

# **SUBMISSION TO THE PRODUCTIVITY COMMISSION**

## **DEFENCE USE OF THE RADIO FREQUENCY SPECTRUM**

### **EXECUTIVE SUMMARY**

1. The nature of Defence use of the Radiofrequency spectrum (the spectrum) is, arguably, unique in Australia and access to that spectrum is fundamental to the capabilities of the Australian Defence Organisation (ADO).
2. Defence reliance on the smart use of technology has meant that it has an extraordinary variety of spectrum requirements and employs nearly every type of radio service.
3. Defence has always been an early adopter of new technology to ensure it retains a capability edge and to enhance its ability to respond militarily. Continual developments in systems which make use of the spectrum now provide significant advantages in the way Defence can deploy its people and weapons systems. This has also meant that Defence is significantly reliant on having ready access to the spectrum to support those systems.
4. The spectrum is also a battlefield. As successful spectrum use is so important to modern fighting forces, denial of or disruption of spectrum access is a potent weapon. Denial or disruption of spectrum access can arise from adversarial action, ineffective management or poor planning and coordination.
5. Civil use of the spectrum is also essential for the economic and social health of the nation. Defence cannot simply rely on usurping civil spectrum use in an emergency. It would be impractical and, indeed, counterproductive to try to do so. The reliance upon spectrum use is a characteristic similarly reflected in civilian emergency services, broadcasters, communications infrastructure and a host of other civilian applications on which Defence would rely in many contingency situations.
6. It is becoming increasingly common that military operations will take the form of a coalition of countries created to address the

particular circumstances or situations. This means that the ability to interoperate within such a coalition is critically important, and our capability in this regard needs to be actively protected.

7. Commercial demand for the use of spectrum currently identified for military applications may lead to pressure for re-allocation of portions of that spectrum. While, in some circumstances, and for particular uses, coexistence is possible, great care is needed as inappropriate sharing could jeopardise future, critical military use.
8. While Defence has some difficulties with the current licensing arrangements, these can usually be overcome with the cooperation of the Australian Communications Authority.
9. Defence has commenced the production of a Defence Strategic Spectrum Plan that will document and justify Defence's existing and future spectrum requirements. It is hoped that this Plan will better enable Defence to clearly articulate its spectrum requirements now and in the future.
10. Nevertheless, the security nature of certain Defence activities precludes discussions in open forums and creates difficulties for Defence in publicly defending or justifying some aspects of its spectrum requirements. There therefore needs to be improved mechanisms for handling such highly sensitive national security related matters.
11. In summary Defence requires extensive access to spectrum as a fundamental enabler of many of its core capabilities. Without reliable access to and confidence of non-interference in that spectrum Defence would be limited in its ability to respond when and where required to meet the tasking of Government. Similarly, in order to maintain its preparedness, Defence must be able to routinely exercise those capabilities.

## **PART 1**

### **DEFENCE MISSION AND VISION**

1. The Defence mission is:

"Defending Australia and its national interests".

The Defence vision is:

"A force for good • a force to be reckoned with • a force to win".

These ideals present significant challenges for a country with a relatively small fighting force which defends some 10% of the Earth's land area. That force, the Australian Defence Force (ADF) must therefore rely upon smart use of technology to "fight above its weight".

### **NATURE OF DEFENCE OPERATIONS**

2. While it has been some time since the ADF has been called upon to defend Australia from foreign military forces, the ADF is routinely called upon to contribute to securing our coastline from illegal immigration, smuggling, quarantine evasion and other intrusions on our sovereignty. It also undertakes other peacetime national tasks including counter-terrorist response, maritime search and rescue, the protection of maritime resources, and emergency management tasks such as natural disaster relief.
3. Australian troops may face hostile action in remote areas away from Australia, and recent examples include deployments to East Timor, Bougainville and, as recently announced, support of the post 11 September war on terror.
4. Essential to virtually all of the ADF's tasks are effective communications, sensors and control systems that support the ability to respond militarily using existing weapon and other systems. Specific requirements for spectrum will vary from operation to operation, depending on the nature of the task being undertaken, and the weapons that might need to be used in any engagement. It will also be dependent on the geographic location of the operation, and whether the ADF is acting independently, with other agencies, or in coalition with foreign forces.

## DEVELOPMENT OF SPECTRUM USE BY DEFENCE

5. Defence first used the spectrum before World War I to support simple message services and, by World War II, to enable real time voice communications to support the tactical manoeuvre of aircraft, ships and military units. Since that time, radio communications has evolved to support integrated computer aided command and control systems, requiring very large quantities of data to be exchanged between participating units. The capability of these systems continues to be enhanced by the use of satellite technology, which has enabled the extension of high capacity communications to mobile units operating anywhere on the globe.
6. World War II also saw the introduction of radar technology for surveillance. That technology has now developed to the point where it is used widely throughout military forces for navigation, surveying, surveillance, search, target acquisition and tracking, weapons guidance, meteorology, and a range of other applications. Illustrative of the importance of radar is its use to detect the threat of, and direct countermeasures to, very small anti-ship sea skimming missiles that could destroy a ship. Such radars make significant demands on the spectrum to be effective.
7. During World War II, radionavigation systems were initially deployed to guide ships and aircraft. This technology has evolved into sophisticated terrestrial and satellite radionavigation systems that are a vital component of a modern military force. A wide variety of surveying equipment ranging from radio theodolites, electronic distance measuring equipment, and position fixing equipment also derive from this beginning.
8. After the end of the World War II, simple radio guidance systems were developed for missile control. These have now developed into sophisticated telemetry and telecommand systems, enabling the development of remotely piloted vehicles both as weapons systems and reconnaissance systems, precision guided munitions and sophisticated test and evaluation systems.

9. Given an uncertain threat environment, military interventions must now be far more flexible and responsive in order that they are capable of reacting to a wide variety of situations. This has seen the rapid development of an increasing range of spectrum-using devices designed to boost capability and comparative advantage of military forces. That is, spectrum has become a critical and ubiquitous component of military capability.
10. As military planners have moved away from manpower intensive solutions, and have turned to the increasing use of the spectrum as a “force multiplier”, the nature of modern warfare is such that the use of the spectrum for military purposes pervades almost all activities. Far from reducing its need for spectrum, today’s military forces, more than ever before, are dependent on the use of spectrum to maintain effectiveness and provide a “knowledge edge” over a potential adversary.

#### NATURE OF DEFENCE SPECTRUM USE

11. In broad terms and with the obvious exception of mobile telephony, most civilian spectrum use is either static or confined to a strictly limited and predefined geographic area. In nearly every case, the systems employed can be carefully planned and engineered before installation. Their spectrum use can be coordinated with that of other users sharing the same geographic area or the same frequency. Such civilian systems can achieve a high level of spectrum reuse and thus are regarded as spectrum efficient.
12. By contrast, the vast majority of ADF spectrum use supports applications that are mobile and/or itinerant and used to support tactical forces.
13. The active use of the spectrum cannot be easily concealed from an adversary. The reliance on spectrum also provides an adversary with the opportunity to gain intelligence from or disrupt the system using it. Military equipment is therefore designed to counter this vulnerability. Design strategies include the use of frequency hopping or direct sequence spread spectrum techniques. These techniques make it difficult for an adversary to detect, intercept or jam spectrum use. These attributes, however, have the disadvantage of placing large demands on spectrum availability.
14. Other anti-jamming techniques include the use of considerably greater transmitter power than is necessary to achieve reliable

communication under normal conditions, with the attendant disadvantage of diminishing spectrum efficiency.

15. Military applications need to be able to be used at any time and in any place, and often at very short notice. For ready-to-deploy forces, there is normally insufficient time to coordinate the use of spectrum with existing civil systems in geographic locations to which those forces may deploy. As a consequence, Defence spectrum use cannot readily be shared with civil applications without risk of mutual interference.
16. Interference (whether accidental or deliberate jamming) can be annoying and even harmful. Harmful interference frustrates the purpose of spectrum use. For example, weapons systems can fail to work correctly, communications can be disrupted or radars blinded. This can pose a safety threat to personnel and equipment and threaten the success of an operation.
17. Some applications need a high degree of assurance of interference free operation. These are exemplified by those used for the control and direction of aircraft (manned and unmanned) and missiles. Any vulnerability to interference and disruption of communication (even very brief), can create extremely dangerous situations. The risk of such interference increases where spectrum is shared with civil applications.
18. The ADF has to regularly practice the use of its systems to test and evaluate equipment, develop new techniques and to maintain and improve skills in using the increasingly sophisticated and complex systems. Moreover, it is often necessary to do this in as realistic environmental conditions as can be contrived.

#### ALLIED INTEROPERABILITY

19. The ADF may be required to lead or participate in a coalition of countries created to meet the particular demands of a situation. This requires the ability to effectively interface with, and interoperate with, other national defence forces.
20. There is considerable commonality in international military spectrum planning. with two forums having been instrumental in achieving this.

21. The North Atlantic Treaty Organisation (NATO) has created binding agreements about military spectrum harmonisation in Europe and North America.
22. While Australia is not subject to the NATO binding agreements, the Combined Communications Electronics Board (CCEB), which had its origins as an allied interoperability forum in World War II, has facilitated the harmonisation of military spectrum between Australia, Canada, New Zealand, United Kingdom and United States. Therefore CCEB and NATO outcomes in spectrum harmonisation are similar. Significant effort must be invested to ensure that such harmonisation continues to be successful despite the absence of any Australian national mandate (such as a treaty obligation).
23. Harmonisation of military spectrum has significant beneficial effects, particularly in the area of interoperability. The military forces of the countries that have harmonised their spectrum are able to more easily operate together and are able to train and operate in each other's countries.
24. North America and Europe are the production sources of a significant portion of military spectrum-using equipment employed by the ADF. The design of such equipment is usually driven by the military requirements of the home market, however spectrum compatibility throughout Australasia, North America and Europe facilitates the ready acceptability and consequent sale of such equipment in all constituent countries, thus achieving economies of scale.
25. The harmonisation efforts of the CCEB and NATO have tended to influence the spectrum plans of other countries that are not members of either of these groups. Thus, there is a very broad, but informal, international consensus on military spectrum harmonisation and this greatly facilitates the constitution and effective working of military coalitions.
26. Observing the need for spectrum harmonisation has been particularly difficult for Australia. At present the ADF does not extensively use all the harmonised bands and, in some cases, cannot adequately demonstrate (or for security reasons is precluded from demonstrating) a domestic military demand for all harmonised bands.

27. Military harmonised bands are attractive to civil users as they represent near globally harmonised spectrum and thus global market opportunities. Similarly in Australia, they are often the only readily available nationally harmonised spectrum and therefore appear to offer significant commercial advantage for equipment vendors especially when the military use is not evident in the publicly available records of spectrum use. Some bands of military interest have been re-allocated for civil purposes for this reason.
28. Re-allocation of spectrum from military to civil use is usually an irreversible decision, as the cost of later recovery of such bands for military use is impracticably high.
29. When harmonised bands are unavailable for military use, there will be a consequential loss of international interoperability. The ability of different countries to train and operate together will be diminished with consequential loss of combined military capability. There may also be a loss of domestic Defence capability as equipment designed to use those harmonised bands will probably be unavailable to the ADF should it ever, in future, seek to acquire it.
30. There are many aspects of Defence spectrum use that, for security reasons, must necessarily be withheld from public scrutiny. This security demand extends, in many circumstances, to the particulars of the spectrum use of individual pieces of equipment. Release of such information would assist a potential adversary in planning and developing military tactics and electronic counter-measures.
31. Similarly the preparations to use the spectrum to support a military operation are not normally revealed and this precludes coordination with civil users. Such information could easily betray intent and the nature of the impending operation, thus prejudicing the operation's success.

#### DESCRIPTION OF PRESENT SPECTRUM ARRANGEMENTS

32. Within Australia, there are two Acts relating to the management of the radio frequency spectrum. These are the *Australian Communications Authority Act (1997)* and the *Radiocommunications Act (1992)*.



33. The *Australian Communications Authority Act (1997)* establishes and empowers the Australian Communications Authority (ACA) and sets out the ACA's spectrum management functions. It provides for the Minister of Communications, Information Technology and the Arts to direct the ACA and requires that those directions be published in the *Commonwealth Gazette*.
34. It does not, however, provide for the Minister to direct the ACA but withhold, on security grounds, publication of that direction in the *Gazette*. Whilst this has not yet been a problem to Defence, it does remain a potential difficulty.
35. A notable omission from the objectives of the *Radiocommunications Act (1992)* (the RCA) is the objective of providing adequate spectrum for the purposes of national security or in the national interest. It may be reasonably argued that Defence is a public and community service and is embodied in the objective of providing spectrum for public and community services. Public and community services are defined in Section 10 of the RCA and may not have been intended to include Defence. This matter is also discussed in detail in Part 2 paragraph 2 *ff*.
36. A difficulty has become apparent with sections 24, 25, 26 & 27 of the RCA. These sections are collectively and informally known as the "Defence Exemptions" and were intended to provide Defence with the freedoms necessary to conduct its business. They variously exempt Defence personnel from the Act or portions of the Act.
37. However, the ACA argues that, whilst they exempt personnel, they do not exempt the Department or the ADF and therefore Defence is bound to comply with the Act in its entirety. Defence believes this was not the intent of Parliament. Such an interpretation by the ACA means, for example, that it would be improper for Defence to order the use of radiocommunications to cause an explosion, an essential activity for any defence force, as it is forbidden in Section 199 of the RCA. It would not, however, be an offence for Defence personnel to actually do this.
38. This issue is being discussed with the ACA but has not yet been resolved. In any revision of the Act, Defence recommends that this apparent ambiguity be rectified.

39. Internationally, the use of the spectrum is subject to the provisions of the International Telecommunication Union (ITU) Constitution, Convention and Radio Regulations. These instruments are primarily designed to globally plan and manage the use of the spectrum and to minimise radio frequency interference. Australia has ratified the ITU Convention and is treaty bound to comply with the provisions of the Constitution, Convention and Radio Regulations.
40. A most important part of the Regulations is the Table of Frequency Allocations that determine which particular radio services can use which bands and in which locations. The world is divided into three regions, and the use of a particular band is not necessarily the same throughout the world. As noted earlier, for Defence forces across the globe, the ability to operate, and inter-operate, anywhere is vital and this is currently achieved through the use of harmonised frequency bands.
41. Changes to this table and also to other parts of the Regulations can have a profound impact on the utility of the spectrum to Defence and the way Defence uses that spectrum.
42. The Australian Radiofrequency Spectrum Plan (ARSP) is a written instrument made under section 30 and 34 of the RCA and presents a national Table of Frequency Allocations. This table is mainly derived from the Table of Frequency allocations in the ITU Radio Regulations and is regularly revised as a result of the revisions to the ITU table following World Radiocommunication Conferences.
43. The ACA is bound by the provisions of this ARSP and can only issue licences that comply with the ARSP.
44. The *Radiocommunications Act (1992)* provides that ACA may designate one or more bands to be used primarily for the purposes of Defence (Section 30(b)) and several frequency bands within the plan are so designated by a footnote AUS1<sup>1</sup>. In the revisions to the spectrum plan that are being presently considered, the wording of AUS1 has been revised, with the consent of Defence, to remove the perception that these bands are ‘exclusively’ for Defence. Nevertheless, it remains the expectation of Defence that very little civilian use will be made of the bands designated for Defence, and

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<sup>1</sup> AUS1 The proposed revised text of this footnote to the spectrum plan reads:  
AUS1 This band is designated to be used principally for the purposes of defence. The Department of Defence is normally consulted in considering non-defence use of this band.

that such civilian use will normally be transient and limited to special events, such as the Olympic Games. Defence strongly contends that the changes to the AUS1 footnote being currently considered should not be seen as a convenient solution to spectrum planning difficulties arising from commercial pressures on spectrum.

45. The bands marked with an AUS1 footnote are insufficient to support the totality of Defence use of the spectrum. As a consequence, major ADF deployments and exercises must make extensive, but temporary, use of spectrum usually used by the civilian community. The planning and coordination of this is a significant issue and, as the use of the spectrum throughout Australia by the civil community increases, it is becoming progressively more difficult to satisfy military requirements. Additionally, and as noted earlier, the requirement for Defence to coordinate its temporary demand for civilian spectrum could betray the intent and nature of impending military operations and, for security reasons, therefore make coordination inherently problematic.
46. A related difficulty in spectrum planning concerns the long timeframe of certain Defence procurements. Major system acquisitions are planned many years in advance. Such acquisitions proceed on the reasonable assumption that spectrum availability will not be later eroded. These capital investments are amongst the largest that the Federal Government makes. If critical spectrum becomes unavailable after a procurement decision, significant further investment will be required to restore the capability originally required. The life of these equipment can routinely exceed 30 years.
47. To identify, and where possible articulate publicly, its long-term spectrum requirements, and to better protect these significant investments, Defence is preparing a Strategic Spectrum Plan that will document Defence existing and future spectrum requirements.
48. Defence is a significant participant in national preparations for the periodic World Radio Conferences that revise the ITU Radio Regulations. The national preparations are managed by the ACA and are broadly open to those with sufficient interest to participate.
49. Difficulties have already been encountered where Australian consultants engaged by foreign companies, whose interests do not

necessarily coincide with the Australian national interest, attend preparatory meetings, in order to attempt to influence the outcome in favour of their principal's commercial interests. The ACA is aware of this problem and is attempting to mitigate it by developing rules to manage representation. Defence strongly supports the ACA in this endeavour.

### LICENSING ISSUES

50. There are three types of licensing regime: Apparatus Licence, Spectrum Licence and Class Licence. Nearly all Defence spectrum use is subject to Apparatus Licensing.
51. It is Defence's view that the existing Apparatus Licensing categories are best suited to civil situations and often do not readily meet the needs of Defence. An example is the difficulty of licensing telemetry transmitters on missiles communicating to a ground station. This telemetry facilitates essential test and evaluation activities by transmitting performance data from the missile under test to a ground station where it is recorded for subsequent analysis. The transmitter on the missile does not use aeronautical or radiodetermination frequencies and therefore could not be authorised by an aircraft licence or an aeronautical licence. The only option is to license the missile with a land mobile licence, which is used for applications such as taxi radios.
52. Defence has particular difficulties with the Spectrum Licensing regime, since it is very difficult for Defence to exploit Spectrum Licensed spectrum when it needs to. Unlike the Apparatus Licensing regime, much of the responsibility for managing interference is with the spectrum licensee. The mobility attributes of many Defence applications creates a situation where Defence would be required to coordinate with a wide variety of individual spectrum licensees before the spectrum subject to licensing can be used. This is impracticable for logistic and security reasons.
53. The ACA is aware of these and similar difficulties that these arrangements cause to Defence. A possible solution may be the introduction of a Defence licence that would permit a broader range of uses. No significant work has yet been directed to exploring this possibility.

## CONCLUSION

54. An effective Defence capability is critically dependent on the exploitation of the spectrum in a wide variety of Defence applications.
55. It is important to reserve spectrum for Defence use, because:
  - a. the ADF needs to train in as realistic an environment as possible, and
  - b. it is impracticable to usurp civil use of spectrum in a Defence emergency.
56. It is important to harmonise the spectrum reserved for Defence with similar reservations in other countries because:
  - a. interoperability of allied military forces is enhanced, and
  - b. cost of equipment procurement is diminished.
57. Defence has unique requirements for use of the radio frequency spectrum. These requirements can, at times, be at odds with a legislative and regulatory environment that has been created largely to manage civilian use of the spectrum.

## **PART 2**

### **DEFENCE COMMENTS TO THE QUESTIONS IN THE ISSUES PAPER**

#### **Section 2.1 What problems does the legislation seek to address?**

Do the objectives of the RCA adequately describe the social, environmental and economic problems which radiocommunications legislation should address?

#### **DEFENCE COMMENT**

1. The first objective of the RCA is an all-embracing objective and perhaps would be better and more simply expressed as: “to maximise the benefit to the nation and its citizens of the radio frequency spectrum.” The remaining objectives serve to qualify that principal objective.
2. A notable omission from the objectives of the Act is the provision of spectrum for the purposes of national security or the national interest.
3. It may be claimed that Defence is a public and community service for the purposes of the Act. It is, however, believed that the meaning of public and community services was intended to be those charitable or voluntary organisations typified by Surf Life Saving Clubs (SLSC) and the Royal Flying Doctor Service (RFDS). The definition of public and community services is found in Section 10 of the Act<sup>2</sup>. It should be noted that the Minister has

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<sup>2</sup> 10 Public or community services

- (1) For the purposes of this Act, a ***public or community service*** is a service provided by a body or organisation of a kind specified by the Minister, by written instrument, to be bodies or organisations for the purposes of this section.
- (2) Each such body or organisation must either be:
  - (a) an authority of the Commonwealth, a State or a Territory; or
  - (b) a body or organisation that:
    - (i) is not carried on for the purpose of profit or gain to its members; and
    - (ii) applies its profits (if any) or other income in achieving its objects; and
    - (iii) does not provide for making any distribution, whether in money, property or otherwise, to its members.

not declared Defence to be a public or community service. (The ACA informally advise that there has not been any declaration under Section 10.)

4. There are only 4 further references to public and community services further in the Act. These are:
  - a. Section 32, which empowers the ACA to prepare Frequency Band Plans, and allows the ACA to indicate what parts of the spectrum is reserved for the provision of public or community services.
  - b. Section 39, which requires the ACA to issue marketing plans for spectrum licences and allows the ACA to indicate, inter-alia, how much of the spectrum dealt with under a marketing plan is to be reserved for public and community services.
  - c. Section 88, in which provisions for trading in spectrum licences are defined and allows the ACA to make rules about assignments (eg. restricting assignment of spectrum licences that were previously issued for public and community services).
  - d. Section 294, which empowers the ACA to fix spectrum access charges, and empowers the Minister to direct that relief from spectrum access charges be given to public or community services.
5. These provisions appear to be directed at regulating spectrum allocated on a concession basis to public and community services in order to prevent speculation in that spectrum and/or to give relief from spectrum access charges to deserving cases.
6. The creation of a regulatory environment suitable for SLSC and the RFDS is extremely unlikely to be suitable for Defence.
7. The lack of explicit recognition of national security/national interest requirements in the RCA objective could act to diminish limit the importance ACA attaches to fulfilling Defence requirements. In the extreme, it could result in the ACA treating Defence requirements with the same priority as it accords any commercial company. The inclusion of an objective such as:

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(3) The instrument is a disallowable instrument for the purposes of section 46A of the *Acts Interpretation Act 1901*.

“to provide adequate spectrum for the requirements of national defence and security”

may act to provide additional support to the ACA when they have to balance the needs of Defence against other spectrum users.

Do the objectives have sufficient regard for related technologies which may have implications for the management of the radiofrequency spectrum?

DEFENCE COMMENT

8. Yes.

Are the objectives too broad in scope? Does this cause problems? Is the intent of all the objectives completely clear?

DEFENCE COMMENT

9. It is felt that broad objectives are better than precisely worded objectives that may not have enduring relevance. Greater clarity of intent would be useful in regard to matters of national security or the national interest.

Have the priorities attached to different objectives of the RCA changed over time and what factors explain these changes?

DEFENCE COMMENT

10. The objectives of the Act are not accorded relative priorities within the Act. The priorities given to these objectives by the ACA depend on its perception of current and future need.



Are the existing objectives consistent with each other? Are they appropriate? If not, what should be changed, added or removed? Why?

#### DEFENCE COMMENT

11. The existing objectives are not entirely consistent with each other and there will inevitably be tension between them from time to time. However it is not possible or reasonable to prescribe an enduring priority of possibly conflicting objectives. The degree of priority that is attached to the objectives of the Act will have to remain a matter of judgement for the ACA with advice from relevant sources.

Should the tradeoffs between competing economic and social uses of spectrum be more clearly articulated in the principles governing spectrum management?

#### DEFENCE COMMENT

12. It is appropriate for some spectrum users who operate in the national interest to be accorded a high priority. Defence believes that the provision of spectrum to support national defence, law enforcement and emergency services should be given the highest priority.

### **Section Part 2.2 The approach to allocating spectrum under the Radiocommunications Act**

What are the advantages and disadvantages of the current approach to spectrum planning?

#### DEFENCE COMMENT

13. The overwhelming advantage of the present approach to spectrum planning is that it is in accord with that used by the rest of the world. It is normally in Australia's interest to align its spectrum plans and practices as closely as it can to those of the rest of the world as it facilitates international interoperability.

14. There are occasionally disadvantages. In a few cases the advantages of meeting uniquely Australian requirements outweigh the disadvantages of uniquely Australian spectrum plans. In these cases Australia's geographic isolation will usually readily permit differences in spectrum planning.
15. It is also desirable to be, as far as possible, technology neutral. This is not always possible as in some cases the lack of appropriate spectrum will force the spectrum planners to make technological choices as has occurred in the case of mobile telephony. (There was insufficient spectrum to support all the different standards for mobile technology that exist in the world and a technology choice had to be made in advance of a demonstrated market choice.)

Are there alternative approaches involving less government intervention that would achieve efficient and effective use of the spectrum within Australia? What are their advantages and disadvantages?

#### DEFENCE COMMENT

16. Compared with many countries, there is relatively little government intervention in spectrum management in Australia and it is doubted that there could be less. Many countries have embarked on price based allocation systems similar to Australia's arrangements. Defence is not aware that any of these schemes have been any more successful than Australia's and indeed some appear to have had significant defects.

What lessons can be learnt from planning approaches in other countries?

#### DEFENCE COMMENT

17. Defence does not think that the spectrum planning arrangements in comparable countries have any novel features that Australia should adopt. In all comparable countries the ITU spectrum allocations are closely followed. Significant portions of spectrum are reserved for Defence. Many countries are experimenting with some form of price based allocation system. The only significant country where

there is a radically different spectrum planning approach in the USA in which spectrum is divided between the Federal Government and other users and is managed by two separate authorities; the National Telecommunications and Information Administration (NTIA) and the Federal Communications Commission (FCC). This duopolistic approach does not seem to have inhibited the commercial success of US industry or the provision of effective radiocommunication services for the community. It is an approach that could be examined.

Is there sufficient consultation within Australia prior to ITU meetings? Does the current process of consultation with the ITU promote Australia's interests effectively? How could it be improved?

#### DEFENCE COMMENT

18. Defence considers there is a good level of consultation within Australia within the preparatory process for ITU meetings. There are, inevitably, tensions between competing interests and the ACA generally succeeds in facilitating those competing interests. In the case of Defence there are two difficulties:
  - a. There is a tendency, within the consultation process, for other spectrum users to regard Defence as just another large spectrum user and not pay regard to the unique requirements of Defence.
  - b. Defence is not always able to present open arguments for particular spectrum planning positions that involve classified information. An agreed method of handling these cases has yet to be developed or agreed by the ACA and Defence.

Does the current approach work smoothly from an administrative perspective?

#### DEFENCE COMMENT

19. Defence considers that the present approach is burdensome, involving a great deal of time and effort in preparing and

presenting arguments. However given the need for comprehensive consultation and the desirability of achieving a consensus view, it is difficult to suggest a substantially different approach. A more decisive approach by the ACA could reduce the time and effort involved but at the expense of the degree of comprehensive consultation.

Could the private sector play a greater role in managing the spectrum allocation process? If so, what are the strengths or weaknesses of this approach?

#### DEFENCE COMMENT

20. Defence is strongly opposed to giving any executive power to the private sector in the spectrum allocation process. The spectrum manager/regulatory authority should always retain the executive power to determine spectrum allocations and policies and procedures for frequency management. These processes must remain visibly aloof from the specific commercial interests and be applied by neutral agency such as the ACA.

### **Licensing**

Is there an alternative to licensing for allocating the spectrum?

#### DEFENCE COMMENT

21. There is no alternative to some form of coordinated and planned use of the spectrum in order to minimise interference, and there is therefore a need for the spectrum manager to manage the spectrum by issuing an authority for its use. The most convenient mechanism to achieve this for public use is licensing. Within Defence, individual spectrum users are formally authorised only after the spectrum managers within Defence are satisfied that it both will not cause interference to other spectrum users and that it complies with the terms of the original licence issued by ACA.
22. Licencing could be avoided in only a limited number of exceptional and very specific circumstances. For example:

- a. The bands are allocated to industrial scientific and medical use and widely used without licence by, for example, domestic microwave ovens. Interference control is achieved by confining these applications to specific frequency bands.
- b. Operation of radio equipment in anechoic chambers whose chamber walls are impervious to radio waves and provide interference control.

What is the potential for allowing entities other than the ACA to issue licences? What would be the advantages and disadvantages of delegating this function to other government agencies or to private sector entities?

#### DEFENCE COMMENT

- 23. The effect of this is already achieved through the provisions for third party authorisation in the RCA. The holder of a licence may authorise a third party to operate equipment but only if the conditions of the original licence issued by the ACA are observed. In effect, all Defence spectrum use is through a third party authorisation where the licence holder in Defence authorises individual Defence units and contractors to use the spectrum, but strictly in accordance with the terms of the original licence.
- 24. Defence does not favour allowing organisations other than the ACA to issue the original, or parent, licence.

Are the objectives of the RCA being achieved through the licensing system?

#### DEFENCE COMMENT

- 25. Yes.

Is the licensing system effective in managing frequency interference?.

DEFENCE COMMENT

26. Yes.

Do the current planning and licensing arrangements cause artificial scarcity of spectrum? If so, in what way?

DEFENCE COMMENT

27. Defence does not believe this to be the case. The licensing process is designed to facilitate the maximum reuse of the spectrum whilst minimising harmful interference and, for the most part, succeeds in this design. Occasional aberrations occur but do not, in themselves, justify radical changes to a system that generally works well.
28. Defence is aware of unconfirmed reports of spectrum hoarding where spectrum users retain Apparatus Licences after the licensed equipment has been taken out of service. Such behaviour could deny spectrum to commercial competitors. Where there is suspicion of spectrum hoarding the ACA could be empowered to conduct an audit of actual spectrum usage to identify these cases.

## **Licence types**

What are the advantages and disadvantages of the three types of licence?

DEFENCE COMMENT

29. The Apparatus Licence The Apparatus Licence is the traditional way of authorising spectrum use and is the principal way of authorising Defence use. For most Apparatus Licences, the ACA is responsible for ensuring that interference is managed and does this by setting specific licence conditions. The advantage of the Apparatus Licence is that it can manage widely diverse radio services.

30. The Spectrum Licence The Spectrum Licence was created to provide a more efficient and effective way of managing the spectrum than was done through the Apparatus Licence. The management of interference within the geographic and spectrum boundaries is the responsibility of the licensee. After some years of operation, there is now some evidence that the Spectrum Licence:
- a. has failed to bring a spectrum efficiency dividend;
  - b. can only be effectively applied in those few bands where homogenous mobile radio services are the sole user; and
  - c. in implementation has caused many existing spectrum users to migrate to alternate bands, to the disadvantage of spectrum users in those other bands, due to increased congestion.
31. The Class Licence The Class Licence was created to manage devices that it was impracticable to manage by the other two licensing options. It has proved to be an ideal way of managing publicly available equipment such as citizen band (CB) radios and mobile telephones. The recent extension of the class licence system to some aeronautical and maritime applications is a significant improvement in management efficiency.

What are the characteristics or situations to which each type of licence is most suited?

#### DEFENCE COMMENT

32. The Apparatus Licence is particularly suited to the management of fixed links and non-homogeneous systems belonging to a diverse number of users.
33. The Spectrum Licence is only suited to management of homogeneous mobile radio systems, particularly cellular telephony systems or for bands where a single user such as Defence operates non-homogeneous systems, nationwide.
34. The Class Licence is most appropriate for publicly available radio services, typically, cell phone handsets, CB radios, marine radios in pleasure craft.

Can the different characteristics of the three types of licence cause competitive advantages or disadvantages for licence holders?

DEFENCE COMMENT

35. Both Apparatus Licences and Spectrum Licences can be exploited to facilitate spectrum hoarding as a commercially competitive tactic.

What effect do the three types of licences have on the choice of technology by spectrum users? Do they influence the choice between wired and wireless technologies?

DEFENCE COMMENT

36. Spectrum Licences tend to be technology specific. For example a Spectrum Licence designed to facilitate the management of mobile radio in a specific area can, by its boundary conditions, preclude use by other forms of radiocommunication services. Spectrum Licences have the potential to give a few companies a near monopoly of service provision for up to 15 years and during this time there is little incentive to introduce more spectrum efficient technologies.

Has the introduction of spectrum licences made spectrum use more flexible and efficient? How?

DEFENCE COMMENT

37. It is the perception of Defence that the introduction of Spectrum Licences has not made spectrum use more flexible and efficient. The Spectrum Licence limits the use of the spectrum to a single licensee and those users authorised by the licensee. In practice this tends to limit uses of the spectrum to those uses for which the Spectrum Licence was designed. In contrast apparatus licensing enabled spectrum to be shared between users. Spectrum licensing, where the use of the spectrum in a Spectrum Licence is at the discretion of the licensee, tends to prevent sharing unless it is in the commercial interest of the spectrum licensee. It is rarely in the commercial interest of a spectrum licensee to share spectrum,



especially with a competitor. Furthermore spectrum licensing does not readily permit spectrum sharing between fixed and mobile services operated by different organisations.

Does the current licensing system provide adequate access to spectrum by individuals for private use (for example, amateur radio operators)?

#### DEFENCE COMMENT

38. Defence believes there is adequate access to spectrum available for individuals for private use.

Are there any areas currently subject to other forms of licensing that should be converted to class licences?

#### DEFENCE COMMENT

39. Defence is unaware of any.

### **Standard setting**

What are the advantages and disadvantages of mandatory standards and labelling?

#### DEFENCE COMMENT

40. Defence supports mandatory standards for emission performance for transmitter equipment. Such standards facilitate spectrum sharing and include, inter alia, those standards that set maximum levels of power, out of band and spurious radiation and minimum antenna performance requirements.
41. Defence is not in favour of mandatory standards for receiver equipment. For frequency planning purposes, a defined minimum performance for receivers must be assumed. Advisory minimum performance standards should be set, but there should be no legal

compulsion to protect from interference those receivers that do not meet advisory minimum performance standards.

42. Defence is uncertain that the labelling regime is effective in ensuring compliance with standards. Defence does not want to extend the labelling requirement to military equipment since it would be expensive, serve no useful purpose and may have undesirable security implications.

How effective is the current process for establishing standards, including public consultation?

#### DEFENCE COMMENT

43. Defence considers that the present process for establishing standards is satisfactory and includes adequate provision for public consultation.

What is the effect of mandatory standards and labelling on competition, incentives for innovation and investment, and consumer welfare?

#### DEFENCE COMMENT

44. Defence has no comment on this topic.

## **Section 2.3 Charging for the use of spectrum**

### **Class licences**

Does the absence of fees affect how much spectrum is allocated for class licences?

#### DEFENCE COMMENT

45. Defence has no comment on this topic.

Does the absence of fees give users of class licences competitive advantages over users of other types of licences?.

DEFENCE COMMENT

46. Defence has no comment on this topic.

### **Apparatus licences**

To what extent have economic incentives from spectrum charges helped to encourage efficient spectrum use?

DEFENCE COMMENT

47. Spectrum charges discourage retention of spectrum for which there is no use.

What effect have licence fees had on incentives for investment and innovation?

DEFENCE COMMENT

48. Defence has no comment on this topic.

Have these charges prevented the taking up of apparatus licences?

DEFENCE COMMENT

49. Defence has no comment on this topic.

What are the advantages and disadvantages of the three components of apparatus licence fees?

DEFENCE COMMENT

50. Defence has no comment on this topic.

Is it appropriate to charge the three components for apparatus licence's sold at auction?

DEFENCE COMMENT

51. Defence has no comment on this topic.

Should the SAT be set to maximise revenue or to encourage efficient use of the spectrum? Why?

DEFENCE COMMENT

52. Defence has no comment on this topic.

How should the level of the SAT be determined?

DEFENCE COMMENT

53. Defence has no comment on this topic.

How should changes to the SAT be determined?

DEFENCE COMMENT

54. Defence has no comment on this topic.

Is there sufficient transparency in the processes used to set the initial SAT and changes to it?

DEFENCE COMMENT

55. Defence has no comment on this topic.

Should holders of apparatus licences be able to appeal against increases in the SAT? Why?

DEFENCE COMMENT

56. Defence has no comment on this topic.

Should the SAT comprise an upfront payment, an annual charge, or some combination of the two? Why?

DEFENCE COMMENT

57. Defence has no comment on this topic.

Would it be more appropriate to call the SAT a charge for use of the spectrum resource?

DEFENCE COMMENT

58. Defence has no comment on this topic.

What is the rationale for setting the SMC as a proportion of the SAT? What other methods could be used to set the SMC?

DEFENCE COMMENT

59. Defence has no comment on this topic.

Is there sufficient transparency in the processes used to set the initial SMC and changes to it?

DEFENCE COMMENT

60. Defence has no comment on this topic.

Have the charges for apparatus licence fees influenced the attractiveness of apparatus licences relative to class and spectrum licences?

DEFENCE COMMENT

61. Defence has no comment on this topic.

## **Spectrum licences**

### **The Auction Process**

What are the objectives of allocating spectrum through auctions?  
Are there conflicts between some objectives?

DEFENCE COMMENT

62. Defence is not aware of the formal objectives of the auction process.

Given these objectives, when should auctions (rather than tenders or predetermined prices) be used to sell spectrum or apparatus licences? How much of the spectrum should be allocated using auctions? Why?

DEFENCE COMMENT

63. Auctions are costly, administratively expensive to organise and therefore should only be used when there is a significant amount of spectrum to be allocated.

64. Auctions only achieve an economic advantage when at least two of the bidders are prepared to pay substantial amount of money for the lots being auctioned.
65. Auctions will not work when bidders cannot readily relate a quantifiable economic benefit for the lot. For instance, Defence or a Police Service would find it hard to ascribe economic benefit to a spectrum lot.
66. Defence therefore considers that auctions should only be used where there is a substantial amount of spectrum to be licensed, and only when there are insignificant community or public services interests in that spectrum.

To what extent are auctions effective in promoting efficient use of spectrum?

#### DEFENCE COMMENT

67. Defence notes that Spectrum purchased at an auction and for which a significant price has been paid is a tradeable commodity. If unused, it could be offered for sale if such a sale were to be to the commercial advantage of the licensee. It should be remembered, however, that sale to a commercial competitor is generally not in the commercial interest of the licensee.

Do auction processes ensure that spectrum is allocated to the uses that are of highest value to society?

#### DEFENCE COMMENT

68. Defence has no comment on this topic.

Should entry to the auction process be restricted in order to influence the shape of the industry that uses spectrum?

DEFENCE COMMENT

69. Defence has no comment on this topic.

What should be the ACCC's role in the allocation of spectrum?

DEFENCE COMMENT

70. Defence has no comment on this topic.

How has the auction process affected investment and innovation?

DEFENCE COMMENT

71. Defence has no comment on this topic.

Is the electronic simultaneous ascending bid multiple round auction process the most effective process available to auction spectrum? What are its advantages and disadvantages compared with other methods? Under what circumstances should one approach be used over another?

DEFENCE COMMENT

72. Defence has no comment on this topic.

What are the advantages and disadvantages of setting a reserve price?

DEFENCE COMMENT

73. Defence considers a significant reserve price is necessary to discourage frivolous or speculative acquisition of spectrum.



Can the auction process influence the choice of technology adopted by spectrum bidders?

DEFENCE COMMENT

74. Defence has no comment on this topic.

Should the charge for spectrum licences consist of an upfront payment, annual payments or a combination of both?

DEFENCE COMMENT

75. Defence has no comment on this topic.

In what ways does the requirement that the Minister direct the imposition of any limits affect the allocation of spectrum licences?

DEFENCE COMMENT

76. Defence has no comment on this topic.

Is the auction process sufficiently transparent?

DEFENCE COMMENT

77. Defence has no comment on this topic.

## **Section 2.4**

### **Licence tenure and band clearance**

#### **Licence tenure**

What factors influence the appropriate duration of licences?

#### **DEFENCE COMMENT**

78. Licences should not be “in perpetuity”; an upper time limit of fifteen years is appropriate in many cases and is generally regarded as the upper limit of any possible foresight in spectrum planning. Other factors which may be considered in setting a licence term include: the anticipated duration of relevancy of the applications, the expected time that the spectrum plans are likely to be relevant, and the nature and stability of the industry supported by the licence.

Should apparatus and spectrum licences have the same duration?

#### **DEFENCE COMMENT**

79. Similar considerations in setting licence terms could apply to both Spectrum and Apparatus Licences. It would be reasonable to expect some Apparatus Licences to have the same term as Spectrum Licences.

What would be the likely consequences of extending apparatus licences?

#### **DEFENCE COMMENT**

80. In many cases there would be greater security of tenure that could encourage investment. A significant disadvantage is that there will be a consequential loss of flexibility of spectrum planning.

Is there a need to review licences at some predetermined time before they expire? Under what circumstances? When should they be reviewed?

#### DEFENCE COMMENT

81. There are unconfirmed reports of major spectrum users indulging in spectrum hoarding. Defence is in favour of reviewing both long-term Spectrum and Apparatus Licences at an appropriate time during their tenure. Such a review should be at the ACA discretion. Examples of what could trigger the need for a review include changes to the industry, changes to spectrum planning objectives and a perception that the licensee is indulging in spectrum hoarding.

Should there be more scope for extending licences? If so, for how long?

#### DEFENCE COMMENT

82. Yes, for a term at the discretion of the ACA, but for no more than a specified maximum term which might be fifteen years. This extension could be made at any point in the term of the licence.

What would be the advantages and disadvantages of allocating licences on an indefinite basis? Would a 'use it or lose it' condition be desirable?

#### DEFENCE COMMENT

83. There are significant disadvantages to the allocation of licences for an indefinite term. It is difficult to predict spectrum-planning requirements beyond fifteen years (the maximum duration of the present Spectrum Licence).
84. The "use it or lose it condition" could be a useful tool that could be selectively applied in some circumstances where there is a perception of the possibility of spectrum hoarding. It would, however, be administratively impossible to apply such a tool to every licensee.

Why should spectrum licences be reissued to the same licensee only if special circumstances exist or if the licence is used to provide a service which the Minister declares to be in the public interest?

DEFENCE COMMENT

85. Defence is unaware of the intention of this requirement.

What is the meaning, in this context, of ‘special circumstances’ and the ‘public interest’?

DEFENCE COMMENT

86. The use of some bands in the spectrum is harmonised in many countries of the world. Many of these harmonised bands support Defence applications, maritime and aviation industries, public mobile telephony, and broadcasting. These applications and the users of the spectrum are likely to far outlast the timeframe of the Spectrum Licence. It would often be in the public interest to continue with these applications by reissuing it to the original license holder.

## **Licence reallocation and conversion**

What are the strengths and weaknesses of the reallocation and conversion processes?

DEFENCE COMMENT

87. The re-allocation process can impose an unreasonably large financial burden on incumbent licensees who have to vacate the reallocated spectrum.

88. The conversion process gives some certainty to the existing incumbents.

Under what circumstances should licences be reallocated? Under what circumstances should they be converted?

DEFENCE COMMENT

Re-allocation is probably the only way to facilitate a change of spectrum use from an existing use to an incompatible new use.

89. Conversion enables an existing use that is broadly compatible with a new use to continue to exist under the new spectrum-licensing regime.

Is there sufficient flexibility in reallocating licences?

DEFENCE COMMENT

90. Defence has no comment on this topic.

In the case of spectrum reallocation, who should pay for the cost of moving to a new frequency?

DEFENCE COMMENT

91. The determination of liability for the totality of costs arising from spectrum re-allocation should be considered as part of the re-allocation decision. It could be an option, for example, to require the purchaser of the spectrum to be responsible for costs incurred by incumbents relocating to different parts of the spectrum or acquiring alternate facilities to provide the same service. Defence notes that these costs may far exceed the replacement value of just the spectrum-using equipment.

Should licensees be compensated if their licences are cancelled or if they choose not to convert them? If so, how should compensation be determined?

DEFENCE COMMENT

92. Defence has no comment on this topic.

Is there adequate provision for review of spectrum reallocation declarations?

DEFENCE COMMENT

93. Defence has no comment on this topic.

## **Section 2.5**

### **Secondary trading of licences**

Which areas of spectrum are most amenable to secondary trading? Which areas offer the greatest potential efficiency gain from secondary trading?

DEFENCE COMMENT

94. Defence has no comment on this topic.

Which features of the regulatory framework support secondary trading? How do they do this?

DEFENCE COMMENT

95. Defence has no comment on this topic.

Are there factors constraining the development of secondary markets?

DEFENCE COMMENT

96. Defence has no comment on this topic.

If the duration of apparatus licences is increased, is a secondary market for these licences likely to develop?

DEFENCE COMMENT

97. Defence has no comment on this topic.

Do constraints on secondary trading have economic costs? For example, do constraints prevent spectrum from being reallocated to higher valued uses? Similarly, do constraints mean spectrum trading occurs through more costly mechanisms (such as acquisition of companies that hold spectrum)?

DEFENCE COMMENT

98. Defence has no comment on this topic.

How can any constraints in the secondary market be reduced or removed?

DEFENCE COMMENT

99. Defence has no comment on this topic.

Should secondary trading perform a larger role than is currently the case?

DEFENCE COMMENT

100. Defence has no comment on this topic.

## **Section 2.6 Non-commercial use of the spectrum**

How should 'public or community services' be defined?

DEFENCE COMMENT

101. The existing definition in Section 10 of the RCA does not appear to have been intended to include consideration of the national interest, including that of national security. This is discussed in Part 2 Paragraph 2 *ff* in which the addition of a new objective of the RCA: "to provide adequate spectrum for the requirements of national defence and security" is advocated.
102. Conversely if Defence is to be considered as part of the definition of public or community service, then the definition should make it clear that Defence is included.

How should 'adequate' provision of spectrum for public or community services be determined?

DEFENCE COMMENT

103. An adequate provision of spectrum is that which is necessary to facilitate the functions of the organisation to be achieved effectively.



Is adequate attention given to the opportunity cost of spectrum that is allocated to the Department of Defence and emergency services?

#### DEFENCE COMMENT

104. Any monetary value ascribed to the spectrum used for Defence purposes would be unrealistic. Its value depends on the military circumstances prevailing at the time and these are far from constant, as recent events have amply demonstrated. Defence would prefer to not try to relate the value of the spectrum for defence purposes to the values that can be established by commercial trade in spectrum licences.
105. The direct cost, to Defence, of re-allocation of Defence spectrum will consist of:
  - a. the cost of fully replacing the equipment and systems using the spectrum with others with at least equivalent functionality. This may necessitate additional direct costs to appropriately modify ships, aircraft, etc., to accommodate the replacement system; and
  - b. the cost of retraining the ADF on the replacement system.
106. Indirect costs, which cannot be readily calculated, will include the impact of loss of international interoperability, potential loss of capability and inability to use that spectrum to support future acquisitions.
107. Opportunity cost would only be a realistic measure if, by virtue of spectrum use by Defence, other potential spectrum user had to forego their proposed spectrum use. In general this is not the case; with a few exceptions all potential spectrum users are accommodated and therefore no opportunity cost is foregone.

How should the charges paid by the Department of Defence for spectrum be calculated?

DEFENCE COMMENT

108. While Defence would prefer that there were to be no charges to Defence, it would strongly prefer that, for administrative efficiency, a special “Defence” licence be established with fees calculated on the basis of spectrum used, rather than on the basis of equipment quantities.

Do current licence fees provide adequate incentive for the Department of Defence to make efficient use of spectrum, including surrender or sale of spectrum which it no longer requires?

DEFENCE COMMENT

109. The licence fees play no part in determining Defence spectrum management practices. The incentive for Defence to use the spectrum efficiently and effectively is the understanding that there is already insufficient spectrum to support the anticipated Defence requirements in a major conflict and unless Defence can manage the spectrum effectively its operations could be degraded in conflict. Some spectrum has been released by Defence to meet pressing civil requirements as a result of negotiations with the ACA, but these releases have been at the expense of future Defence capability and interoperability with allies. Careful surveys of Defence spectrum usage indicate there is no spectrum that can be released without an adverse impact on Defence future capability or allied interoperability.

Should spectrum zoning for defence purposes be subject to review and challenge by other spectrum users?

DEFENCE COMMENT

110. Defence believes it would be difficult to publicly review Defence spectrum requirements and still maintain the necessary confidentiality of information, due to security requirements. At

present the ACA, as spectrum manager, reviews Defence spectrum requirements in conjunction with Defence. This process is generally satisfactory. The results of this review can be seen in adjustments to the Spectrum plan where changes in Defence requirements have resulted in changes in spectrum allocations to Defence and Civil users.

Should the Department of Defence holdings of spectrum be converted to spectrum licences?

#### DEFENCE COMMENT

111. There are considerable potential advantages to this idea and Defence would be happy to explore it further. At present Defence has, in theory, no more legal security of tenure in the spectrum than is afforded by an annual Apparatus Licence and this creates significant investment hazards for major capital equipment programs. Whilst in practice this has not proved to be more of a problem than that faced by other major spectrum users, a long duration Spectrum Licence would considerably diminish the uncertainty.

Are there processes and charging regimes that would be conducive to greater efficiencies in defence and national security use of spectrum? For example, what effect have spectrum charges had on spectrum use for defence and community purposes? Should non-commercial users be rewarded or compensated for surrendering spectrum?

#### DEFENCE COMMENT

112. The present spectrum charges have had no impact on Defence spectrum management techniques or the efficiency with which Defence uses the spectrum. Spectrum is essential to Defence operations and simply has to be provided. Measures of spectrum efficiency, in the accepted sense of more revenue per hertz of spectrum, are inappropriate in a Defence environment.

113. In the case of Defence the question of compensation for loss of spectrum can become very complex. In some cases, whole weapons systems are vitally dependent on the use of specific parts of the spectrum which, if denied, could result in the economic loss of the complete system and the cost of acquiring replacement capability.

Which community and emergency services should be exempt from charges for use of spectrum? What criteria should be used to select exempt service?

DEFENCE COMMENT

114. Defence has no comment on this topic.

Are there any particular issues relevant for the provision of services to remote communities?

DEFENCE COMMENT

115. Defence has no comment on this topic.

## **Section 2.7 Broadcasting**

Can the spectrum that is currently designated for broadcasting licences be used for other purposes?

DEFENCE COMMENT

116. Yes, it can and it is. Defence uses broadcasting spectrum from time to time to support major deployments and exercises.

What are the advantages and disadvantages of excluding the allocation of broadcasting spectrum from the broader spectrum planning and management processes undertaken by the ACA?

DEFENCE COMMENT

117. Defence cannot discern any advantages in excluding broadcasting spectrum from the spectrum that is planned and managed by the ACA. There are serious disadvantages in having spectrum set aside solely for broadcasting purposes. In many parts of the country it is technically possible to use broadcasting spectrum for non-broadcasting purposes but under the present arrangements it is administratively cumbersome to achieve. It requires an Australian Broadcasting Authority (ABA) Board decision to permit Broadcasting spectrum to be used for other purposes and this then needs to be followed by an ACA decision on licensing. This is time consuming and when Defence needs to exploit Broadcasting spectrum it diminishes Defence responsiveness in rapidly changing military situations.

Are there differences in the way the ACA and the ABA plan and allocate spectrum? Why?

DEFENCE COMMENT

118. The differences are mainly those necessary to manage the spectrum for the particular services provided. The ABA management regime is designed only to meet the needs of the Broadcasting community. They do not need to be as operationally responsive as the ACA.

What are the advantages and disadvantages of the approach recommended by the Commission in its Broadcasting Report? That is, to transfer all spectrum planning and licensing responsibilities to the ACA?

DEFENCE COMMENT

119. There would be significant advantages in transferring all spectrum planning and licensing activities from the ABA to the ACA. The synergies between spectrum planning for broadcasting and

spectrum planning for other radio services can be exploited to allow the ACA to more efficiently serve the needs of both the Broadcasting community and non Broadcasting communities. On those occasions when Defence needs to use Broadcasting spectrum this could significantly improve the responsiveness of frequency management for Defence purposes.

What effect would transferring responsibility for broadcasting spectrum have on the availability of spectrum in the broadcasting services bands? Would any spectrum be freed up? For what purposes could it be used?

#### DEFENCE COMMENT

120. Although spectrum would in general become more freely available but may not have a large impact on many spectrum users. Broadcasting spectrum is heavily used in centres of population and may not be readily available to ease the spectrum congestion suffered by other spectrum users. Conversely, Defence whose spectrum needs for major exercises are often in the less populated rural and remote areas would benefit from the administratively simpler arrangements for spectrum use.

## **Section 2.8 Satellites**

What allocation and charging arrangements should apply to spectrum for satellite operations?

Do current charging arrangements (for example, only charging satellites declared to be 'Australian') affect competition between spectrum users?

#### DEFENCE COMMENT

121. Defence considers this to be a significant difficulty at present. There is no globally agreed mechanism to recover fees for the use of spectrum by satellite systems. Australian satellites must be licensed by the ACA in accordance with the RCA. However, any satellite operator with appropriate satellites can provide service to Australia whether or not they are licensed by the ACA. This

created an inequitable situation where Australian satellite operators are paying licence fees and foreign satellite operators, who may be providing a similar and competing service, were not.

122. One option for remedy could have been to transfer the burden of licensing satellite systems onto the ground segments located within Australia, however an overriding disadvantage to this tactic is that in many cases consumer earth stations are very small and individually licensing them is impracticable.
123. The ACA has tried to resolve this dilemma by declaring some foreign satellites to be Australian satellites for the purposes of collecting licence fee revenue from the operators. This is not likely to be a universally successful policy, and will only work where those foreign satellite operators need to seek the cooperation of the ACA in facilitating their service to Australia. An example of where it would fail would be US Navstar GPS constellation that provides satellite based world wide radionavigation services freely available to anybody. The service is very extensively used in Australia to the net benefit of Australia. To declare that the Navstar GPS constellation is an Australian satellite system and seek the owners of the system to pay licence fees to Australia is not likely to be successful.
124. Furthermore licensing foreign satellites by declaring them to be Australian satellites implies that Australia is taking some responsibility for those satellites to ensure they, and Australia, comply with the provisions of the ITU Convention. However the ACA is uncertain that the RCA and licences issued under its authority to satellite operators is adequately enforceable. To overcome this Australian satellite operators are required to execute a Deed of Agreement with the ACA, which is designed to enable the ACA to enforce compliance with the provisions of the ITU convention.
125. Defence considers that the elements of one possible solution to this problem could be to:
  - a. revise the RCA to make it clear that operators of Australian licensed satellites are fully bound to comply with the provisions of the Radiocommunications Act and the ITU Convention, thus removing the need for Deeds of Agreement with the ACA;

- b. to maintain an apparatus licensing regime for Australian satellites;
- c. to abandon the policy of declaring foreign satellites to be Australian satellites in order to collect revenue;
- d. to correct the resulting inequity by reducing the licence fee charges for Australian satellites to only that which is necessary to cover the administrative costs;
- e. to require all prospective Australian satellites to achieve coordination with other Australian satellites using accepted ITU standards and using established dispute resolution procedures when a dispute arises.

Does international coordination through the ITU adequately protect Australia's interests in managing the Australian radiofrequency spectrum and in the allocation of orbital slots?

#### DEFENCE COMMENT

- 126. Orbital slots are only allocated by the ITU in the Broadcasting Satellite Bands and in the "Planned" Bands. This was an unsuccessful attempt to bring equal opportunity to operate satellite services to all countries. The limited sizes of the allocations in the "Planned" bands make them commercially unattractive.
- 127. Outside the Broadcasting Satellite bands and "Planned" bands, the international coordination process operated by the ITU is unsatisfactory. The process is, by nature; a first come first served process that fails to address ambit claims. The result is considerable uncertainty that proposed satellites can be coordinated which often lasts well into the high investment period of system construction. It is likely that the problems of satellite coordination will, at some time in the future, prevent a satellite operator providing a viable and useful service to Australia and could result in considerable financial loss to a satellite operator.
- 128. In its defence the system has worked, albeit inefficiently and with uncertainty, and its one overwhelming advantage is that it is the only system which all member countries of the ITU have accepted.



129. Defence, in common with many other satellite operators throughout the world, has no suggestions for improvements that would be likely to be acceptable to the membership of the ITU. Defence will be working with other Australian Satellite operators and with the ACA to seek remedies for this situation but, realistically, it must be regarded as very doubtful that a satisfactory solution will be found in the near term.

## **Section 2.9 Impact of the legislation on competition**

Overall, does the RCA encourage or discourage competition?

DEFENCE COMMENT

130. Defence has no comment on this topic.

Which particular sections of the RCA retard or encourage competition?

DEFENCE COMMENT

131. Defence has no comment on this topic.

Does the RCA affect competition between wired and wireless communication technologies?

DEFENCE COMMENT

132. Defence has no comment on this topic.

Does the RCA's licensing system promote or discourage innovation?.

DEFENCE COMMENT

133. Defence has no comment on this topic.

Is the RCA effective in controlling market dominance and increasing competition?

DEFENCE COMMENT

134. Defence has no comment on this topic.

What benefits and costs are associated with any restrictions that the RCA imposes on competition?

DEFENCE COMMENT

135. Defence has no comment on this topic.

In assessing competition issues, what effects on the environment, welfare and equity, occupational health and safety, economic and regional development, the competitiveness of business including small business, and efficient regulation, need to be taken into account? Why?

DEFENCE COMMENT

136. Defence has no comment on this topic.

Are there alternative ways to allocate, reallocate and convert spectrum which would be more conducive to competition than the current approach? What are they?

DEFENCE COMMENT

137. Whilst Defence does not have a view on competition management, it notes that provision of more spectrum to a wider variety of competitive commercial enterprises could significantly and undesirably diminish the spectrum availability for Defence.

## **Section 2.10 The effectiveness of the ACA**

What is the most appropriate criteria for assessing the ACA's effectiveness in implementing the reforms introduced by the RCA?

DEFENCE COMMENT

138. Defence has no comment on this topic.

Do the key performance indicators in the ACA's Corporate Plan provide an appropriate basis for assessing its performance? If yes, how well has the ACA performed against its own key performance indicators? If not, what would be more useful set of indicators and how well has the ACA performed against these indicators?

DEFENCE COMMENT

139. Defence has no comment on this topic.

Is there an organisation in another country which could provide a meaningful benchmark for comparison purposes? If so, how does the ACA compare to it?

DEFENCE COMMENT

140. Defence has no comment on this topic.

In making comparisons, how should differences in weightings attached to different objectives be handled?

DEFENCE COMMENT

141. Defence has no comment on this topic.

How has the capacity of the Minister to issue directions to the ACA influenced its effectiveness?

DEFENCE COMMENT

142. Defence has no comment on this topic.

## **Section 2.11 Looking to the future**

How is technological change likely to affect the future management of the radiofrequency spectrum?

DEFENCE COMMENT

- 143. The foreseen technological change is likely to result in a greater demand for spectrum use, by a wider variety of applications. It will become progressively more difficult to confidently predict the details of longer-term (beyond 10 years) spectrum requirements.
- 144. The future nature of spectrum use is likely to continue to be heavily influenced by multinational companies specialising in equipment design and supply. These companies will be usually headquartered in North America, Europe or Japan.
- 145. Successful exploitation of the spectrum will become an increasingly important contributor to the military, economic and social health of the country.
- 146. Defence reliance on spectrum will continue to increase as will the need to harmonise spectrum to facilitate the interoperability to participate in and support coalition operations.
- 147. Some changes are already apparent:
  - a. Intercontinental high capacity communications systems are becoming more reliant on optical fibre cables rather than satellite systems.
  - b. Domestic high capacity communications systems will also be increasingly provided by optical fibre cables rather than microwave point to point radio systems.

- c. The preferred communications delivery technology for cities and urban areas is likely to remain cable. Radio (either terrestrial or satellite) will remain an important delivery technology for rural areas for economic reasons but will suffer from capacity limitations that will make it less attractive than cable in some applications.
148. There are also some things that are unlikely to change in the foreseeable future:
- a. There is no known alternative technology that will diminish the use of spectrum to provide the communication needs of mobile users.
  - b. There is no known alternative technology that will diminish the use of spectrum to support radar, radionavigation, remote sensing and other similar services.
149. It is increasingly important that Australian spectrum management and planning be in harmony with other major economic and military groups in the world. Australia cannot proceed independently of other countries and implement uniquely Australian solutions.
150. Spectrum management and planning throughout the world must become more responsive to change.

How is technological change likely to affect competition issues?

DEFENCE COMMENT

151. Defence has no comment on this topic.

Is the role of the Government in spectrum management likely to change in the foreseeable future?

DEFENCE COMMENT

152. Defence is unaware of any reason for the Government to pay less attention to spectrum management. Since the spectrum is likely to become more, rather than less, important to the economic, social and military health of the nation it would seem there would be

pressure on the Government to take a more active role in spectrum management.

How accommodating of future change is the approach of the RCA?

#### DEFENCE COMMENT

153. Defence is not aware of any changes to spectrum use that cannot be adequately managed within the present approach of the RCA.

What changes may be necessary to provide an appropriate regulatory framework for managing the radiofrequency spectrum in the future?

#### DEFENCE COMMENT

154. Defence has not identified any major changes needed to the RCA. The Act, however does not adequately recognise the importance of the spectrum to Defence. The objectives of the Act should include the objective:

“To make adequate provision of spectrum for the purposes of national defence and security.”

155. The apparent ambiguity of the purpose and meaning of the Defence exemptions, sections 24, 25, 26 and 27 should be remedied.

### **Technological convergence**

What pressures does technological convergence exert on the RCA?

#### DEFENCE COMMENT

156. Defence is not aware of any pressures on the Radiocommunications Act as a result of technological convergence.

To what extent are differences in regulatory structures inhibiting the efficient use of spectrum?

DEFENCE COMMENT

157. Defence is not aware of any inhibitions on the efficient use of the spectrum due to differences in the regulatory structure except in the case of the spectrum managed under by the ABA that has been addressed earlier in this submission.

Should there be a single regulatory framework for managing all communication technologies?

DEFENCE COMMENT

158. Defence notes that the RCA is about managing the radio frequency spectrum not about managing communication technologies or regulating commercial competition between spectrum users. Not all the devices that use the spectrum are traditionally thought of as communication systems, for example: radars, radionavigation systems, and meteorological systems. These devices, together with many spectrum using communications systems need no further regulation than that provided by the RCA.
159. Defence is not in favour of consolidating all communications related legislation including the RCA into a single omnibus Act. Defence would strongly prefer that the RCA be confined to managing the use of the radio frequency spectrum and not used for any other purpose.

## GLOSSARY

ABA	Australian Broadcasting Authority
ACA	Australian Communications Authority
ADF	Australian Defence Force
anechoic chamber	A room that has walls impervious to radio waves and are often lined with radio absorbing material in which radio experiments and tests can be conducted in a controlled environment unaffected by radio waves from outside the chamber.
ARSP	Australian Radio Frequency Spectrum Plan.
AUS1	A footnote in the Australian Radio Frequency Spectrum Plan The text reads: AUS1 This band is designated to be used principally for the purposes of defence. The Department of Defence is normally consulted in considering non-defence use of this band.
CCEB	Combined Communications Electronics Board. An informal grouping of the most senior signals officers of the Defence Forces of Australia, Canada, New Zealand, United Kingdom and the United States. The group meets at least annually and its activities include military spectrum management.
Defence	A general term that includes the ADF and the Department of Defence and associated organisations.
Direct sequence spread spectrum	An electronic countermeasure in which the information transmitted on a radio circuit is spread over a far wider bandwidth than would normally be required to make it difficult to jam or intercept.
Electronic counter measures	Employing defensive design techniques to minimise the possibility of jamming or interception of a radiocommunications system.
FCC	Federal Communications Commission. A US quasi government agency whose role includes spectrum management for non-government use of the spectrum in the USA.
Frequency hopping	An electronic countermeasure in which the frequency of a radio circuit is changed at intervals in a pseudo random pattern to make it difficult to jam or intercept.
Harmful interference	<i>Interference</i> which endangers the functioning of a <i>radionavigation service</i> or of other <i>safety services</i> or seriously degrades, obstructs, or repeatedly interrupts a <i>radiocommunication service</i> operating in accordance with Radio Regulations.
Intercept	Intercept is to deliberately eavesdrop on another's use of the spectrum in order to gain intelligence.
ITU	International Telecommunication Union, a specialised agency of the United Nations created by the International



	Telecommunications Convention
jam	Jam is to deliberately disrupt use of the spectrum by interfering with the wanted transmission with a co-frequency signal of significantly greater power than the wanted transmission.
knowledge edge	A defence force which has superior tactical and strategic information and can exploit that superiority is said to have a knowledge edge.
NATO	North Atlantic Treaty Organisation
NTIA	National Telecommunications and Information Administration. A US organisation, part of the Federal Department of Commerce, whose role includes spectrum management of federal government use of the spectrum in the USA.
out of band and spurious radiation	Radio emissions which, as a result of inevitable imperfections in the design of radio transmitters, are outside the authorised bandwidth of the radio and thus can cause interference to other radio receivers.
position fixing equipment	Navigation equipment used for determining the position of objects, usually using radio techniques.
precision guided munitions	Munitions, (bombs, shells or missiles) which can be guided during flight in order to hit the target with a high degree of accuracy.
radionavigation	<b>radionavigation</b> means use of the propagation properties of radio waves to: (a) determine the position, velocity or other characteristics of an object; (b) obtaining information about those characteristics. for purposes of navigation or obstruction warning.
RCA	<i>Radiocommunications Act (1992)</i>
remotely piloted vehicles	Vehicles (usually aircraft) which are unmanned and controlled by command from a remote station.
RFDS	Royal Flying Doctor Service
sea skimming missiles	Missiles that accomplish at least the last part of their journey to the target by flying very low over the sea so as to evade, until the last possible moment, detection by radar or visual means.
SLSC	Surf Life Saving Club
target acquisition and tracking	Identifying and continually measuring the position of a potential target in order to select the best time to attack it and also to subsequently guide or direct the munitions used to attack it.
Telecommand	Transmission, usually by radio, of commands for the guidance or operation of a remote object (typically a missile) from a controlling station.
Telemetry	Transmission, usually by radio, of data on the performance and position of a remote object (typically a missile) to a controlling or recording station.

theodolites	A surveying instrument used to measure relative angular displacement in altitude and azimuth. Modern theodolites use laser technology.
US Navstar GPS	A satellite radionavigation system operated by the USA.
weapon guidance	The mechanism that steers a self propelled weapon, typically a missile, to its target.