

Industry Canada

Consultation on a Policy and Technical Framework for the Use of Non-Broadcasting
Applications in the Television Broadcasting Bands Below 698 MHz

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Contents

Executive Summary	1
6-1 Comments are sought on the benefits that could be expected from making white space available in Canada.	2
6.4 Protection of TV Broadcasting.....	4
6-9 Comments are sought on the potential for improvements to the policy and technical framework for RRBS, including the possibility of moving to a licence-exempt regime, leveraging white space technology.....	5
6-14 On balance, do the potential benefits of permitting licence-exempt white space devices to operate in Canada outweigh their potential risks to other services.....	6
References:.....	8

Executive Summary

1. This submission strongly supports the further development of unlicensed spectrum (white space) in the television broadcasting bands below 698 MHz. There are two overarching reasons for this support:

- 1) The opening of spectrum white space will provide opportunity and incentive to create and develop new wireless communication applications in Canada.
- 2) Spectrum is a public resource which must allow for a degree of unrestricted usage and experimentation.

2. The authors of this submission draw on their academic expertise on issues concerning white space development and related policy aspects regarding the development of broadband infrastructure in Canada. This submission does not offer extensive comment on the technical provisions for white space devices and operating channels. This submission is largely in response to the request for comment on the possible introduction of licence-exempt TV band white space devices. We address four of the specific areas of inquiry expressed in the call for comments:

6-1 Comments are sought on the benefits that could be expected from making white space available in Canada.

6.4 Protection of TV Broadcasting

6-9 Comments are sought on the potential for improvements to the policy and technical framework for RRBS, including the possibility of moving to a licence-exempt regime, leveraging white space technology.

6-14 On balance, do the potential benefits of permitting licence-exempt white space devices to operate in Canada outweigh their potential risks to other services

The authors of this submission strongly endorse creating a policy environment which encourages the further development of white space-based technologies in Canada. These nascent technologies have potential to provide a range of industrial and social benefits, do not pose a threat to traditional broadcasters, and can complement and expand existing RRBS infrastructure. In short, their potential benefits far outweigh any potential risks.

6-1 Comments are sought on the benefits that could be expected from making white space available in Canada.

3. Allowing for licensed exempt devices in the spectrum below 698 MHz offers opportunities for growth in a wide range of applications including wireless broadband expansion; smart building and smart energy technologies which save resources and costs; agricultural applications to improve farm efficiency and productivity, to name a few (Chapin, Lehr, 2010). As the Federal Communication Commission wrote in its September 2010 white space regulation: “The potential uses of this spectrum are limited only by the imagination” (FCC, 2010). Canada requires as clear an endorsement from its spectrum regulators. The benefits for Canada are by and large the same benefits that are

expected in other jurisdictions more advanced in their exploration of white space and other aspects of the digital dividend. Wireless broadband access and new technologies employing remote sensors clearly benefit by use of unlicensed spectrum. As noted in the call for comments, the United States and Great Britain are at the forefront in recognizing the potential of white space development. Industry Canada notes the similarity of the US and UK approaches; however, researcher M. Calabrese has gone further and observed the positions of the FCC (US) and Ofcom (UK) are “nearly identical” (Calabrese, 2008). Each of these two countries has enjoyed longer government engagement and guidance with this emerging technology.

4. The U.S. National Broadband plan recommended the FCC move to expeditiously finalize its hearings into white space (it did so in 2010). The U.S. Broadband Plan observes: “innovation sometimes occurs in bands that conventional wisdom had at one time considered to be ‘junk’ spectrum.” (FCC, March 2010, 94). The FCC has determined that the best way to facilitate innovative new applications is via licence exemption “and that licensing would not be practicable for many of the new applications envisaged” (Nekovee). We believe unlicensed use of white space can foster innovation in Canada to enhance our productivity, and encourage more engagement with digital society/economy.
5. Ofcom’s 2007 Digital Dividend Review statement indicated that white space devices would be allowed in the UK if they did not cause interference to licensed products (Digital Britain, 118). In September 2011 Ofcom published its proposal to allow use of white space devices on the television white spaces. (Ofcom, 2011).

6. Many of these benefits explored in the US and UK may be magnified in the Canadian context since Canada has large areas of geography where large amounts of spectrum go unused. White space development holds great promise for a range of applications; however, the early benefit to Canada will likely be in broadband access. The potential for wireless broadband via white space holds great potential to diminish the digital divide between rural and urban Canada. In September, 2009, a wireless company named Spectrum Bridge became the first company in the world to offer wireless access over television white space in the rural town of Claudville, Virginia. White space clearly opens attractive possibilities for broadband expansion and other spectrum uses.
7. A difficulty in assessing the value of white space development is that Canada must be prepared for technologies which may not yet exist. Unlicensed access will ensure Canada does not restrict possibilities. This long-term vision is essential for Canada's ability to grow and evolve using digital technology.

6.4 Protection of TV Broadcasting

8. The areas of the Canadian spectrum traditionally used for television broadcasting is ideal for white space spectrum development. The characteristics of this spectrum (able to penetrate obstacles, long transmission per energy use) have long been recognized as making this region of the spectrum "beachfront property". Television white space is well suited to unlicensed applications since TV transmitters are left on more or less continuously, and infrequently change location or frequency (Marcus, 2005). This

predictability makes this region of the spectrum appropriate for furthering Canadian white space exploration.

9. The current research indicates there is little concern for interference with established television broadcasting. Recent American studies have shown that there is an abundance of white space available and that an unlicensed device can operate in an adjacent channel to a primary user in the TV band without causing significant levels of interference (Petty et al, 2007; Marcus, 2005).

6-9 Comments are sought on the potential for improvements to the policy and technical framework for RRBS, including the possibility of moving to a licence-exempt regime, leveraging white space technology.

10. With regards to Remote Rural Broadband Systems (RRBS), we believe that Industry Canada should discontinue licensing the UHF bands 512 to 608 MHz and 614 to 698 MHz, and align this area of spectrum management with an open standards approach such as IEEE 802.22 (for Wireless Regional Area Networks). Alignment with an open standard need not be exclusive, in case other industry solutions prove to be more cost-effective, reliable, etc. At the very least, Industry Canada should permit service providers to take advantage of innovation in white space devices, an action that would overcome the issue of Canada's small market for RRBS limiting the availability of equipment for this broadband service.

11. Under Industry Canada's current licensed approach to RRBS it appears that incentives for innovation and economies of scale are difficult to achieve. It is also too early to predict how significant IEEE 802.22's market impact will be, especially given the persistent demographic and geographic challenges of the remote/rural broadband marketplace. What matters at this point, at least in terms of regulation, is how well Industry Canada enables a competitive environment for further experimentation and innovation. The licensed approach does not do enough.

6-14 On balance, do the potential benefits of permitting licence-exempt white space devices to operate in Canada outweigh their potential risks to other services

12. We respond to this question with a strong "yes". Under current technologies, the risks to other services are minimal. The recent research supports this position and also indicates there may still be a necessary regulatory position for Industry Canada.

13. While we recommend that the RRBS be unlicensed for white space devices, we caution Industry Canada that an alternative to the status quo should not remove it from spectrum management in the whitespace marketplace. Industry Canada's leadership role will be particularly important during the regulatory transition to a more database driven cooperative cognitive radio environment. We are troubled by Industry Canada's statement in section 6.2 of SMSE-012-11 (2011) that it "would not regulate the development, management or internal operation of such databases or the exchange of

data between different database administrators, and would not establish requirements for open access, security or reliability”. This position requires clarification as to how conflicts between Canadian service providers, BDUs, and other interests, will be arbitrated in cases where the database driven systems break down. This approach seems to contradict the spirit of the Policy Objectives part of the call for comments which clearly states “the (industry) Minister is responsible for developing national policies for spectrum utilization and ensuring effective management of the radio frequency spectrum resource”. The authors of this submission believe a degree of continued regulatory oversight will still be required in a database environment. Spectrum use is essentially a question of overcoming obstacles posed by space. It expands the geographic range of technologies; therefore, its allocation, usage and development is vital for the future of a country as vast as Canada.

14. We thank Industry Canada for the opportunity to participate in this consultation.

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References:

Berleemann, Lars, and Stefan Mangold. *Cognitive Radio and Dynamic Spectrum Access*.

Chichester, UK: John Wiley & Sons, 2009

Calabrese, M. "Broadcast to Broadband: Unlicensed Access to Unused TV Channels?" *Internet Computing, IEEE* 12, no. 2 (2008): 71-75.

Chapin, John M. and William H. Lehr. "Scada for the Rest of Us: Unlicensed Bands Supporting Long-Range Communications." In *38th Research Conference on Communication, Information and Internet Policy (TPRC)*. Alexandria, VA, Oct 1-3, 2010.

Federal Communications Commission. "In the Matter of Unlicensed Operation in the TV Broadcast Bands. ET Docket No. 04-106 ", Sept 23, 2010.

Federal Communications Commission. "Connecting America: The National Broadband Plan." March, 2010.

Ganapati, Priya. "FCC White Spaces Decision Kicks Off the Next Wireless Revolution." *Wired* (Nov. 5, 2008).

Great Britain. Dept. for Culture Media and Sport. Dept. for Business Enterprise and Regulatory Reform. *Digital Britain : The Interim Report*, Cm. Norwich: TSO, 2009.

Marcus, M. J. "Unlicensed Cognitive Sharing of TV Spectrum: The Controversy at the Federal Communications Commission." *Communications Magazine, IEEE* 43, no. 5 (2005): 24-25.

Migneault, Jonathan. "Google Says Government Should Follow U.S. Lead on Unlicensed, 'White Space' Spectrum." *The Wire Report* (July 14, 2010).

Nekovee, M. "Cognitive Radio Access to TV White Spaces: Spectrum Opportunities, Commercial Applications and Remaining Technology Challenges." Paper presented at the New Frontiers in Dynamic Spectrum, 2010 IEEE Symposium on, 6-9 April 2010 2010.

Ofcom (2011). Implementing Geolocation: Summary of Consultation Responses and Next Steps. <http://stakeholders.ofcom.org.uk/consultations/geolocation/statement/>.

Prendergast, D., Wu Yiyan, and G. Gagnon. "The Effect of Unlicensed Cognitive Device Operation on Digital Television Performance in the Vhf/Uhf Band." Paper presented at the Radio and Wireless Symposium, 2008 IEEE, 22-24 Jan. 2008.