, in the reasonable belief that the operation or possession was necessary for the purpose of:

- securing the safety of a vessel, aircraft or space object that was in danger; or
- dealing with an emergency involving a serious threat to the environment; or
- dealing with an emergency involving risk of death of, or injury to, persons; or
- dealing with an emergency involving risk of substantial loss of, or substantial damage to, property.

There are three types of radiocommunications licences apparatus licences, class licences and spectrum licences.

Radiocommunications equipment typically authorised under an apparatus licence includes stations operating in the Outpost, Amateur, Broadcasting, Maritime, Aircraft and Land Mobile services. Operation of equipment under an apparatus licence involves the payment of licence fees. Individual licences are issued to authorise the operation of equipment.

Class licences are open, standing authorities that allow anyone to operate particular radiocommunications equipment provided that the operation and the device is in keeping with the conditions of the licence. Class licences do not have to be applied for and no licence fees are payable. Equipment that is currently subject to class licensing in Australia includes citizen band radios, mobile phone handsets, cordless telephones and a range of other low power devices, such as garage door openers.

Spectrum licensing is a form of licensing introduced in Australia by the Act. Spectrum licences are a tradeable, technology neutral (that is, the licence is not related to any particular technology, system or service) spectrum access right for a fixed non renewable term. Instead of authorising the use of a specific device,

spectrum licences authorise the use of spectrum space and give licensees the freedom to deploy any device from any site within their spectrum space, provided that the device is compatible with the core conditions of the licence and the technical framework for the bands.

4. GNSS in Australia

The Radionavigation-Satellite Service (RNSS), also known as the Global Navigation Satellite System (GNSS), is a worldwide position, velocity and time determination system that involves the use of satellites, as well as supporting infrastructure on the ground. It includes the Global Positioning System (GPS), which is the predominant RNSS used in Australia.

The Australian GNSS Coordination Committee (AGCC) is a committee established by Deputy Prime Minister and Minister for Transport and Regional Services, the Hon John Anderson MP to consider and develop mechanisms to coordinate all land, sea and air aspects of GNSS, promote the safe and effective utilisation and development of GNSS in Australia, and coordinate national security issues, the application of augmentation systems, and the national use of GNSS in other relevant applications. As ACMA is the regulator of radiocommunications in Australia, it was felt it would not be appropriate for ACMA to be a member of the AGCC, however ACMA does provide advice to the Committee.

In December 2001 the AGCC requested that devices that jam RNSS signals be declared prohibited devices under section 190 of the Act. The devices are designed to deliberately interfere with RNSS reception through the emission of radiofrequency energy. The devices are relatively easy and inexpensive to make and can be purchased from overseas.

A RNSS jamming device is defined as a device designed to have an adverse effect on the reception by RNSS receivers of RNSS radiocommunications and would be likely to substantially interfere with, disrupt or disturb the reception by RNSS receivers of RNSS radiocommunications. GPS is a satellite based radionavigation system developed and operated by the United States Department of Defense (US DoD). Currently GPS satellites transmit on two frequencies, known as L1 (1.57542 GHz), and L2 (1.22760 GHz). There are plans to implement a further signal known as L5 (1.17645 GHz). The bandwidth for these signals is nominally 24 MHz. Individual apparatus licences are issued to Australia's Department of Defence for each of these GPS frequencies.

Russia operates a similar system known as GLONASS and the European Union is in the process of developing its own system, GALILEO. GLONASS operates on different frequencies from the US DoD GPS. GALILEO will operate on the same frequencies as the US DoD GPS using different codes to separate the signals.

GPS provides highly accurate positioning (three dimensional), timing and velocity data to a common worldwide standard and is already being used extensively in a wide range of sectors including: aviation; emergency services; land transport; communications; timing; resources; maritime; and security. Two GPS services are provided: one for civilian use; and one for military use which provides a higher level of accuracy than that provided for civilians. The ground segment is generally authorised by a class licence issued by ACMA-the Radiocommunications (Communication with Space Object) Class Licence 1998.

GPS receivers work by receiving low powered signals from at least four satellites for the purpose of identifying the location of the receiver in time and space. GPS receivers are becoming everyday items located in cars, boats and ships as navigation tools/aids; emergency position indicating radio beacons for safety and rescue; and used by many organisations to identify locations of physical infrastructure for inventory or logistics purposes. GPS signals also provide accurate times for utilities such as ATM banking and GSM telephones. The GSM telephone system relies on GPS for the accurate timing it requires to operate effectively.

As GPS uses radiofrequency (RF) signals it is susceptible to performance degradation due to interference, like any other RF system. The effects of interference can range from degradation in navigational accuracy to a complete loss of the receiver tracking. This interference can be either unintentional or intentional. Unintentional interference can be caused accidentally by everyday devices such as mobile telephone signals in close proximity to a GPS receiver. This affects reception of the GPS signal by overloading the front end of the GPS receiver. Another form of unintentional interference can be caused naturally by blockage of the satellite signal by buildings and topography.

Intentional interference can be in two forms: corruption to cause inaccuracies in the received signal so the GPS receiver provides spurious results; and total blockage of the signal so the receiver never 'sees' the signal. Intentional interference to a system which affects the accuracy of the signal is known as 'spoofing', while intentional interference which blocks the signal is referred to as 'jamming'. For the purposes of this paper, jamming will be the term used to cover both forms of intentional interference.

As a result of initial investigations and lack of a specific problem identified in Australia, ACMA initially considered GPS interference caused by jamming devices was not an issue. However, because of the relative ease with which a GPS jammer could be built and the significant potential for disruption to a wide range of services ACMA considered that the issue should be properly considered and a public consultation process was undertaken in 2003.

5. Prohibition of the Use of Certain Devices

In Australia it has been possible since 1905, under successive Acts of Parliament, for radiocommunications devices to be prohibited.

5.1 Legislative Arrangements

The power to declare the operation or supply, or possession for the purposes of operation or supply, of radiocommunications devices to be prohibited stems from Part 4.1, Division 8 of the Act.

Section 189 of the Act makes it an offence to operate or supply, or possess for the purposes of operation or supply, a prohibited device, without reasonable excuse. Section 189 also details the penalties that apply if a person is found guilty:

- if the offender is an individual - imprisonment for two years or
- otherwise - 1,500 penalty units (currently \$165,000).

Section 190 of the Act describes the manner in which ACMA may declare a device to be prohibited and the kinds of devices that may be declared to be prohibited. Such devices must be devices that:

- are designed to have an adverse effect on radiocommunications or
- would be likely substantially to:
- interfere with radiocommunications or
- disrupt or disturb radiocommunications in any other way or
- are radiocommunications transmitters or radiocommunications receivers that would be reasonably likely to have an adverse effect on the health or safety of persons who:
- operate the devices or
- work on the devices or
- use services supplied by means of the devices or
- are reasonably likely to be affected by the operation of the devices.

A declaration is a disallowable instrument for the purposes of section 46A of the Acts Interpretation Act 1901. A declaration is taken to be a statutory rule within the meaning of the Statutory Rules Publication Act 1903.

Section 191 of the Act requires ACMA to undertake public consultation in a specified manner before making a declaration that a device is prohibited. ACMA, in a notice published in the Commonwealth of Australia Gazette must:

- describe the device
- specify the reasons why ACMA proposes to make a declaration
- invite interested persons to make representations about the proposed declaration within a period not less than one month after the date of publication of the notice and
- specify the address to which representations may be sent.

5.2 Devices Declared To Be Prohibited By ACMA

The operation or supply or possession for the purposes of operation or supply, of the following devices have been declared to be prohibited by ACMA under section 190 of the Act.

5.3 Mobile Telephone Jammers

Mobile telephone jammers transmit signals that interfere with reception from cellular telephone base stations. All mobile phones could suffer harmful interference (be 'jammed') within a distance of up to four kilometres from the jamming device. ACMA's spectrum management responsibilities are to facilitate access to the radiofrequency spectrum for all forms of radiocommunications, including those used to provide public mobile telecommunications services. These responsibilities include provisions relating to minimising intentional and unintentional interference to radiocommunications.

ACMA also has a responsibility for setting electromagnetic radiation standards and is concerned that radiation levels of some of these devices may result in exposure levels exceeding the maximum permitted under the current Australian health exposure standard.

It is a requirement of the Act that the operation of all radiocommunications transmitters within Australia be authorised by a radiocommunications licence. While jammers are transmitters, the operation of which would require a licence, the interfering and disruptive nature of these devices means that they could not be licensed under normal circumstances.

On 26 November 1998, the Australian Communication Authority (ACA) began public consultation about a proposal to prohibit the operation or supply, or possession for the purposes of operation or supply, of devices designed to operate within the frequency bands 870-960 MHz or 825-845 MHz and to interfere with radiocommunications or disrupt or disturb radiocommunications. As required under section 191 of the Act, the ACA published a notice seeking public comments about the matter in the Commonwealth of Australia Gazette of 2 December 1998.

Following consideration of comments received, the ACA decided to make a declaration prohibiting the operation or supply, or possession for the purposes of operation or supply of mobile telephone jammers on 4 March 1999. The declaration was given effect by advertisements appearing in newspapers circulating generally in the capital cities of Australian States and Territories on 10 March 1999.

5.4 Radionavigation-Satellite Service (RNSS) Jammers

Given the widespread use of the GPS and its vulnerability to interference, the ACA decided to prohibit RNSS jamming devices. RNSS jammers transmit signals that interfere with RNSS signalling and reception. Jammers can affect services over significant distances. The ACA's spectrum management responsibilities are to facilitate access to the radiofrequency spectrum for all forms of radiocommunications. These responsibilities include provisions relating to minimising intentional and unintentional interference to radiocommunications.

It is a requirement of the Act that the operation of all radiocommunications transmitters within Australia be authorised by a radiocommunications licence. While jammers are transmitters, the operation of which would require a licence, the interfering and disruptive nature of these devices means that they could not be licensed under normal circumstances.

In August 2003, the ACA began public consultation about a proposal to prohibit the operation or supply, or possession for the purposes of operation or supply, of devices designed to:

- have an adverse effect on the reception by RNSS receivers of RNSS radiocommunications; and
- would be likely to substantially interfere with, disrupt or disturb the reception by RNSS receivers of RNSS radiocommunications.

As required under section 191 of the Act, the ACA published a notice seeking public comments about the matter in the Commonwealth of Australia Gazette of 13 August 2003.

Following consideration of comments received, the ACA decided to make a declaration prohibiting the operation or supply, or possession for the purposes of operation or supply, of RNSS jammers on 25 August 2004. The declaration was given effect by advertisements appearing in The Australian Newspaper on 28 August 2004 and commenced on gazettal on 1 September 2004.