

The Chair
Cabinet Economic Development Committee

Broadband Wireless Spectrum Allocation

Hon David Cunliffe
Minister of Communications

Office of the Minister of Communications

Proposal

1. This paper seeks agreement to the allocation of radio spectrum suitable for broadband wireless access (BWA) services, including approval for an auction in the 2.3 GHz spectrum band.

Executive Summary

2. A key work programme item arising from the telecommunications stocktake is encouragement of alternative broadband infrastructure development [POL Min (06) 7/9]. BWA can provide such infrastructure, and there is strong industry support for early allocation of additional radio spectrum frequencies suitable for BWA.

3. The 2.3 GHz spectrum band has been little used since its initial allocation for television broadcasting in 1990. In 2004, Cabinet agreed that rights in this band not be renewed on expiry.

4. Current management rights in the 2.3 GHz band do not expire until 2010. Discussions with rightholders indicate, however, that most of the band can be returned to the Crown by agreement for immediate reallocation at minimal cost.

5. Agreement is sought for a competitive commercial allocation of 80 MHz of this band, configured for BWA deployment, in the first quarter of 2007, with the remaining 16 MHz forming a "managed spectrum park". An alternative is to make an exception for Woosh Wireless Limited by offering it renewal of its existing rights on a non-competitive commercial basis.

6. This paper also seeks agreement for:

- two other spectrum bands to be made available for BWA under "general user licences", which allow any person to share the band without obtaining an individual licence; and
- further work to clear other spectrum bands for BWA.

Context

7. On 3 May 2006, Cabinet agreed [POL Min (06) 7/9 refers] a package of measures for the telecommunications sector to deliver end-user benefits and to close the relative performance gap between New Zealand's telecommunications services (including advanced broadband services) and those of the top quartile OECD countries. Cabinet additionally noted that there is limited effective competition in the New Zealand broadband market.

8. A key aspect of the telecommunications work programme noted by Cabinet is the encouragement of alternative broadband infrastructure development. BWA can provide such alternative infrastructure. The work programme includes measures to ensure the optimal use of spectrum for BWA, promote competition, and to provide investment certainty for market participants.

Spectrum Allocation for Broadband Wireless Access

9. In July 2006 Cabinet [EDC Min (06) 10/9 refers] agreed to the public release of the discussion paper, *Spectrum Allocations for Broadband Wireless Access*, and authorised the Minister of Communications to conduct discussions with stakeholders on the Crown gaining early access to the 2.3 GHz band, which is not currently being used significantly, and to other spectrum suitable for BWA that is currently used for other services, with a view to facilitating early deployment of BWA. Cabinet invited the Minister of Communications to report back on the outcome of the consultation.

10. The Ministry of Economic Development (the Ministry) received 43 responses to the discussion paper from such interest groups as nationwide commercial operators, regional commercial operators, consultants, international standards organisations, and equipment suppliers. A detailed summary of submissions will be released when decisions arising from this paper are announced.

11. Spectrum bands at 800/900 MHz, and 1.8, 2.2, 2.4, 5.8, 3.5 and 25 GHz are currently available for BWA through a mixture of nationwide and regional rights, and shared use. This paper discusses spectrum allocation opportunities for BWA in the 2.3, 2.5, 5.4 GHz bands, and spectrum bands above 60GHz. The main allocation options considered for these spectrum bands are:

- a. allocation as nationwide management rights: this is the standard approach for high value spectrum where there is strong interest in providing a national service (e.g. mobile phone networks); allocation is usually by auction;
- b. allocation under general user licences: this is the standard approach where a number of devices are able to share spectrum (e.g. cordless phones and Wi-Fi hotspots); allocation is at no charge;
- c. allocation as a managed park, a new option: a managed spectrum park would be accessible to any person, provided they comply with park rules, which might restrict entry to an optimal number of users to limit interference and maintain quality of service, and may entail an administrative fee.

2.3 GHz Band Allocation

12. Frequencies between 2300-2396 MHz (2.3 GHz band) were allocated by tender in 1990 as 12 management rights of 8 MHz. The 20 year tenure ends in 2010.

13. On 13 December 2004, Cabinet [CAB Min (04) 41/24] applied government policy on expiry of commercial spectrum rights to the 2.3 GHz band. Cabinet:

“12 **noted** that a case by case assessment including consultation with rightholders has been completed for rights between 2.3 and 2.396 GHz, and that these rights have not had significant utilisation since creation in 1990; and

13 **agreed** that replacement management rights over frequencies between 2.3 and 2.396 GHz not be offered to current rightholders, and that this spectrum should be reallocated in due course following technical replanning.”

14. I propose reconfiguration of this band based on the likely best future use. This planning will accommodate new BWA technologies (including WiMax) that use 5 or 10 MHz channel plans rather than the present 8 MHz channelling of rights.

15. A key issue for the 2.3 GHz band allocation is timing. The interests of intending users of this band would best be served by an early decision as to its future configuration and ownership, as mobile WiMax-based equipment is expected to be marketed by several manufacturers from 2007. Immediate release and reallocation of the band would ensure investment certainty and facilitate early deployment of such new technologies as WiMax in New Zealand.

Discussions with Current Rightholders

16. The overarching objective of policy is to facilitate the early rollout of BWA by optimising the packaging of spectrum rights and providing early access to the market. Rollout before the expiry of current 2.3 GHz rights in 2010 will be facilitated if rights are relinquished early, current rightholders are successful at auction, or new rightholders agree early access with the current holders.

17. The Ministry has conducted discussions with rightholders to seek early relinquishment of current rights. These discussions show promise.

- a. Telecom has offered to relinquish seven of its eight 2.3 GHz management rights without charge, provided that it is not excluded from any 2.3 GHz band auction and is able to deliver its “Customer Multi-Access Radio” rural telecommunications service via a managed park. Telecom’s remaining right is subject to an agreement [would be withheld under section 9(2)(b)(ii) of the Official Information Act 1982] that constrains its ability to relinquish immediately.
- b. Broadcast Communications Limited (BCL) appears willing to relinquish its single right (before or after the exchange noted below) [would be withheld under section 9(2)(f)(iv) of the Official Information Act 1982]
- c. Sky Network Television’s (Sky’s) single right is subject to an agreement with Woosh. Sky may, however, consider an exchange with BCL, as long as this does

not jeopardise Woosh's interests and there are no technical issues. Such an exchange would result in a larger contiguous amount of spectrum being immediately available.

- d. Woosh currently owns two management rights, for which it seeks renewal (see below). However, if all other rightholders wish to relinquish rights early, Woosh may also be persuaded that it is in its best interests to relinquish, with reallocation of the entire band being possible immediately.

18. I propose to reallocate the entire 96 MHz of the 2.3 GHz band as soon as practicable. If the Telecom arrangement is completed, up to 56 MHz will become available immediately, and up to 64 MHz under the Sky/BCL exchange. If Woosh and Sky do not relinquish early, a smaller bandwidth (up to 40 MHz) will be allocated now but not be available until 2010.

19. I seek authorisation to conclude agreements with current rightholders to relinquish their rights in the 2.3 GHz band prior to 2010 [would be withheld under section 9(2)(f)(iv) of the Official Information Act 1982].

Method of Allocation of the 2.3 GHz Band

20. The discussion paper proposed reconfiguring the band after expiry into three blocks of 2x30 MHz management rights and 1x36 MHz managed spectrum park. Eighteen respondents including Telecom, Intel and the WiMax Forum, favoured reconfiguring the band largely as 30 MHz blocks. Woosh supported a 50 MHz block which would be capable of carrying higher quality video. Other than the Sprint-Nextel plans in the USA and Austar-Unwired plans in Australia, most countries are planning blocks in the 20 MHz to 30 MHz range.

21. Twenty-five respondents believed that spectrum for future BWA deployments should be reserved as a managed spectrum park. The strongest support for spectrum parks came from small-to-medium enterprises, who generally consider that such parks would advantage local and regional providers. Larger companies, including Telecom and Vodafone, see some benefits in a managed spectrum park, but consider the management rights regime to be the optimal way to manage spectrum.

22. The managed spectrum park is a new concept, details of which will not be finalised until closer to 2010 (or earlier if the relevant 2.3 GHz rights are relinquished early) in consultation with industry. It is anticipated that:

- a. the park would be accessible to any person provided that they comply with park rules (including the payment of park management fees), but the number of users at any time would be limited to ensure quality of service;
- b. the park would not be restricted to any particular technology, which reflects a technologically neutral stance, although there would be technical measures implemented to ensure efficient spectrum sharing; and
- c. any person accessing the park would be responsible for technical coordination with other users.

23. I propose reconfiguration of the 2.3 GHz band as 8x10 MHz management rights and a 16 MHz managed park, subject to confirmation of technical feasibility. With the proposed auction cap (discussed below), a lot size of 10 MHz will allow bidders the flexibility to select 10, 20 or 30 MHz holdings as required, and will promote competition by enabling more parties to purchase spectrum than if it were divided into a smaller number of wider management rights. All three bandwidths were favoured by the different respondents to the BWA consultation.

24. The modest size of the managed park (16 MHz) is sufficient to provide commercial opportunities for local and regional enterprises. Opportunities to allocate managed park spectrum in other bands are expected to become available in the future.

25. The Government's policy objectives include encouragement of broadband rollout and promotion of price competition, both of which would be facilitated by the entry of viable alternative providers into the national market. I recommend that, subject to the considerations outlined in the following section, nationwide management rights in the 2.3 GHz band are offered on a competitive commercial basis in the first quarter of 2007. The allocation process will be designed to support contiguous management rights, thus enabling purchasers to acquire discrete blocks of 10, 20 or 30 MHz according to preference.

26. In the event that the configuration in 23 above proves to be technically undesirable, I seek authorisation to determine the number and final configuration of lots offered, the period of those rights, the distribution of spectrum between management rights and a managed park, and the location of the park in the band.

Woosh Wireless Limited

27. Woosh Wireless Limited (Woosh) currently owns management rights over 16 MHz of the 2.3 GHz band until 2010 and opposes competitive reallocation.

28. Woosh is planning for investment in the 2.3 GHz band and has entered into contractual arrangements with other band managers giving it access to a further 16 MHz of the band until 2010. The company claims to have obtained promises of substantial financial backing and technical support. Woosh states that it is committed to using this spectrum, beginning with a deployment in Hamilton in 2007, and with plans for further coverage of a large percentage of the New Zealand population by the end of 2008.

29. Woosh seeks uncontested renewal offers for replacement 2.3 GHz management rights to current holders for 2010, subject to competition issues, and has made a number of representations in favour of this preference. Officials understand that if replacement rights were offered for renewal, Woosh would seek to extend its existing contractual arrangements beyond 2010 and might seek to increase its control to 50 MHz (around half the 2.3 GHz band).

30. Woosh has asserted on a number of occasions to Ministry officials, and in the media, that:

- if its rights in the 2.3 GHz band are not renewed and become available at auction it will be shut out of the bidding by more affluent competitors;

- it currently offers the most promising BWA alternative to the national cellular networks; and
- to deny it renewal of rights would set national broadband wireless deployment back by five years.

Ministry Comment

31. Woosh's investment plans and alliances were made in the knowledge that rights in the 2.3 GHz band would not be renewed in 2010. In requesting renewal of its rights, Woosh is in effect seeking to overturn the Cabinet decisions of 2004. This is not a precedent to be encouraged.

32. Woosh has expressed a requirement for 50 MHz of 2.3 GHz spectrum in order to deliver triple play (voice, data and real-time video) services. However, responses to the discussion paper suggest that the industry generally considers 30 MHz to be adequate for effective broadband services in high traffic areas. For instance, the International WiMAX Forum considers 30 MHz to be sufficient to deliver some triple play services (voice, data, and on-demand video). The appropriateness of using WiMax technology to deliver real-time video is still under debate in many countries as such services can also be delivered via new wireless broadcasting technologies.

33. Further, the Ministry's proposal for reallocating the 2.3 GHz band would allow each bidder to purchase up to 30 MHz of spectrum upfront, with the possibility of amalgamating greater quantities of spectrum after two years.

34. Woosh is not alone in seeking access to the 2.3 GHz band. More than half of the respondents to the discussion paper, including BCL, CallPlus, Compass, Econet, JDA, NZWireless, TeamTalk, Telecom, TelstraClear and Vector, indicated an interest in accessing this and other spectrum bands for BWA.

35. For the Crown to offer renewal rights to Woosh and not to the other rightholders would be inequitable, and can be expected to lead to adverse comment [would be withheld under section 9(2)(h) of the Official Information Act 1982]. The consequences of offering renewal to all rightholders, however, would be to close any opportunity for new market entrants or to implement a 2.3 GHz managed park, and carries the risk of continued lack of use, all of which would not be in the interests of the broadband sector or the New Zealand economy. A fair allocation process requires that all interested parties have equal opportunity to gain access to the spectrum.

36. Two allocation options are considered as follows.

Option A – Auction of all rights (the Ministry's preferred option)

37. This option confirms the Cabinet decisions of 2004, and entails the immediate auction of all 2.3 GHz management rights, effective from expiry in 2010 or earlier if negotiated with rightholders, as proposed by the Ministry.

38. This option will place Woosh on an equal footing with other intending BWA providers, maintain equity in the market and entail no legal risks.

39. Woosh's major risk will be failure to secure use of spectrum in the 2.3 GHz band beyond 2010. This risk will be offset by the proposed auction spectrum cap and associated implementation requirements (see below), which in turn will tend to curb speculative and 'shut out' bidding. The likelihood is that spectrum will be available to Woosh, as to other interested parties, in sufficient quantity and at a fair market price.

40. The further advantage of an early auction is that it removes current uncertainty surrounding the spectrum, not least for Woosh, and gives it immediate use for BWA across the bandwidth that will be voluntarily relinquished.

Option B – Exemption of Woosh's rights

41. Should, however, it be considered that Woosh's arguments have some validity in the light of their prior right-holding and current commitments, and that these arguments deserve consideration, then the following alternative is proposed.

42. The alternative would be to offer Woosh the option of renewing its 2x8 MHz rights (as 2x10 MHz rights, consistent with the proposed reconfiguration of the band) at the average of the price received for the other 10 MHz rights at auction. Note that Government has used an averaging methodology to establish spectrum prices in the past, for example, in the allocation of 3.5 GHz Crown retained area licences, which attracted a reserve price based on the average of auction sales of other nation wide management rights. The offer would be conditional on Woosh's cooperation in any early reconfiguration and reallocation of the band, and on its agreement to the same implementation requirements as the successful bidders.

43. The basis for implementing this option would be that Woosh has already made substantial commitments towards developing BWA services in the 2.3 GHz band and that it would be unreasonable to penalise an enterprise that is, in essence, furthering the Government's broadband policies. These are, indeed, the arguments put forward by Woosh itself.

Risks to the Crown of this option are as follows.

44. An exception is created to the 2004 Cabinet decisions (whose basis has not changed in the interim, there still being no effective deployment of infrastructure in the band), and sets an undesirable precedent for future spectrum allocation and renewal processes.

- Current rightholders not being offered renewal could have justifiable grounds for objection on the grounds of inequitable treatment. Arrangements for early relinquishment of rights are consequently likely to be placed in jeopardy.
- Potential bidders who are not current rightholders could have justifiable grounds for objection on the grounds of Woosh's preferential access. Replacement of Woosh's current 16 MHz of spectrum with 20 MHz would serve only to exacerbate that perception.
- [would be withheld under section 9(2)(h) of the Official Information Act 1982].

- Removal of two lots from the competitive allocation can be expected to change the average price for the remaining lots. Given the strong interest shown on the demand side (by respondents to the BWA consultation) and the 25% reduction on the supply side, the price is likely to be higher and would also increase the price paid by Woosh for renewal of its rights.

Conclusion

45. For the reasons given above, officials consider that Option A represents the least risk to the Crown.

Competition issues (Spectrum caps and implementation requirements)

46. Spectrum acquisition caps ensure, at least initially, a broader distribution of rights than reliance on the Commerce Act alone. A cap tends to increase infrastructure competition by ensuring that more parties gain access to spectrum. A spectrum cap assures individual bidders that they will not be shut out of the bidding by a single, more affluent, party. Corresponding trade-offs are that outcomes may be less efficient, and a cap imposes government's, rather than the market's, view of the amount of spectrum required for a viable network.

47. The acquisition of management rights is subject to s47 of the Commerce Act. Entities wishing to acquire spectrum rights must show that the acquisition does not have the effect of "substantially lessening competition in a market". As some rights may not commence until 2010, and given the cutting edge nature of WiMax services, it may be impractical for the Commerce Commission to apply the acquisition test to the 2.3 GHz band.

48. I recommend that, as the 2.3 GHz band is the only spectrum currently available for WiMax, to ensure competition, the auction rules should include a spectrum cap effective for two years from acquisition. Note that a similar timeframe has been taken previously in the allocation of 3.5 GHz and 3G cellular spectrum. The intention of the cap rules is to create at least three un-associated rightholders in the band.

49. This cap may be criticised as limiting bandwidth to less than the optimum for fully converged triple play services (voice, data, and real-time or high definition video) in competition with broadcasting and wire-based services. Industry consensus, however, as expressed in responses to the BWA consultation, is that 30 MHz of bandwidth is more than sufficient in the New Zealand environment. The International WiMAX Forum also considers 30 MHz to be adequate to deliver some triple play services (see point 32 above). Further, I consider that a larger number of players will promote more effective competition in telecommunications markets than a single holder. As the spectrum cap is time-limited, consolidation can occur over time.

50. An issue for spectrum management in New Zealand is the large amount of spectrum that has been commercially allocated but is currently unused. It is increasingly apparent that, as technology drives up the demand for radiocommunications, there could be value in considering enforceable conditions of use. This principle has already been applied [EXG Min (04) 8/8 refers] to the 3.5 GHz

Crown-retained spectrum allocation, which imposed a requirement to implement services within two years of allocation.

51. Defining conditions of use needs to be considered carefully. Specification, interpretation and level of detail must be balanced against administrative simplicity, transparency and compliance costs. The most cost-effective method of monitoring is likely to be through Ministry audit of an implementation report from rightholders that includes performance measures capable of independent verification.

52. Responses to the discussion paper indicate a reasonable level of support for attaching conditions of use to BWA spectrum, particularly where it is in high demand. Two respondents (CallPlus and TeamTalk) specifically advocate use-it-or-lose-it provisions for successful bidders for 2.3 GHz band rights.

53. In order to ensure an effective use-it-or-lose-it regime, successful bidders could be required, under any related licence agreement, to implement wireless broadband services in the 2.3 GHz band under spectrum rights to a level acceptable to the Ministry of Economic Development within two years of allocation, or face commercial penalties and/or revocation of the spectrum licence without compensation. As noted above, the two year timeframe has already been applied to the 3.5 GHz band and provides sufficient time for rightholders to deploy infrastructure and implement initial services. Officials will undertake further work to develop a suitable penalty regime alongside use-it-or-lose it provisions.

54. I seek agreement that, rightholders should be subject to conditions of use or face revocation without compensation, noting that further work is required to finalise the details of the conditions. I also seek authorisation to determine auction and managed spectrum park rules and to prepare and release documents which will set out the detailed requirements of the allocation.

2.5 GHz Band

55. Frequencies between 2.500 and 2.690 GHz (2.5 GHz band) are currently coordinated for “TV Outside Broadcasting” (e.g. linking back to the studio) under administrative radio licences. The band is also used to trial new technologies.

56. The 2.5 GHz band has been identified as suitable for WiMax deployment in a similar manner to the 2.3 GHz band. It is also an extension band for advanced cellular services. The United States has already allocated this band for BWA use. The majority of submissions to the discussion paper supported use of this band for BWA.

57. I recommend that the Ministry develop and implement a transition plan, in consultation with existing users, to clear this band for future BWA allocation. The Ministry will engage with current radio licence holders to discuss a suitable migration path for existing services; the 2.7-2.9 GHz band is available as a replacement band. I expect that the 2.5 GHz band will be allocated for BWA services once the technical details of technologies suitable for deployment in this band are determined, which is likely to be after the World Radio Conference in November 2007.

5.4 GHz Band

58. Frequencies between 5.470 and 5.725 GHz (5.4 GHz band) are currently used for radiolocation and radionavigation under administrative radio licences. This band has been identified internationally as being suitable for sharing by Wireless LAN devices (WLAN) and existing services.

59. The discussion paper proposed that access to the 5.4 GHz band for WLAN use be granted under a general user licence subject to appropriate protections. The discussion paper proposed the adoption of FCC rules to ensure sharing complies with international best practice.

60. Respondents generally supported the use of the 5.4 GHz band for WLANs. A majority of respondents with an interest in the band advocated the use of a general user licence to manage access. General user licences are already in place for similar devices elsewhere in the 5 GHz band.

61. The Ministry will grant a general user licence in this band by June 2007 to facilitate deployment of BWA services. The licence will be subject to conditions to protect radiolocation and radionavigation services.

60 GHz Band

62. Frequencies between 57 and 66 GHz (the 60 GHz band) are allocated currently to mobile and fixed wireless services under administrative radio licences, but are little used. There is an international trend for this band to be allocated on a shared basis for high capacity short range point-to-point links (a form of BWA).

63. The discussion paper looked at the possibility of a general user licence for access to this band for BWA. Submissions indicated some demand and equal interest in access through a general user licence or a managed spectrum park.

64. The Ministry will grant a general user licence in the 60 GHz band by June 2007 to facilitate deployment of BWA services. In addition to being the lowest compliance cost option for access to spectrum, a general user licence is favoured because the properties of radio propagation in the 60 GHz range obviate the need for co-ordinated spectrum management. The licence will include conditions to balance technology neutrality with spectrum utility and efficiency.

70, 80, 90 GHz and other bands

65. There are currently no licensing policies for the 70, 80 and 90 GHz bands. There has been no demand for these bands in the past. Interest in using these bands for high speed BWA is becoming evident.

66. The discussion paper noted that current thinking for these higher-frequency bands is to follow the US and European lead with access through some form of a managed spectrum park. A managed spectrum park is favoured because the propagation characteristics of radio waves in the 70 to 90 GHz bands does not warrant fully co-ordinated spectrum management to achieve the required balance between spectrum utility and efficiency. However, some level of co-ordination is anticipated. The final allocation arrangements for these bands will be the subject of a future discussion paper.

67. Respondents also expressed interest in other bands, including amendments to the current 900 MHz general user licence and use of the 10.5 GHz bands. Policy and technical work for these bands is on-going.

Consultation

68. This paper was prepared with assistance from the Ministry, in consultation with the Treasury, Ministry for Culture and Heritage and Te Puni Kokiri, who support the recommendations. The Department of Prime Minister and Cabinet was informed. The paper follows a public consultation process and engagement with interested parties, including current holders of 2.3 GHz management rights.

Fiscal Implications

69. [would be withheld under section 9(2)(f)(iv) of the Official Information Act 1982].

70. Costs associated with the preparation of spectrum for auction would be funded through the existing Crown contribution for spectrum sales activities under Vote Communications, Management and Enforcement of the Radiocommunications Act 1989, [would be withheld under section 9(2)(f)(iv) of the Official Information Act 1982].

71. As part of spectrum sales arrangements, costs associated with monitoring and enforcing conditions of use would be funded through the existing Crown contribution for spectrum sales activities under Vote Communications, Management and Enforcement of the Radiocommunications Act 1989.

72. The administration costs associated with managed spectrum parks could be recovered either through fees and/or within existing baselines. Costs of enforcing general user licences are currently met through third party licence fees. If necessary, increases in appropriations will be sought at the appropriate time.

Legislative and Human Rights Implications

73. None.

Regulatory Impact and Compliance Cost Statement

74. Not required.

Publicity

75. The Minister of Communications will announce these decisions and release relevant documents (including this paper and associated minutes) in due course. There are media risks around announcement of the decisions, particularly concerning Woosh. A communications strategy will be developed prior to making announcements.

Recommendations

76.

Hon David Cunliffe
Minister of Communications