Optus submission to ACMA on Proposal to Remake the Radiocommunications (Low Interference Potential Devices) Class Licence 2000

Background

The ACMA wrote to incumbent 3.4 GHz licensees on 18 Dec 2014 advising them that the proposal to remake the Radiocommunications (Low Interference Potential Devices) Class Licence 2000 included, among other things, arrangements for ultra-wideband (UWB) devices to be permitted in the spectrum licenced 3400-3600 MHz range.

The ACMA has occasionally visited the issue of UWB technology. In April 2010 the ACMA issued the consultation paper “Planning for Ultra-Wideband (UWB) – Proposals for the introduction of arrangements supporting the use of UWB devices operating in the 3.6–4.8 GHz and 6.0–8.5 GHz bands in Australia” and more recently in March 2014 with its discussion paper “Proposed variation to the Radiocommunications (Low Interference Potential Devices) Class Licence 2000”.

In 2010, Optus indicated that it supports the current regulatory position that, in practical effect, prohibits the use of UWB devices in any spectrum licensed band. This is reflected in s.138 of the Radiocommunications Act 1992 which states:

“The ACA must not issue a class licence that authorises the operation of radiocommunications devices at frequencies that are within a part of the spectrum that is designated under section 36 to be allocated by issuing spectrum licences”

In 2010 Optus indicated it would strongly oppose any moves to relax or amend the current prohibition regarding the issuance of class licences within a spectrum licenced band. Optus has not altered its view.

In 2014, the ACMA indicated that the proposed provisions for UWB in the bands 3.6-4.8 GHz and 8.4-8.5 GHz were removed to allow further discussion with stakeholders to occur without delaying the implementation of other proposals.

Optus’ comments regarding the proposal to remake the LIPD Class Licence are confined to the potential impact to spectrum licensed space owned by Optus or its subsidiaries. Optus makes no comments on other elements of the proposal to remake the Radiocommunications (Low Interference Potential Devices) Class Licence 2000.
ACMA LIPD Proposal in the 3.4-3.6 GHz band

The ACMA proposes to add a new Item 78 to the LIPD Class Licence Schedule 1 permitting UWB operation in the range 3400-4800 MHz provided that:

a) the transmitter complies with ETSI EN 302 500 or EN 302 065;
b) the transmitter is not operated on an aircraft or a fixed outdoor location; and
c) there is a restriction regarding proximity to Australian radioastronomy sites.

These proposals would come into effect on 15 December 2015, namely, after existing spectrum licences in the 3.4-3.6 GHz band have expired, and new licences are reissued with conditions that explicitly allow UWB.

The provisions of s.138 of the Radiocommunications Act can only be overridden if:

a) issuing the class licence would not result in unacceptable levels of interference to the operation of radiocommunications devices operated, or likely to be operated, under spectrum licences; and
b) issuing the class licence would be in the public interest.

It is Optus’ view that the ACMA has not demonstrated the “public interest” that is a mandatory prerequisite for being able to issue such a class licence. Further, it is Optus’ view that the ACMA is not in a position to provide sufficient levels of certainty or guarantees that such a class licence would not result in unacceptable levels of interference to the operation of radiocommunications devices operated, or likely to be operated, under a spectrum licence in the 3.4-3.6 GHz range.

Optus Concerns regarding UWB in the 3.4-3.6 GHz band – unacceptable levels of interference

The ACMA contends in its discussion paper (p.8) that recent re-evaluation of the interference risks of coexistence between UWB services and spectrum licenced services has substantially concluded that the risks are minimal:

“Further examination of current overseas experience and arrangements however indicates that this risk is minimal given the mitigation techniques required of the UWB transmitters imposed by the existing ETSI standard requirements which would be mandated in the LIPD class licence. In particularly, the ACMA consideration of experience of overseas UWB deployments has not identified verified evidence that indicates that the UWB limitations proposed in the LIPD are not sufficient to provide co-existence with other spectrum uses.”

The Federal Communications Commission (FCC) in the United States has established a mean power limit of -41.3 dBm/MHz EIRP for UWB transmitters operating in the 3.1 – 10.6 GHz range. The European Telecommunications Standards Institute (ETSI) standard EN 302 065 specifies a maximum mean EIRP of -80 dBm/MHz for UWB devices operating in the 3.6 – 3.8 GHz range, or a much higher mean EIRP of -41.3 dBm/MHz (the same as that proposed by the FCC) if interference mitigation techniques are adopted, namely, Low Duty Cycle (LDC) or Detect And Avoid (DAA) mitigation techniques.

Mitigation techniques such as LDC and DAA are absolutely essential if the accumulation of RF energy from multiple UWB devices is to be managed and controlled within acceptable limits. Without such
mitigation, any proliferation of UWB devices will create an unstoppable rise in the RF noise floor and potentially impact licensed radio services in the future.

The debate is whether these mitigations are sufficient to reduce the interference risk, particularly over the long term, to negligible levels to other services operating in the spectrum licenced band. For example, Optus has reviewed research\(^1\) which examined coexistence between UWB and WiMax in the 3500 MHz band (comparable to operating 4G TDD in the same band), for both single and multiple UWB interferers:

“In summary, from the results presented in Figures 2, 3, 4 and 5 it can be concluded that the power density of -41.3 dBm/MHz recommended by FCC, implies a very high range reduction, unless Detect and Avoid (DAA) techniques are implemented.”

While this might appear to give the green light if DAA or LDC mitigation techniques are employed, the fact remains that these techniques are not perfect (the “hidden node” problem with DAA, and the “periodic clash” with LDC) and when the UWB device does transmit, it transmits at the full permitted power of -41.3 dBm/MHz which, according to this research, demonstrably impacts spectrum licenced services.

The other consideration is that if Optus or any other licensee rolls out 4G services in the 3.5 GHz band and these services are intensively used, any UWB device in the same band would actually have few opportunities to transmit if the DAA technique works well, which is self-defeating for the UWB device, or will interfere periodically if the LDC technique is employed, which harms the spectrum licenced service and results in a reduced spectrum utility and efficiency for the spectrum licence owner. Neither of these outcomes serves the public interest.

While UWB may appear relatively benign, it is impossible to guarantee that any future quantity of UWB devices will not materially add to the noise floor in a spectrum licenced band and, in particular, negatively impact a TDD system operating in that band. If there are enough UWB devices in a given area, their cumulative emissions may well be material, despite the use of DAA or LDC. Unlike coexistence in “public park” or other spectrum bands, if this occurs in a spectrum licenced band there is no way to “undo” the damage.

At least with UWB coexistence in “public park” or other spectrum bands, any accumulated damage is contained and inflicted upon other similar types of services, none of which have spectrum tenure rights or absolute protection from interference.

It is Optus’ view that UWB must only be permitted where any future proliferation of UWB devices will ultimately only damage the usefulness and functionality of other UWB devices, or other similar services, and not to any spectrum licensed services.

Has the “Public Interest Test” been satisfied?

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\(^1\)“UWB Coexistence with 3G and 4G Cellular Systems”, Ahmed Bazil Taha and Miguel Calvo Ramon, InTech, 2012
Under s.138 (2)(a)(ii) of the Radiocommunications Act 1992, the ACMA must determine that it is in the public interest for a class licence to be issued in a spectrum licensed band. Optus contends that in the case of UWB in the 3.4-3.6 GH band, the ACMA has not demonstrated this public interest exists.

In July 2013, Optus attended a Standards Australia’s Radiocommunications Committee RC/6 meeting and at the time the ACMA admitted that it had received few requests for approval of UWB devices under the framework agreed in 2010. The ACMA has provided no evidence in its March 2014 discussion paper that the demand for UWB devices has increased since 2013, or that UWB class licence applications to ACMA have increased, or that specifically the demand has increased for UWB to be permitted in the 3.4-3.6 GHz band.

The discussion paper also does not reflect to that fact that industry has largely lost interest in UWB as an emerging or future technology, mostly due to the lack of standards and the chicken-and-egg problem that technology investment requires a demonstrable market demand which has been lacking. In some sense, UWB is a solution in search of a problem.

Industry progress on UWB basically stopped in 2007 despite regulatory amendments made by FCC and Ofcom to support some form of deployment. The lack of UWB deployments means it is not possible for ACMA to demonstrate proof that the technology works without impacting spectrum licensed services.

One industry article\(^2\) regarding the closure of yet another UWB start-up noted that:

“...to build that case the chips needed to be cheap enough to justify their addition to laptops, displays and other products. To get costs down, chip start-ups needed to sell a lot of chips—something they can’t do unless there’s a large market demand for the technology”

Some recent articles\(^3,4\) have suggested that UWB may find new life in the “Internet of Things” (IoT) or for location services, but even then industry may decide to focus instead on alternative and more established technologies such as Bluetooth Low Energy (BLE) and RFID. Hence demand for UWB and the development of an ecosystem remains firmly in the realms of speculation and regulatory accommodation should be restricted to less critical “public park” or similar spectrum bands.

Further, the applications proposed for UWB require extremely low cost devices in order to create a viable business case and ecosystem, which seems incompatible with the need for sophisticated context awareness and active interference management – both of which cost money to implement effectively.

In summary, regarding the “public interest test”:

- The ACMA has apparently had few requests for approval of UWB devices under the framework agreed in 2010 and has not demonstrated any increase in demand for UWB class licensed applications;

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3 “Ultrawideband returns from the grave! This time as a location play.”, gigaom.com, Oct 2014 (https://gigaom.com/2014/10/06/ultrawideband-returns-from-the-grave-this-time-as-a-location-play/)

• UWB has a chequered history, with UWB-related companies going out of business and a growing view that the technology is considered dead;
• There are substantial ecosystem development and cost barriers to the development of a viable UWB technology platform and the ACMA should not consider regulatory accommodation of UWB in spectrum licensed bands until these are solved; and
• Alternative technologies such as Bluetooth Low Energy (BLE) and RFID may be better placed to meet the objective of high speed short range communications.

Therefore, Optus contends that any regulatory accommodation of UWB should be in non-spectrum licenced bands, where any long-term damage or spectrum pollution can be confined to similar services.

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