Bureau of Meteorology Response to the ACMA IFC-07-2020 Consultation Paper: Implementation of the Spectrum Pricing Review - Proposed guidelines and focus areas for change

Introduction

All ACMA licences held by the Bureau are of the apparatus type and span diverse frequency bands and population density and geographic settings. Any changes to the associated taxation formula(s) that result in increased costs to the Bureau have the potential to significantly impact its annual budget. Depending on the Government's response to the ensuing need to increase the Bureau's budgetary allocation to compensate, increased licensing costs may impact its ability to maintain or expand crucial safety-of-life services to the Australian public, other Government agencies and industry.

Responses to Relevant Questions

Question 2

Do stakeholders have any views on the legislative and policy environment that may be relevant to the pricing issues outlined in this paper?

The Bureau would like to offer some comments on its public good applications of spectrum in the context of the following subset of *Principles for spectrum management* listed on page 10 of the Consultation paper.

1. Allocate spectrum to the highest value use (HVU) or uses

The valuation of spectrum used by the Bureau and other organisations for public good applications has been and will continue to be complex and problematic. It must not only take into account the value of existing use of the spectrum, but also future value to society and the need to expand and improve those applications as demand for associated services increases. Another factor that must be taken into account is that the Bureau has no control over most of the spectral bands it uses, resulting in little or no flexibility in being able to perform a given function in an alternate band that may have a lower opportunity cost. The bands used are determined by the natural processes being observed, and by international harmonisation of these and other sensing bands, such as those used for meteorological radars, that are then incorporated into the design and manufacture of equipment that competes in a much smaller marketplace than that of telecommunications equipment manufacturers. A majority of active sensing applications in meteorology and Earth observations utilise particular bands because of their favourable propagation characteristics for a given application, and the way in which the electromagnetic radiation at the given wavelength interacts with the phenomena being sensed. This effectively necessitates global harmonisation of these bands, which in turn provides the economies of scale necessary for a sustainable meteorological technology sector.

2. Enable and encourage spectrum to move to its HVU.

As outlined in section 1. above, the Bureau has no control over most of the spectral bands it uses, resulting in little or no flexibility in being able to perform a given function in an alternate band that may have a lower opportunity cost.

4. To the extent possible, promote both certainty and flexibility.

The spectral bands used by the Bureau for its meteorological sensing applications and for space-to-Earth satellite data links do not change significantly for long periods of time due in large part to the factors listed in 1. above. The Bureau relies totally on data from GSO and NGSO meteorological and Earth exploration satellites owned and operated by other countries. As is the case for all complex and long-duration satellite missions, spectrum planning for these space vehicles commences many years in advance of actual launch and remains constant for the mission duration which typically involves continuation to successive generations of satellites. Therefore the Bureau has little or no flexibility to alter the frequency bands it uses for these applications, and requires certainty in future availability of the associated spectrum, free of interference and increasing constraints on the operating environment in these bands.

5. Balance the cost of interference and the benefits of greater spectrum utilisation.

Unlike end-to-end communications links, none of the Bureau's applications of spectrum for active and passive environmental sensing have the ability to detect and correct information corrupted by interference. Digital communications systems are able to inform the user that there is an issue with interference that exceeds the level at which it can be corrected, whereas information from remote sensing applications that is determined to be contaminated by interference, is lost. Low-level interference into passive microwave sensors can be impossible to discriminate from the wanted signal, leading to contaminated data being recorded as valid. Weather radars rely on transmitting high power pulses of RF energy and being able to receive the extremely weak echo returns from liquid and solid atmospheric water particles in order for precipitation intensity and type to be determined out to several hundred kilometres from a radar. Any interference above the noise floor of a radar's receiver can severely impact its ability to function effectively. Space-to-Earth data links from GSO and NGSO satellites in the Metsat and EES services are half duplex and do not have the facility to re-transmit data that may have been corrupted by interference. The Bureau's applications therefore require no or minimal interference to fulfil their intended function, thereby precluding sharing of associated spectrum. Interference can also occur by allowing adjacent spectrum to be used for communications applications that produce high levels of unwanted emissions. Class licensed devices such as consumer market 5GHz WiFi routers and other devices are by definition not required to be licensed and are therefore resource-intensive to locate and shutdown when interfering with Bureau C-Band radars located in close spectral proximity.

Question 3

Do stakeholders have comments on the ACMA’s draft spectrum pricing guidelines including the relevant spectrum pricing decisions, guiding principles and process for changing prices?

The guiding principle *Efficient allocation and use of the radiofrequency spectrum* on page 15 of the Consultation paper states the following:

> The primary economic objective for managing public resources is to maximise the benefit that resource provides to society. This occurs when spectrum is allocated and used efficiently. This is achieved where spectrum is allocated to the highest value use or uses; that is, the use or uses that maximise the value derived from the spectrum by licensees, consumers and the wider community. This is most likely to occur when prices are set in a way that reflect the opportunity cost associated with spectrum denial.

This principle is linked to an ability to put a value on spectrum. The value of a resource such as spectrum is most easily represented by a dollar value that is derived from one or more associated business models that generate revenue from that resource. Public good uses of spectrum such as for meteorology, environmental monitoring, and defence do not have business models for generating revenue. It’s value must therefore be derived differently than for commercial uses of spectrum, and based on the value of protecting life, the environment and sovereignty. **Therefore public good applications of spectrum must not be placed in direct competition with current or future commercial applications of the same or similar spectrum.**

An example of where similar spectrum is used for both commercial applications and public good is the 2500-2690 MHz ("2.5 GHz") mobile band and the adjacent 2700-2900 MHz radar S-Band. Spectrum licences in the 700 MHz and 2.5 GHz bands were auctioned in May 2013 as part of the Digital Dividend (700 MHz band) auction raising approximately $1.95 billion in revenue from the successful bidders, Telstra, Optus Mobile and TPG. Of this total amount, the value attributable to the 190 MHz of licences in the 2.5 GHz band is not available but it is assumed to be a significant portion. In comparison, the 200 MHz of spectrum in the radar S-band is used solely for meteorological, defence and air traffic primary surveillance radars. If the *market valuation methods* in Appendix D of the Consultation (*ACMA implementation of opportunity cost pricing of spectrum*) is used to value the radar S-band spectrum without taking into account its public good value, it would have a very high opportunity cost. Calculating licence fees for radars based on this value would result in the public good uses of this spectrum becoming prohibitively costly to the Australian Government and the taxpayers that benefit from the services made possible by these radars.

As noted in the Bureau's response to Question 2 above, the valuation of spectrum used by the Bureau and other organisations for public good applications has been and will continue to be complex and problematic. It must not only take into account the value of existing use of the spectrum, but also future value to society and the need to expand and improve those applications as demand for associated services increases. A November 2016 study by London Economics valued the net economic benefit to Australia of the Bureau's services at $28.6 billion over the subsequent ten year period. The largest beneficiaries were the agriculture sector (39%) and the public (27%). The report noted that the net benefit to the aviation sector is actually much larger than the value included in this net figure, given that "*international aviation rules require meteorological advice for airlines to operate*" and that *"...an alternative approach would be to include all activity in the civil aviation sector as an economic benefit enabled by the Bureau.*". The report goes on to say "*This alternative approach would add $166 billion to the ten-year benefit calculation, and an additional $227 billion if flow-on benefits to the tourism sector are included.*".

Ongoing access to the 2700-2900 MHz radar band under an administrative, non-market based pricing formula, plays a crucial role in enabling the Bureau to provide this value both directly and indirectly to the Australian taxpayers. Similar assessment of the Defence and AirServices radar applications in this band will add considerably to the total value obtained from this spectrum by existing public good uses, and would far outweigh tax revenue and potential economic value from commercial applications such as IMT.

Transparency of the methodology used to calculate licence fees for public good spectrum can be achieved by the ACMA recognising that the highest value use of certain bands is for specified applications provided by government agencies for the benefit of the public, and that a separate formula is to be used to calculate associated licence fees. The ACMA may attempt to assess the economic value of the applications and services that use the given spectrum as a basis for this recognition, but as noted previously, this can be a difficult process. The ACMA should publically acknowledge that there are certain applications that spectrum must be reserved for to enable the provision of essential public services, regardless of its potential market value if it was to be reallocated to an alternate application.

Focus area 1: Large bandwidth and multiple (networked device) requirements

The Bureau utilises the 5600-5650 MHz radiolocation band for C-band meteorological radars which represent a significant and increasing contribution to the value to the Australian economy from the Bureau's services. C-band radars do not provide the same detection range as S-band radars due to higher atmospheric attenuation, however they have lower capital and ongoing costs than S-band radars and are therefore more cost effective in providing coverage of agricultural areas and crucial rainfall catchment areas.

The 5.6 GHz band underwent considerable reconfiguration during 2019 in order to accommodate Wireless Internet Service Providers (WISPs) being displaced from the 3.5 GHz band. The Bureau did not support the ACMA's proposal to reduce the spectrum available for radars from 50 MHz to 10 MHz (5620-5630 MHz) as this would expose radar receivers to potential interference from WISP devices, and greatly constrain future reconfiguration and expansion of its C-band radar network. Despite the Bureau's objections, the changes were subsequently put in place within a defined 5.6 GHz reallocation area. This significant reduction in the Bureau's access to the 5600-5650 MHz radiolocation band, when combined with the ACMA's current proposal to offer access to the 5600-5620 MHz and 5630-5650 MHz bands beyond WISP licensees to general use for PMP WiFi networks (*Proposal to open the 5.6 GHz band for general access - Consultation paper*), may have significant repercussions on the Bureau's future ability to utilise this band for weather radars.

By nature of the high power transmitter employed in radars and the highly sensitive receiver in combination with a 45dBi gain parabolic antenna, a single C-band radar effectively denies cofrequency spectrum use up to 100km or more from the radar depending on terrain and incident power levels, and adjacent spectrum use up to several tens of kilometres depending on the unwanted emission level of the devices that will use that spectrum. The spectrum requirements of both C-band and S-band meteorological radars have changed very little over many decades and is not anticipated to change significantly for the foreseeable future, as the technology currently employed will persist until some period after suitable solid state radar transmitters become viable for meteorological applications. Therefore no increase in spectral efficiency of radars is anticipated in the foreseeable future, and any incentivised taxation methodology would simply translate into a higher tax on the Bureau with no ability to reduce the amount of spectrum used.

An increase in licensing costs for radars in the 5.6 GHz band resulting from application of an opportunity cost methodology will further impact its viability for the Bureau. The ACMA should recognise the safety-of-life and economic benefits of meteorological radars operating in the 5600-5650 MHz band by excluding their licensing cost calculations from any change in taxation methodology for bands above 5 GHz.

Focus area 3: Defined approach to considering changes in taxes and opportunity cost pricing

Question 9
Do stakeholders have comments on:

> the proposal to monitor bands for potential changes in taxes and the balance and precision required in monitoring and pricing spectrum?

The Bureau would need more detailed information before offering specific comments on the ACMA's proposal to use band monitoring as a basis for changes in taxation and in determining opportunity cost pricing for bands reserved exclusively for meteorological (Metaids) applications, for radiolocation (radar) bands, and for Metsat and EESS data communications bands.

> the use of inflation to keep apparatus licence taxes contemporary and whether there are alternative approaches?

The Bureau supports the use of CPI indexation on licence taxes.

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