
# IoT and Spectrum – the ACMA's role

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As Australia's Communications Regulator, the ACMA has responsibility for the planning and management of Australia's radiofrequency spectrum. The 'internet of things' (IoT) is one of a number of exciting developing wireless applications that require access to radiofrequency spectrum for operation. This paper outlines the ACMA's role regarding spectrum access for IoT and some of the initiatives that have been and are being pursued by the ACMA to support IoT.

## IoT and spectrum

The ITU defines IoT as: *a global infrastructure for the information society, enabling advanced services by interconnecting (physical and virtual) things based on, existing and evolving, interoperable information and communication technologies*[1].

The Communications Alliance describes IoT in its Industry Report[2] as follows:

> *The IoT is an environment that gathers information from multiple devices (computers, vehicles, smart phones, traffic lights, social media and anything with a sensor or actuator) and applications – anything from a social media app like Twitter to an e-commerce platform, from a manufacturing system to a traffic control system.*
>
> *Where the IoT gets even more interesting is where information from devices and other systems is combined in novel ways, tapping into the huge processing capabilities available today to do the kinds of expansive analysis usually associated with the concept of big data – meaning analysis of data not necessarily designed to be analysed together to create beneficial outcomes.*

Given the diverse range of uses and users of IoT, these applications are being deployed across a broad range of radiofrequency bands under a mixture of spectrum authorisation protocols. This is illustrated in Figure 1.

Currently in Australia there are three types of radiocommunications licences. Each of these have different features which lend themselves to particular IoT applications. These are:

- Class licensing - sometimes referred to as the 'public park' or 'spectrum commons' approach, class licensing allows users to operate devices in designated segments of spectrum on an uncoordinated and shared basis. Users must operate devices in accordance with specified parameters;

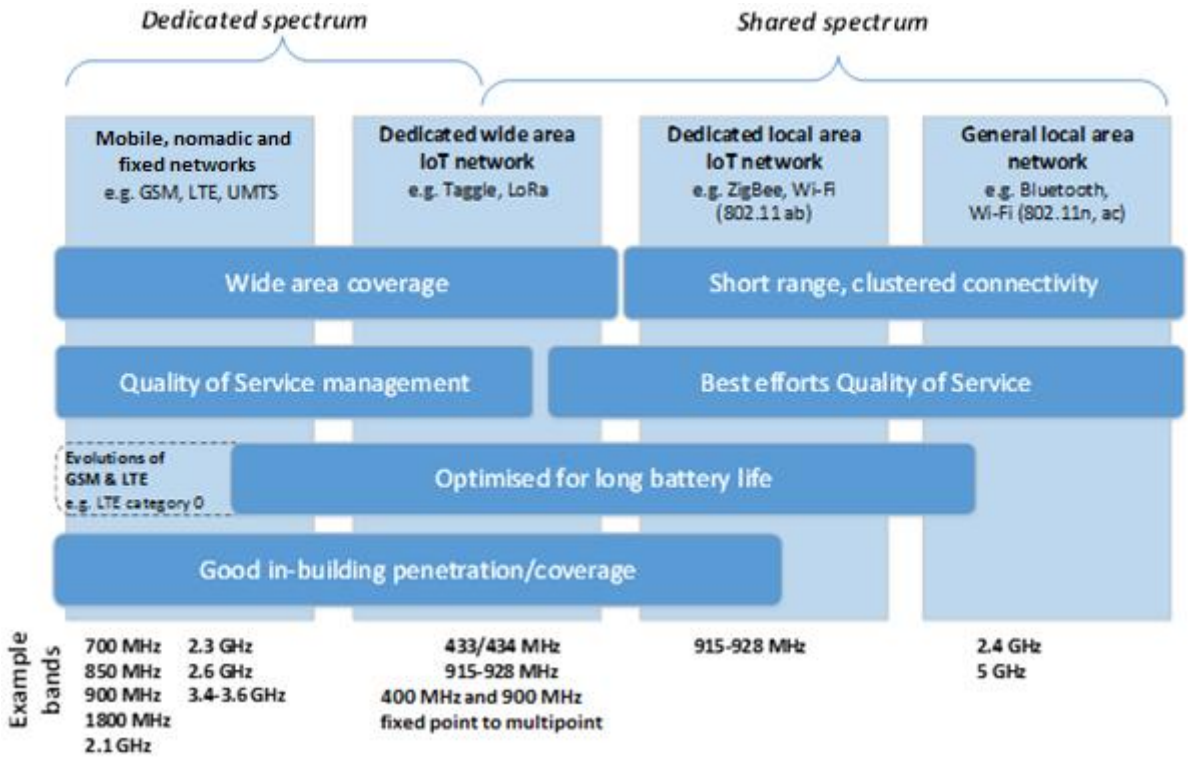
- Apparatus licensing- typically site-based licensing where individual transmitters or receivers are coordinated against existing services using a set of technical conditions and licensed for a fee; and

- Spectrum licensing - area-based licensing where a block of spectrum is licensed to one party over an area. Typically used for cellular networks.

[1] Recommendation ITU-T Y.2060- Overview of the Internet of things

[2] Enabling the Internet of Things for Australia, An Industry Report commissioned by the Communications Alliance Internet of Things Think Tank Executive Council, October 2015

**Figure 1: Spectrum available for IoT applications**




*Source: ACMA, based on Ofcom model 2015, updated for Australian spectrum band plans.*

In many cases, there is radiofrequency spectrum already available for use for IoT applications. For example, IoT applications using 'commons' spectrum which doesn't require individual licensing can be rolled out now provided they comply with the technical requirements that are in place. A further example is IoT applications on networks using spectrum that is already licensed, such as existing cellular networks. These applications can and are being deployed in a range of bands within the existing regulatory framework in cooperation with existing licensees.

## Australia's radiofrequency spectrum

The International Telecommunication Union (ITU) Radiocommunications Sector (ITU-R) is the organisation whose role is to manage the international radiofrequency spectrum. In the ITU Radio Regulations the world is divided into three ITU Regions namely Region 1 (Africa, Europe and the Middle East), Region 2 (Americas) and Region 3 (Asia and Oceania).

While there is harmonisation of arrangements to varying extents across the globe, in some cases, radiofrequency arrangements differ across each of the three Regions or even across different countries. An example is in the 900 MHz band, which is discussed below. As a relatively small radiocommunications market, Australia is often faced with decisions to choose between a number of arrangements in a particular radiofrequency band. Decisions to harmonise with a particular overseas use of a band must also take account of existing arrangements in Australia, including any occupants of the band in question. For these reasons, depending on the choice of arrangements adopted in Australia, equipment used overseas is not always able to be used in Australia. However, there are opportunities for harmonisation with those markets whose arrangements have been adopted in Australia. The ACMA has developed a fact sheet outlining the range of radiofrequency spectrum arrangements which are in place to support IoT applications. The ACMA is also available to provide advice on whether equipment may or may not be compatible with Australian arrangements.

### Case Study– the 900 MHz band

A number of popular emerging applications of IoT use low-power, low data-rate technologies which operate in and around the 900 MHz band. The 900 MHz band is an example of a radiofrequency band where a choice between different spectrum arrangements has been made for adoption in Australia. Relevantly, Australia has adopted a mix of cellular mobile telephony arrangements from both Europe and the US. From Europe, Australia has adopted the "GSM" band (890-915 MHz paired with 935-960 MHz) and from the United States the 850 MHz band (825-845 MHz paired with 870-890 MHz), as well as part of the adjacent land mobile allocation.

This mix of different cellular mobile solutions means that some spectrum used for IoT applications internationally is unable to be used in Australia. For example, in the US the frequency band 902-928 MHz is available as 'commons' licence-fee free spectrum, however, only the 915-928 MHz portion of the band is available in Australia, due to the overlap with the European (and Australian) GSM band. Similarly, while a number of IoT devices operate around 868 MHz in Europe, this is not available in Australia due to the overlap with the US 850 MHz band. Given Australia's harmonisation with larger radiocommunications markets, there are significant opportunities for the Australian IoT industry to both import devices from overseas that it compatible with Australian arrangements and develop equipment for export that is compatible with a range of international markets.

## ACMA IoT initiatives

Given the huge diversity of users and uses of IoT, there is no one simple solution to spectrum access for all of these applications. IoT is trending towards requiring access to a range of different bands under a range of access protocols, from dedicated spectrum to 'commons' spectrum and options in between. Therefore, the ACMA is monitoring developments in IoT to ensure that all relevant spectrum arrangements take into account these emerging applications.

With respect to low power, low data date IoT applications using the 900 MHz band, the ACMA has taken steps, as part of the implementation of the ACMA's review of the 803–960 MHz band, to make new spectrum available to support a range of applications, including machine-to-machine applications such as automation, switching, metering and control. While permanent arrangements are not set to be in place until 2021, applications for early access may be considered on a case-by-case basis provided existing services are able to be coordinated against.

In a second initiative, class licensing arrangements for existing spectrum in the 'commons' part of the 900 MHz band (915-928 MHz) were recently updated to better facilitate the use of low data rate machine-to-machine wireless internet interconnections.

Related to IoT is the ACMA's initiatives regarding Cooperative Intelligent Transport Systems (C-ITS). The ACMA is in the process of developing spectrum access and licensing arrangements to facilitate the introduction of C-ITS in the 5855-5925 MHz band. Further progress is expected on this in the second half of 2016.

The Spectrum Planning and Engineering Branch has been charged with managing the ACMA's approach to spectrum for IoT and is keen to continue engagement with all parts of industry. Contact details are as follows:

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