Industry Canada Industrie Canada

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Spectrum Management and Telecommunications

Decisions on a Band Plan for Broadband Radio Service (BRS) and Consultation on a Policy and Technical Framework to License Spectrum in the Band 2500-2690 MHz

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Contents

Intent

Through the release of this paper, Industry Canada hereby announces the decisions from the consultation process undertaken in *Canada Gazette* Notice No. DGSO-001-10 – *Decisions on the Transition to Broadband Radio Service (BRS) in the Band 2500-2690 MHz and Consultation on Changes Related to the Band Plan* (see Part A of this paper). The Department is also taking this opportunity to initiate the consultation on a policy and technical framework to license spectrum in the band 2500-2690 MHz (the 2500 MHz band) in Part B of this paper.

Through a separate consultation initiated by SMSE-018-10 in November 2010, the Department launched its *Consultation on a Policy and Technical Framework for the 700 MHz Band and Aspects Related to Commercial Mobile Spectrum*[1] (hereinafter referred to as the "700 MHz consultation").

Developments in the 2500 MHz band and the 700 MHz band have shown that both bands are suitable for the deployment of advanced mobile/broadband networks/services to meet growing user demands. The Department notes that a number of policy-related issues could benefit from concurrent consideration of the development of these two bands, as well as the development of the wireless services market as a whole. Industry Canada is therefore seeking views in the 700 MHz consultation on issues related to spectrum demand and on the possible need for government intervention to promote competition in the wireless market in the upcoming licensing processes. Interested parties are therefore encouraged to submit their comments with regard to questions on spectrum demand[2] and competition[3] through the 700 MHz consultation process. Comments for the 700 MHz consultation are due on February 28, 2011, and reply comments are due on March 30, 2011. The possible requirement and mechanisms to promote competition specifically applicable to the 2500 MHz will be addressed within the 2500 MHz consultation paper.

Background

The 2500 MHz band, previously allocated to the fixed and/or broadcasting services, has been licensed to Multipoint Communication Systems (MCS) operators in the bands 2500-2596 MHz and 2686-2688 MHz, and to Multipoint Distribution Service (MDS) operators in the bands 2596-2686 MHz and 2688-2690 MHz.[4] The World Radiocommunication Conference in 2000 (WRC-2000) identified the band 2500-2690 MHz for International Mobile Telecommunications-2000 (IMT-2000) systems (also known as third generation mobile or 3G services). The International Telecommunication Union's (ITU) identification of this band created significant interest, as it is the only band identified by the ITU on a

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1 700 MHz consultation: SMSE-018-10 – *Consultation on a Policy and Technical Framework for the 700 MHz Band and Aspects Related to Commercial Mobile Spectrum* (http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf09947.html).

2 See Section 4 of the 700 MHz consultation.

3 See Section 7 of the 700 MHz consultation.

4 In November 1991, Industry Canada issued SP-2500 MHz, *Spectrum Utilization Policy for the Fixed and Broadcasting Services in the Band 2500-2686 MHz*. This document is currently under review.

global basis for next generation mobile services. In November 2001,[5] Industry Canada indicated that the fixed and mobile services would be allocated throughout the band 2500-2690 MHz. At that time, the Department indicated that the use of the mobile service would be subject to the development of appropriate licensing considerations.

In 2004, the Department initiated a public consultation on the use of the 2500 MHz band through *Canada Gazette* notice DGTP-004-04, which considered the ongoing spectrum planning activities and the licensing approach for all services allocated in the band.

In 2006, in DGTP-002-06 – *Policy Provisions for the Band 2500-2690 MHz to Facilitate Future Mobile Service* (hereinafter referred to as "the 2006 Policy Decision"), the Department announced its policy on the use of spectrum in the 2500 MHz band, including the spectrum utilization policy which designates this band for mobile, fixed and broadcasting use. (The term adopted for policy, technological and licensing purposes in this band is Broadband Radio Service (BRS), where any of the mobile, fixed or broadcasting services may be deployed.) The 2006 Policy Decision also announced the policy to permit existing MCS and MDS licensees authorized to operate in the 2500 MHz band to apply for new BRS licences. Existing MCS or MDS licensees wishing to offer mobile service would apply to Industry Canada for a new BRS licence. The Department would issue a new BRS licence that would include approximately two thirds of the originally authorized spectrum in the 2500 MHz band. The remaining approximate one third of the spectrum under the former licences would be the subject of a future licensing process by the Department (referred to in this paper as "returned spectrum"). Although the 2006 Policy Decision provided some details in terms of the spectrum for the new flexible licences under BRS, it did not fully address the eligibility criteria for conversion of MCS and MDS authorizations to BRS licences, and it did not address whether site-specific MCS licences should be eligible for conversion to BRS spectrum licences.

Noting that the licence terms for MCS and MDS incumbents in the band (hereinafter referred to as "the incumbents") are coming to an end in 2011,[6] and in keeping with Industry Canada's policy of consulting two years prior to the end of a licence term, the Department published DGRB-005-09 – *Consultation on Transition to Broadband Radio Service (BRS) in the Band 2500-2690 MHz* (DGRB-005-09) in March 2009. The consultation requested comments on the Department's proposals regarding (1) a firm transition date to BRS licences, (2) the criteria to be used in determining which operations would be eligible for converting to BRS licences, (3) the geographic service area for converted BRS licences, and (4) the proposed conditions of licence for BRS spectrum licences until the policy and licensing framework for BRS has been finalized.

In June 2010, Industry Canada announced its decisions from the consultation initiated by DGRB-005-09 in DGSO-001-10 – *Decisions on the Transition to Broadband Radio Service (BRS) in the Band 2500-2690 MHz and Consultation on Changes Related to the Band Plan* (DGSO-001-10). In DGSO-001-10, the Department announced decisions on several issues, including (1) the establishment of March 31, 2011, as the firm transition date to BRS licences, (2) that all site-specific MCS licences in

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[5] News Release: *Minister of Industry Announces Canadian Decision Regarding the 2500 MHz Frequency Band* (http://www.ic.gc.ca/eic/site/ic1.nsf/eng/02881.html)

[6] MCS licences expire on March 31, 2011, whereas MDS licences expire on August 31, 2011.

Manitoba would be grandfathered, (3) the eligibility criteria for conversion to BRS licences, (4) the geographic service areas for converted licences, and (5) licence conditions for converted licences. In DGSO-001-10, the Department also initiated the consultation on the band plan, including the mapping of incumbents into a new band plan. Comments and/or reply comments were received from 3G Americas LLC (3G Americas); Bell Canada, Inukshuk Wireless Partnership and Rogers Communications Partnership (collectively Inukshuk); Bragg Communications Inc. (EastLink); Ericsson Canada Inc. (Ericsson); GSM Association (GSMA); Intel Corporation (Intel); Motorola Canada Limited (Motorola); MTS Allstream Inc. (MTS Allstream); Pacomm Consulting Group (Pacomm); Quebecor Media Inc. (QMI); Radio Advisory Board of Canada (RABC); Saskatchewan Telecommunications (SaskTel); SSI Micro Ltd. (SSI); TELUS Communications Company (TELUS); and YourLink Inc. (YourLink).

Industry Canada hereby announces its decisions, including the adoption of a new band plan and the mapping of incumbents into the new band plan, in Part A of this paper. In Part B of this paper, the Department initiates a consultation on a policy and technical framework to further license spectrum in the 2500 MHz band.

Part A – Decisions on Band Plan and Mapping of Incumbents to the New Band Plan

1. Band Plan

1.1 General Discussion

At the WRC-2000, the band 2500-2690 MHz was globally identified for IMT-2000 systems. At the World Radiocommunication Conference in 2007 (WRC-07), identification was expanded to include IMT-Advanced.[7] Recent technological evolutions and market trends enabling multimedia applications over broadband access systems have resulted in a significant increase in spectrum demand for broadband wireless applications. As noted in DGSO-001-10, in order to support such growth in spectrum demand, the BRS band plan in the 2500-2690 MHz range should support:

- harmonization of equipment specifications to the extent possible;
- economies of scale and greater equipment availability;
- orderly deployment of broadband radio systems, enabling efficient use of the limited radio spectrum;
- deployment of systems with reduced capital and operational costs, enabling affordable services to consumers; and
- international interoperability and roaming.

[7] An IMT-Advanced cellular system must have target peak data rates of up to approximately 100 Mbit/s for high mobility (such as mobile access) and up to approximately 1 Gbit/s for low mobility (such as nomadic/local wireless access), according to the ITU's requirements.

1.2 Adoption of Band Plan

In the 2006 Policy Decision, Industry Canada announced policy provisions associated with the conversion to BRS licences.[8] As discussed in the Decision, in formulating this policy, it was recognized that: (i) market demand should play a role in the development of new services for Canadians; (ii) mobile spectrum is very valuable; and (iii) there are numerous technological advances occurring in the 2500 MHz band. The Department also acknowledged that regulatory flexibility was necessary to permit mobile service in the band.

In particular, the Department adopted the policy to permit incumbents to apply for new BRS licences. The Department stated that each new spectrum licence would authorize the use of approximately two thirds of the spectrum associated with the former MCS/MDS licences in the 2500 MHz band, and the remaining spectrum under the former licence would be considered "returned spectrum." This latter spectrum would be the subject of a future licensing process, along with any other available unassigned spectrum.

At that time, as shown in Figure 1 below, 98 MHz of spectrum was designated for use by MCS licensees to operate in the band 2500-2596 MHz, as well as in the band 2686-2688 MHz. Ninety-two megahertz of spectrum was designated for use by MDS licensees to operate in the band 2596-2686 MHz, as well as in the band 2688-2690 MHz. The spectrum designated for MCS and MDS was unpaired. In the 2006 Policy Decision, the Department indicated that the bands 2535-2568 MHz (totalling 33 MHz) and 2657-2690 (totalling 33 MHz) would become returned spectrum once the incumbents obtained new authorizations which would allow them to provide mobile service.

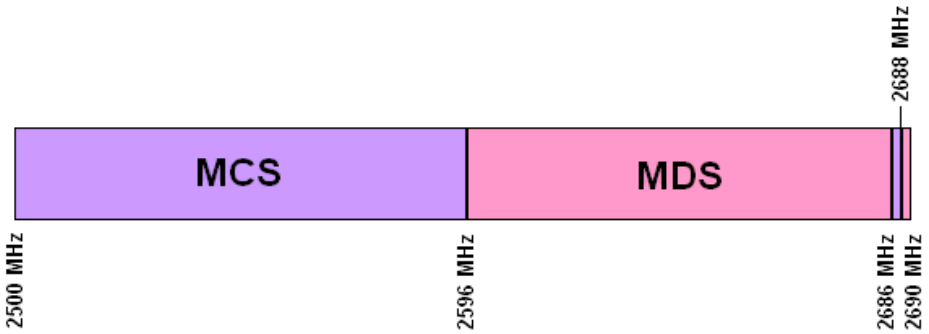
In the Policy Decision, the Department also noted that it intended to harmonize the band plan to be compatible with the U.S. band plan, as appropriate. However, the Department indicated that it reserved the right:

1. "to decide whether to implement a new band plan as contemplated in the policy;
2. to decide when to adopt and to implement the new band plan; and
3. to take any action to ensure that the new band plan is implemented and that the incumbents fully conform to the new band plan and the policy, at a date determined by the Department and after due notice."

The Department furthermore indicated that it would consult with the industry on the implementation of the new band plan.

[8] The consultation leading to this decision was initiated in April 2004 by DGTP-004-04, *Revisions to Allocations in the Band 2500-2690 MHz and Consultation on Spectrum Utilization.*

Figure 1 - Current Spectrum Attribution for Band 2500-2690 MHz



In March 2009, a Stakeholder Proposal Development (SPD) process was initiated by DGRB-005-09, in which the Department held discussions with MCS and MDS incumbents. The goal of this process was to develop proposals to align the spectrum that incumbents would retain following the transition to BRS with a new internationally compatible band plan. In DGRB-005-09, the Department noted that, at that time, the band was divided into two large contiguous unpaired blocks of spectrum, along with two other small blocks, while many international band plans are based on the basic model of paired blocks, separated by an unpaired block of spectrum.

Subsequently, in 2010, through DGSO-001-10, Industry Canada initiated a public consultation to determine whether to adopt the U.S. Educational Broadband Service (EBS)/BRS band plan (the "U.S. band plan") or the international band plan based on the Frequency Arrangement C1 in the Report ITU-R M.1036 (henceforth referred to as the "ITU band plan").

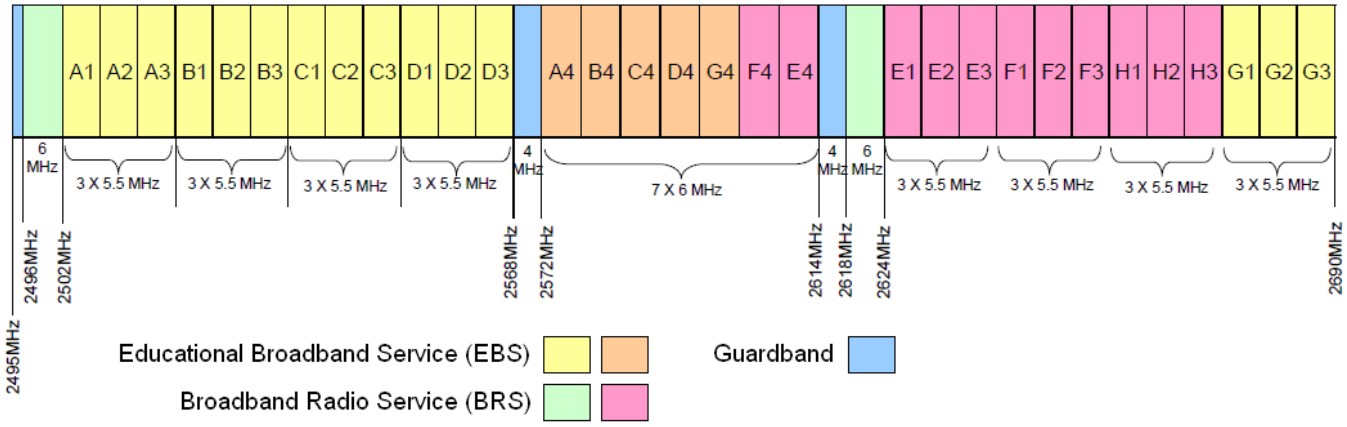
The Department noted that the U.S. band plan (shown in Figure 2 below) encompassed the following characteristics:

- the band is structured in 16.5 MHz blocks, except in the 2572-2614 MHz range, which is based on 6 MHz channels;

- the band plan is technology-flexible, as there are no specific designations for frequency division duplex (FDD) or time division duplex (TDD) frequency ranges, and licences are issued in an unpaired configuration; and

- the band starts at 2495 MHz (i.e. 5 MHz below the band designated for BRS in Canada).

Figure 2 – Option 1 - U.S. Band Plan Model[9]

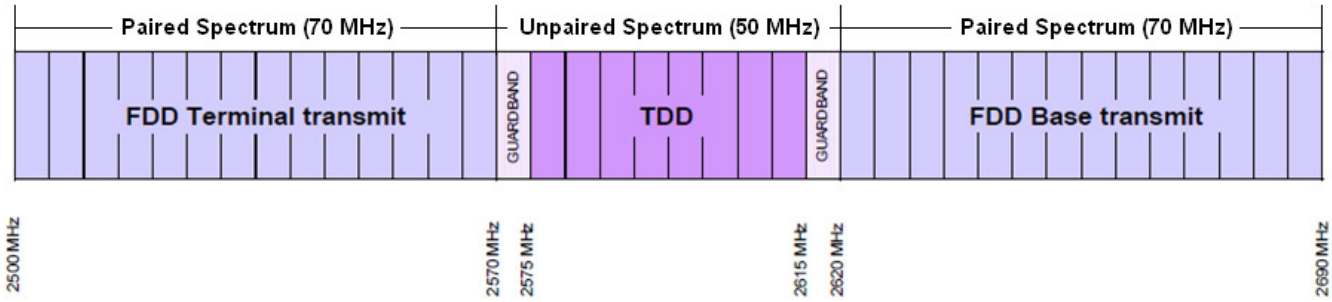


Although harmonization with the U.S. band plan would simplify cross-border frequency coordination and present a technology-flexible option, the Department proposed the implementation of the ITU band plan (shown in Figure 3 below), noting that the ITU band plan would:

- allow the deployment of both FDD and TDD systems;
- promote spectral efficiency, since guardbands, which are mostly unusable spectrum, would not be required between operators in adjacent FDD frequency blocks;
- permit global harmonization, thus enabling economies of scale for equipment and international roaming;
- facilitate equipment compatibility with other mobile bands licensed in Canada on a paired basis; and
- enable access to a wider range of services and applications which are expected to be developed on a global basis.

[9] Reproduced from the U.S. Federal Communications Commission (FCC), http://wireless.fcc.gov/services/brsebs/data/BRS-EBS-BandPlans.pdf.

Figure 3 – Option 2 - ITU Band Plan Model



In response to DGSO-001-10, most parties agreed that adopting the ITU band plan would provide several advantages, as noted above. All parties supported the option to adopt the ITU band plan, with the exception of Intel, which instead advocated a "flexible technology neutral" band plan, such as the one adopted by the Federal Communications Commission (FCC) in the United States.

Based on the considerable advantages inherent in the ITU band plan and overwhelming stakeholder support, the Department has decided to adopt the ITU band plan for the 2500 MHz band.

1.3 Realigned Spectrum Blocks

In adopting the ITU band plan in Canada, the amount of spectrum to be returned to the Department will need to be adjusted, as the ITU band plan is based on 5 MHz blocks. The 2006 Policy Decision stated that returned spectrum would equal approximately one third of the formerly authorized MCS/MDS spectrum. In DGSO-001-10, the Department proposed that the exact spectrum blocks to be returned be amended from 2535-2568 MHz to 2540-2570 MHz and from 2657-2690 MHz to 2660-2690 MHz (i.e. a slight decrease from 2 x 33 MHz blocks to 2 x 30 MHz blocks). In addition, consistent with the ITU band plan, the Department proposed that two blocks of 5 MHz (2570-2575 MHz and 2615-2620 MHz) be used as guardbands between the paired and unpaired spectrum. In DGSO-001-10, the Department also proposed spectrum exchange plans that could facilitate the use of paired spectrum by incumbent licensees.

Consistent with the 2006 Policy Decision, the proposed band plan and incumbent mapping proposals in DGSO-001-10 represent approximately one third of the originally authorized spectrum. This is illustrated in Figure 4 and Table 1 below.

Figure 4 – Comparison of Band Plans

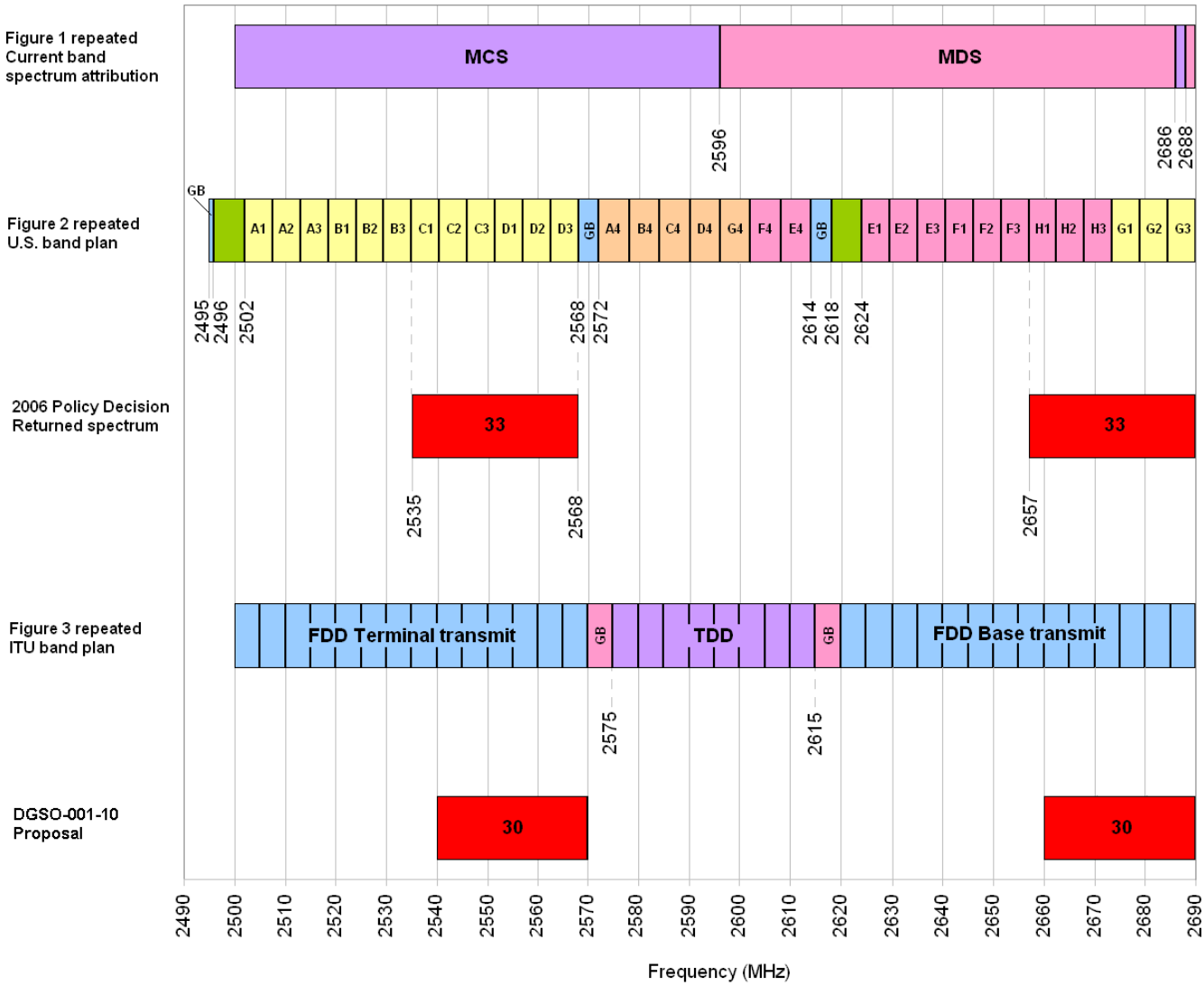


Table 1 – Returned Spectrum

	MCS				MDS			
	Retained spectrum		Returned spectrum	% returned spectrum (relative to originally authorized spectrum)	Retained spectrum		Returned spectrum	% returned spectrum (relative to originally authorized spectrum)
	Frequency range	Amount	Amount		Frequency range	Amount	Amount	
Originally authorized spectrum	2500-2596 MHz, 2686-2688 MHz	98 MHz	Not applicable	Not applicable	2596-2686 MHz, 2688-2690 MHz	92 MHz	Not applicable	Not applicable
2006 Policy Decision	2500-2535 MHz, 2568-2596 MHz	63 MHz	35 MHz	36%	2596-2657 MHz	61 MHz	31 MHz	34%
DGSO-001-10	2500-2540 MHz, 2570-2596 MHz	66 MHz	32 MHz	33%	2596-2660 MHz	64 MHz	28 MHz	30%

TELUS, in its comments and reply comments, objected to the amount of returned spectrum set out in DGSO-001-10. TELUS stated that "the 2006 Policy [Decision] precisely specifies the return of 50% of the FDD spectrum created via the mobile conversion and adoption of the FDD/TDD band plan." As well, TELUS made the following observations and proposals:

Table 2 – Excerpt from TELUS' Reply Comments

Translation	Description	Incumbent retained FDD	Returned FDD
Baseline	2006 Policy/US Band plan	66 MHz (6 of 12 pairs)	66 MHz
1	Pro Rata	70 MHz (7 of 14 pairs)	70 MHz
2	DGSO-001-10 Proposed	80 MHz (8 of 14 pairs)	60 MHz
3	TELUS Proposed	60 MHz (6 of 14 pairs)	80 MHz

TELUS argued that changing the 2006 Policy Decision with respect to the amount of returned spectrum would result in providing incumbents with a "21% increase in retained incumbent FDD spectrum (from 33 MHz to 40 MHz)," which "comes at the expense of band entrants and tax payers and is not in keeping with the in-force policy in the band." As an alternative, TELUS recommended that the Department "give band entrants as a group the opportunity to bid on 21% more FDD spectrum at auction and reduce the incumbent's retained FDD spectrum by 9%" (See Translation 3 in Table 2 above). MTS Allstream and EastLink, in reply comments, supported TELUS' proposal. EastLink also recommended that the Department reconsider the spectrum return and reallocation in light of the proposed harmonization with the international band plan. SaskTel objected to TELUS' proposal, stating that it was narrowly focused on FDD spectrum and failed to take into account the entire 2500 MHz spectrum. Inukshuk also objected to TELUS' proposal and recommended that Industry Canada adopt Inukshuk's alternate incumbent mapping proposal instead (to be discussed in Section 1.4 below).

The 2006 Policy Decision indicated that the Department would harmonize the Canadian band plan to be compatible with the U.S. band plan. Similar to the licensing process in the United States, Canadian MCS and MDS licences were issued based on a technology-flexible band plan in which no distinction was made between FDD or TDD operations. Licensees were free to deploy either TDD or FDD within their authorized licensed spectrum. Furthermore, licences were issued on an unpaired basis. In accordance with the 2006 Policy Decision, calculation of the amount of returned spectrum was based on the amount of originally authorized spectrum, and not based on whether the spectrum is paired.

As shown in Figure 4 above, if the returned spectrum were to have remained as the bands 2535-2568 MHz and 2657-2690 MHz (as per the 2006 Policy Decision), the incumbents would have retained 2 x 37 MHz (2500-2535 MHz and 2568-2570 MHz; and 2620-2657 MHz) of paired spectrum under the ITU band plan. In comparison, the proposal to amend the returned spectrum to 2540-2570 MHz and 2660-2690 MHz (as per DGSO-001-10) would provide the incumbents with 2 x 40 MHz (2500-2540 MHz and 2620-2660 MHz) of paired spectrum. This would represent an increase in paired spectrum to incumbents of 8%, and not 21%.

The Department notes that the 2006 Policy Decision has been in place for more than four years and that it has provided regulatory guidance to incumbents and other potential band entrants on their operational and business plans. Thus, major changes to the implementation of the 2006 Policy Decision are not appropriate at this point and would fundamentally undermine such business plans based on the Department's previous determinations (i.e. the return to the Department of roughly one third of the spectrum).

Therefore, consistent with the 2006 Policy Decision, the Department maintains that it is appropriate to require that returned spectrum constitute 2 x 30 MHz of spectrum (i.e. 2540-2570 MHz and 2660-2690 MHz) as set out in DGSO-001-10.

1.4 Alternate Incumbent Mapping Proposals

Inukshuk, in its comments, stated that the 2006 Policy Decision did not provide incumbents with paired blocks of spectrum and thus presented incumbents with the prospect of being stranded with only one of two paired blocks in the FDD portion of the band. Inukshuk submitted that the 2006 Policy Decision has been overtaken by technological developments and that the Department's proposal for mapping incumbents has been unnecessarily constrained by that Decision. Inukshuk contended that, by limiting the amount of paired spectrum which incumbent licensees may retain, the Decision forced incumbents to hold both paired and unpaired spectrum. Inukshuk also stated that the 2006 Policy Decision arbitrarily and unreasonably limits the amount of contiguous paired spectrum that incumbents may retain, thereby impeding the maximal spectral efficiency and data speeds that will be required to satisfy the demand for mobile broadband services. Inukshuk proposed alternate incumbent mapping proposals, which would result in additional contiguous spectrum in the paired spectrum for incumbents under the new BRS band plan. More specifically, Inukshuk recommended that, in areas where it holds only MCS or only MDS licences, it would obtain new BRS licences based on 30 + 30 MHz of paired contiguous spectrum (2530-2560 MHz paired with 2650-2680 MHz) with no unpaired spectrum. In areas where Inukshuk holds both MCS and MDS licences, it recommended that it should obtain new BRS licences based on 60 + 60 MHz of contiguous spectrum (2500-2560 MHz and 2620-2680 MHz) with no unpaired spectrum. Inukshuk submitted that such an exchange would provide it with an opportunity to acquire additional spectrum in order to satisfy future demand for mobile broadband services and to achieve

larger spectral efficiencies, faster data speeds and more reliable service levels. In reply comments, MTS Allstream and TELUS objected to Inukshuk's proposal, stating that it is inconsistent with the Department's goal of fostering competition and with the objective of maximizing FDD availability.

Pacomm recommended that Industry Canada "shift the MCS paired spectrum to the top of the FDD uplink and downlink bands, to facilitate coexistence between MCS FDD uplinks and MCS unpaired bands and possible elimination of lower TDD guard or restricted band." Similarly, EastLink proposed that the Department "allocate the upper part of the FDD paired spectrum to the same licensee that would operate in the TDD part of the band." EastLink also indicated that "the spectrum returned by the incumbents should be reallocated as largely TDD spectrum with paired FDD from the upper portion of the band. This would allow the incumbents to minimize the impact on their systems, and on consumers, while freeing up the maximum amount of FDD spectrum for the auction."

SSI claimed that if the new band plan required SSI to operate in FDD rather than TDD, "its operations would be crippled." SSI stated that it operates in 54 of the most remote communities in Canada and that a change in band plan would require significant changes to its wireless equipment in these areas. SSI therefore urged the Department to make its band plan determination sufficiently flexible to accommodate such constraints.

Industry Canada recognizes that permitting incumbents to choose which portions of the spectrum the Minister should authorize for BRS licences would provide them with the flexibility to choose the spectrum that is best suited for their needs on an individual basis. However, the Department notes that, in allowing such flexibility, the 2500 MHz band could be fragmented on a nationwide basis, potentially affecting the value of all authorizations within the band. Apart from the necessary amendment to align with the ITU band plan, the specific frequency range of spectrum to be treated as returned spectrum has been known since 2006. This has provided regulatory guidance to incumbents, as well as potential new entrants, as to the future availability of spectrum. The Department therefore considers that it is not beneficial to consider an alternative set of licensed versus returned spectrum at this point. Therefore, the returned spectrum will be 2540-2570 MHz and 2660-2690 MHz, as indicated in DGSO-001-10.

1.5 Operation of Non-FDD Systems in Paired Blocks

In the event that the ITU band plan was adopted, the Department sought comments on whether the operation of TDD systems should be permitted in the paired portion of the band plan (2500-2570 MHz and 2620-2690 MHz) and, if so, under what conditions.

GSMA, MTS Allstream, QMI, and SaskTel were of the view that permitting TDD systems in the paired spectrum blocks would lead to significant interference. GSMA, RABC, SaskTel and TELUS stated that interference is very likely to happen both with base stations and terminals. These parties stated that TDD systems operating in the paired spectrum blocks would generate interference to FDD systems operating in the same geographical area in the adjacent FDD blocks, as well as to FDD systems operating in the same frequency block (or in a frequency block overlapping with the block of the TDD system) and in an adjacent geographical area. SaskTel also indicated that, in some cases, mitigation measures would be very costly to implement and that there would be cases where interference would be extremely difficult or even impossible to eliminate. Inukshuk, Ericsson, MTS Allstream and QMI pointed out that permitting TDD operation in the paired spectrum would require the use of additional guardbands, resulting in an inefficient use of the spectrum.

SaskTel stated that operation of TDD and FDD systems in the same or adjacent spectrum blocks in different geographical areas would place future restrictions on the geographic expansion of the networks for both FDD and TDD operators. RABC and TELUS noted that permitting TDD operation in paired spectrum would especially affect global roaming for portable/mobile equipment and would result in the loss of most of the benefits of adopting the ITU band plan. Further, 3G Americas maintained that allocation of separate frequency ranges for use by FDD and TDD would be more efficient given that guardbands would not be required. 3G Americas added that the equipment currently in development for this band is based on globally recognized standards and, therefore, that an allocation reflecting a globally harmonized recommendation would enable rapid, affordable deployment of infrastructure, devices and innovative applications within Canada. MTS Allstream was of the view that the unpaired spectrum block should be more than sufficient to support any existing and anticipated TDD system demand.

As such, the majority of respondents (3G Americas, EastLink, Ericsson, GSMA, Inukshuk, MTS Allstream, QMI, RABC, SaskTel, TELUS and YourLink) submitted that new TDD operation should not be permitted in the paired spectrum blocks. Inukshuk, RABC, and TELUS added that continued TDD operation could be permitted in the paired spectrum blocks on a transitional basis only (i.e. during the migration period to the new band plan). RABC and TELUS further argued that, in the event where an incumbent would need to operate TDD systems in the paired spectrum block for an extended period of time, the incumbent should provide the necessary guardbands to avoid interference.

Inukshuk and YourLink argued that incumbent TDD operators should not be required to migrate their systems unless and until other BRS licensees require access to that spectrum. In particular, it was submitted that TDD systems in remote areas should be permitted to continue to operate until new FDD systems are licensed in those areas.

Intel maintained that TDD systems should be permitted to operate in the paired spectrum blocks. Intel argued that this would allow the most flexibility for technological innovation and permit operators to deploy the technology that best suits their customers' needs. Similarly, Pacomm recommended that the Department permit TDD operation in the paired spectrum and stated that some TDD applications may be able to coexist with FDD in the same spectrum (e.g. indoor underlays). In other cases, however, there would be inefficiency in using FDD spectrum for TDD operation due to the requirement for guardbands.

In light of its position as a service provider in remote communities in the Northwest Territories and Nunavut, SSI argued that the continued operation of its TDD systems should be permitted. SSI stated that forced conversion to FDD would be disruptive to its ability to provide service to its customers in 54 of the most remote communities in Canada. As SSI does not intend to install FDD equipment for a considerable period of time, it therefore does not anticipate having to manage the coexistence of its own FDD/TDD operations. Any interference would arise as a result of coexistence with new operators, in which case a guardband may be necessary. In some cases, other mitigation measures could be employed.

In DGSO-001-10, it was noted that the Department created technology-neutral rules in the Personal Communications Services (PCS) and Advanced Wireless Services (AWS) bands, which permitted the operation of TDD systems in paired bands. Any such TDD systems must operate within the technical rules for FDD and must avoid creating any interference to FDD systems. To date, no TDD systems have been deployed in either the PCS or AWS bands.

As noted in DGSO-001-10, FDD and TDD radio systems are not generally interoperable. In the FDD uplink band (2500-2570 MHz), without any interference mitigating techniques, TDD base station to FDD base station interference is high for both co-located and in proximity scenarios. There are a number of actions that can be taken in order to limit the interference between base stations: guardbands, additional front-end filters, restricted channels, deployment restrictions and special site engineering (in the case of co-siting). The Department notes that many of the measures would need to be taken in both FDD and TDD operators' networks in order to be meaningful (e.g. it would be necessary to apply additional front-end filters to both the FDD and TDD systems to suppress adjacent channel interference). Also, the use of guardbands, where appropriate, should not be considered in isolation, but in conjunction with other solutions such as additional front-end filters. Adding filters, however, to the base stations would of course increase the network complexity, partly due to the additional hardware and partly due to installation and maintenance. This would affect quality and coverage of the system where the filters are applied. For co-siting, one may use vertical antenna separation together with front-end filters (applied to both base stations involved) to decrease the interference. This will give sufficiently low interference for the second adjacent channel, but not for the first. The interference mitigating techniques suggested above for the adjacent channel scenario (e.g. filtering, guardbands) are not all applicable to the co-channel case, which may lead to increased separation distances for co-channel situations.

In the FDD downlink band (2620-2690 MHz), TDD terminal station to FDD terminal station adjacent-channel interference in the same geographic area can be severe regardless of frequency separation. Saturation, or "blocking," where a terminal station becomes overloaded by the high power levels of the adjacent channel interferers, would prevent the receiver from processing the wanted signal. In this case, an FDD terminal station (on any FDD channel across the entire downlink band) will typically receive interference if within approximately 10 metres (assuming other losses or physical blockage) of a transmitting TDD terminal station operating in any particular channel within the downlink band. The FDD terminal station is also susceptible to radiation spectral leakage, as the pass-band of the FDD front-end filter would nominally cover the frequency range 2620-2690 MHz in order to allow the terminal station to receive signal from base stations transmitting in any of the paired (FDD) downlink blocks. In addition to the preceding effects, it is also possible for signals received at adjacent channels to result in interference through intermodulation (IM) products caused by non-linear behaviour at the FDD receiver. The IM products can be a significant source of co-channel interference when the FDD receiver is exposed to multiple unattenuated adjacent-channel TDD interferers.

The Department also notes that some incumbent operators have already deployed non-FDD systems in the paired blocks. Some of these operations are in rural or remote areas where the probability of interference with other systems is relatively low. The comments received generally supported the continued operation of such incumbent systems provided that they do not cause interference to new BRS systems. There was general agreement that incumbents should be displaced only if necessary and, even then, should be given sufficient notice before being required to do so. MTS Allstream was of the view that Industry Canada should give incumbents as much time as is reasonably necessary to migrate to the

new band plan. TELUS, Motorola and RABC stated that incumbents should be given a period of 12 months starting from the issuance of a displacement notice by Industry Canada. The Department should issue displacement notices after having reviewed and approved displacement requests from BRS licensees. Inukshuk provided similar comments, except it stated that incumbents should be given a minimum period of 12 months starting from the issuance of a displacement notice by the Department. EastLink and QMI preferred using the auction date as a reference point. EastLink urged Industry Canada to set a hard deadline for transition based on the auction date, whereas QMI proposed that migration be completed no later than 12 months before the beginning of the auction. EastLink further indicated that a period of less than 12-36 months from the date of displacement notice would be preferable.

It is the general policy of Industry Canada to effect the displacement of frequency assignments only when and where required, so as to minimize disruption. The Department recognizes the significance of providing reasonable notice to inform spectrum users of any conditions or circumstances that might result in the displacement of services. In addition, the Department recognizes the challenges associated with the physical migration of existing systems and their impact on users, particularly in northern areas of Canada, i.e. Yukon, the Northwest Territories and Nunavut, where a longer migration time may be necessary. The Department also recognizes that FDD operation could potentially be affected by non-FDD operation in the paired blocks.

Therefore, the Department has decided that incumbents may continue to operate their non-FDD systems in their existing licensed bands within the paired spectrum blocks subject to the decisions included in Section 1.9. Accordingly, incumbent non-FDD operators are herewith advised to take the above into consideration and, if necessary, begin planning and implementing their migration plan in a timely manner.

In accordance with the band plan adopted in this decision, it is intended that FDD systems are to be deployed within the paired spectrum blocks.

New non-FDD systems may be deployed within the paired spectrum blocks in exceptional cases subject to the policy provisions contained in this paper. As discussed previously, it is noted that a non-FDD operation could potentially affect not only FDD systems operating in the same area in the same frequency channel, but also frequency channels anywhere in the paired blocks in the same or nearby areas in which the non-FDD system operates. Even after a non-FDD system is deployed, it could be subject to future displacement or termination due to the requirement of any existing or future FDD operators. Non-FDD operators are advised to take the above into consideration should they decide to deploy a non-FDD system in the paired spectrum blocks.

1.6 Operation of TDD Systems in the Unpaired Block

If two or more operators occupy the unpaired portion (2570-2620 MHz) of the BRS band in the same service area, a 5 MHz guardband between operators will typically be necessary to minimize interference to their networks. One possible solution to ensure the effective use of the unpaired block, while avoiding the use of frequency guardbands, would be to synchronize two TDD networks. However, as outlined in DGSO-001-10, such a measure could result in a number of technical limitations.

The Department sought comments on whether Industry Canada should rely on voluntary agreements[10] or develop specific technical rules to facilitate coexistence between two or more operators within the unpaired block. Most respondents were in favour of relying on voluntary agreements to resolve coexistence issues, with government intervention only where necessary. GSMA and Pacomm advocated the development of specific technical rules. There was general agreement that network synchronization should be avoided as a technical solution.

Industry Canada agrees that incumbent TDD operators in the unpaired blocks should be encouraged to work with the other incumbent operator or future operator(s) toward voluntary agreements facilitating coexistence before any government intervention is implemented. Therefore, the Department will support the use of voluntary agreements between affected licensees and will not impose the synchronization of TDD operators. However, in the event that operators are not able to come to a voluntary agreement, the Department may be requested to intervene, in which case, the Department may impose the use of a guardband between the affected operators.

1.7 Operation in the Bands 2570-2575 MHz and 2615-2620 MHz (Restricted Bands)

In DGSO-001-10, comments were sought on whether the blocks 2570-2575 MHz and 2615-2620 MHz should be held in reserve by the Department or whether they should form part of the unpaired block (2575-2615 MHz). The Department also sought comments on whether these blocks should be considered for future use by licence-exempt wireless systems.

No party supported licence-exempt operation in these blocks. Several parties noted that it would be virtually impossible to address interference issues with licence-exempt operators given that their identities would be unknown to both BRS licensees and the Department.

[10] For the purposes of this paper, a voluntary agreement includes transfers/trades of licences, commercial agreements, financial transactions and other business arrangements between authorized users.

With respect to the use of the guardbands, Inukshuk, Ericsson, GSMA, Intel, Motorola, Pacomm, RABC, SSI and TELUS were of the view that guardband blocks should form part of the unpaired block, whereas EastLink, MTS Allstream, QMI, SaskTel and YourLink stated that Industry Canada should hold the guardband blocks in reserve.

RABC, Ericsson and TELUS submitted that these blocks should be assigned to TDD operators along with the obligation to avoid interference to FDD systems.

Internationally, it is noted that the European Conference of Postal and Telecommunications Administrations (CEPT) Report 19[11] has identified (i) block 2570-2575 MHz as a proposed "Restricted" band, and (ii) block 2615-2620 MHz as a proposed guardband[12] to protect TDD base station receivers from FDD base station transmitters. Both the guardband and restricted band form part of the unpaired spectrum. Technical requirements such as band edge masks (BEMs) and power flux density (PFD) limits are included within this report. The European Commission (EC) Decision 2008/477/EC invokes these technical requirements and is based upon CEPT Report 19.

Industry Canada recognizes that the purpose of guardbands is to reduce the risk of interference between TDD and FDD operations. The Department supports the "Restricted" spectrum approach and believes that the same approach can be applied to both guardbands in Canada's BRS band plan. This would be consistent with the Department's goal of ensuring minimum interference between operators, as well as promoting the efficient use of the frequency spectrum.

1.8 2596 MHz Boundary Between MCS and MDS

Although not specifically addressed in DGSO-001-10, the Department received comments from Ericsson, Pacomm, RABC and TELUS requesting that the central boundary between MCS and MDS spectrum within the unpaired block be moved from 2596 MHz to 2595 MHz, in order to preserve the granularity of 5 MHz blocks in the ITU band plan.

The Department considers that, given its decision to adopt the ITU band plan, which is based upon a 5 MHz granularity, it is appropriate to shift the central boundary between MCS and MDS spectrum from 2596 MHz to 2595 MHz. BRS licences assigned to former MCS incumbents will not include this 1 MHz of spectrum.

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[11] Report from CEPT to the European Commission in response to the mandate to develop least restrictive technical conditions for frequency bands addressed in the context of WAPECS (Wireless Access Policy for Electronic Communications Services), http://www.erodocdb.dk/Docs/doc98/official/pdf/CEPTREP019.PDF

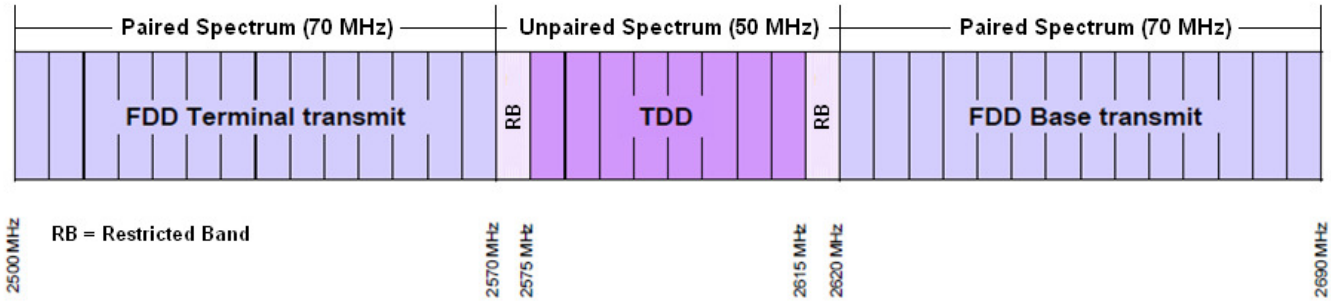
[12] The interference between unsynchronized TDD base stations of different operators and from TDD base station transmitters in the "Restricted" unpaired spectrum into FDD base station receivers can be ameliorated by a lower EIRP and attention to siting and coupling losses.

1.9 Decisions

Decisions:

1-1 Industry Canada has decided to adopt the ITU band plan as shown in Figure 5 below for BRS licensing in the band 2500-2690 MHz.

Figure 5 – General band plan for BRS in the band 2500-2690 MHz



1-2 In all geographic areas, the spectrum blocks 2540-2570 MHz and 2660-2690 MHz ("returned spectrum") are to be licensed by the Department as set out in Part B of this paper.

1-3 Operation in the paired blocks (2500-2570 MHz and 2620-2690 MHz):

Operation of non-FDD systems in the paired blocks (2500-2570 MHz and 2620-2690 MHz) are subject to the following conditions, which will apply to existing non-FDD systems and to new non-FDD systems deployed after the release of this paper:

(1) Non-FDD systems are permitted to continue to operate, but are subject to displacement. Industry Canada may issue a displacement notice on the following basis:

(a) Where a licensee planning to deploy FDD services in the paired blocks identifies specific non-FDD station(s) that may prevent their deployment, the FDD licensee can approach the Department with an identification of the areas, the spectrum required and time frames for their deployment that will be affected by an existing non-FDD station. Industry Canada will examine the submission and may issue a displacement notice requiring the non-FDD operator to cease or migrate all or part of its operations in order to provide for the timely deployment of the FDD system.

(b) The following minimum notification periods will apply:

(i) For systems operating in Yukon, Northwest Territories and Nunavut, non-FDD stations subject to displacement will be afforded a minimum of a two-year notification period; and

(ii) For systems operating in all other areas, non-FDD stations subject to displacement will be afforded a minimum of a six-month notification period.

(c) Voluntary agreements between the FDD and non-FDD licensees may provide for earlier displacement or for the continued operation of the non-FDD stations.

(2) Licensees planning to deploy new non-FDD systems or licensees wishing to expand their existing non-FDD systems must approach Industry Canada to obtain specific authority for all non-FDD stations. Such authorization will only be granted in exceptional cases on the following conditions:

(a) Licensees planning to deploy non-FDD stations must first use best efforts to reach voluntary agreement with all potentially affected licensees[13] in the paired blocks;

(b) Where a voluntary agreement has been reached, Industry Canada may issue an authorization in accordance with any conditions arising from the voluntary agreement;

(c) Where no voluntary agreement has been reached, Industry Canada may authorize the station(s) where the non-FDD system can demonstrate that it would not constrain the deployment or operation of existing and planned FDD systems[14];

(d) Specific conditions of licence authorization will include a defined notification period for displacement as per Section 1-3(1) above.

1-4 Operation in the unpaired block (2570-2620 MHz): Incumbents in the unpaired block are required to work with each other or any future operator(s) toward a voluntary agreement that would allow their networks to coexist. If operators fail to come to an agreement, the Department may be requested to intervene. In such a case, the Department may set conditions on both operators' authorizations to provide for the use of guardbands between the two operators in order to mitigate interference.

1-5 Operation in the "restricted bands" (2570-2575 MHz and 2615-2620 MHz): The restricted bands will form part of the unpaired block. The use of these blocks will be on a licensed basis. The operation by licensees within these block is on a restricted basis and is subject to the following conditions:

(1) Operation by licensees within these blocks is permitted on a no-protection, no-interference basis with respect to FDD operations in the bands 2500-2570 MHz or 2620-2690 MHz.

(2) Licensees may be required to modify or cease operation if they cause interference to FDD operations in the bands 2500-2570 MHz or 2620-2690 MHz.

(3) Licensees will be subject to specific technical rules applicable to these bands to be developed by Industry Canada.

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[13] It is noted that a non-FDD operation could potentially affect not only FDD systems operating in the same area in the same frequency channel, but also frequency channels anywhere in the paired blocks in the same or nearby areas in which the non-FDD system operates.

[14] Industry Canada may consult with the existing FDD operators before making a final determination.

1-6 The boundary between MCS and MDS operators, which is currently at 2596 MHz, is amended to 2595 MHz.

2. Mapping of Incumbents into the BRS Band Plan

2.1 General Discussion

The Department consulted on methods to reorganize the frequency blocks authorized for use by incumbents in the band plan:

1. through voluntary agreements which rely on market forces and mutually beneficial solutions instead of the Department imposing a solution; or

2. through direct action by the Department, for example, by the reassignment of spectrum licences, among other possible measures.

The following sections provide Industry Canada's decisions on the mapping of incumbents into the BRS band plan, categorized by specific geographic areas and mapping scenarios.

2.2 Mapping of Incumbents in Regions where the MDS Spectrum has not been Licensed

In certain regions (shown as Region A in Appendix A), including Alberta, the Atlantic Provinces, the Yukon, and parts of British Columbia, Ontario and Quebec, spectrum holdings in the 2500-2690 MHz band are currently divided between a BRS licensee (Inukshuk, the former MCS incumbent) and Industry Canada (the MDS spectrum holder). Currently, Inukshuk holds a BRS licence in the bands 2500-2535 MHz and 2568-2596 MHz, as well as an interim MCS licence in the band 2535-2568 MHz.

In the Northwest Territories (NWT) and Nunavut, SSI currently holds two MCS licences. Conversion to BRS will require SSI to return a portion of its MCS spectrum to the Department. The MDS spectrum has not been licensed in these areas.

To facilitate the use of paired spectrum, the Department sought comments in DGSO-001-10 on its proposal to mandate the exchange of the existing licence authorizing the use 20 MHz of the MCS spectrum by the MCS incumbent for a new one authorizing the use of 20 MHz of currently unassigned spectrum.

Inukshuk supported the principle of licence exchanges where the MDS spectrum has not been licensed.

SSI was of the view that a reassignment of licences should not be mandated in NWT and Nunavut, in order to provide operators with maximum flexibility in the use of BRS spectrum. SSI stressed that this approach would be crucial for SSI given the difficulties and costs associated with replacing its wireless

equipment in these areas. SSI commented that its operation employs TDD technology to bring Internet service to 54 of the most remote communities in Canada and that the new BRS band plan would require significant changes to its operation and equipment.

The Department notes that, should a mandatory reassignment of licences not be required with the adoption of the ITU band plan, the band 2620-2660 MHz in the upper paired spectrum would be left without a paired frequency block in the lower portion of the band. A mandated reassignment would provide, to both incumbents and new entrants, the certainty of the availability of paired spectrum in a timely manner. The Department understands the concern of incumbents currently using TDD technology that it will be necessary to ensure that sufficient time be allowed for the physical migration of the existing network facilities to minimize any negative impact of migration to the new band plan. The issue of a physical migration date will be addressed in Section 2.2.1 below. Therefore, the bands 2540-2570 MHz and 2660-2690 MHz will be designated as returned spectrum. As well, BRS licensees in the band 2520-2540 MHz will be required to exchange their licences authorizing the use of this spectrum for a licence authorizing the use of unassigned spectrum in the 2620-2640 MHz range. Industry Canada will issue a new BRS licence authorizing the use of spectrum blocks of 2500-2520 MHz, 2620-2640 MHz and 2570-2595 MHz.

2.2.1 Physical Migration Date - Bands 2520-2540 MHz, 2540-2570 MHz and 2595-2596 MHz

Comments were sought on the timing aspects related to the physical migration of the existing network facilities to the new band plan, including the timing required for the completion of all transactions regarding spectrum exchanges and returned spectrum. MTS Allstream was of the view that Industry Canada should give incumbents as much time as is reasonably necessary to migrate to the new band plan. TELUS, Motorola and RABC stated that incumbents should be given a period of 12 months starting from the issuance of a displacement notice by Industry Canada. The Department should issue displacement notices after having reviewed and approved displacement requests from BRS licensees. Inukshuk provided similar comments, except it stated that incumbents should be given a minimum period of 12 months starting from the issuance of a displacement notice by the Department. EastLink and QMI preferred using the auction date as a reference point. EastLink urged Industry Canada to set a hard deadline for transition based on the auction date, whereas QMI proposed that migration be completed no later than 12 months before the beginning of the auction. EastLink further indicated that a period of less than 12-36 months from the date of displacement notice would be preferable. SSI urged the Department to make its band plan determinations sufficiently flexible to accommodate the constraints faced by SSI in its operating territory. In order to avoid disruption to its network and customers, SSI requested the maximum time available for migration of existing network facilities to the new band plan – ideally, not before March 31, 2021.

The Department recognizes the challenges associated with the physical migration of existing systems and their impact on users, particularly in northern areas of Canada, i.e. Yukon, the Northwest Territories and Nunavut, where a longer migration time may be necessary. In order to minimize such impact, the Department agrees that existing systems will not be required to be displaced unless and until it becomes necessary. The Department agrees that sufficient time should be given to incumbents in order to update or replace the existing MCS and MDS radio systems with new systems based on the new BRS band plan and new broadband technologies, including the transition of current users to new systems. However, the Department also recognizes that a prolonged migration time can prevent the deployment of new BRS systems. Therefore, it has been decided that the transition policy included in Section 2.2.2 will apply.

Accordingly, incumbent licensees are herewith advised to begin planning and implementing their migration plan in a timely manner.

2.2.2 Decisions

Decisions applicable to Region A in Appendix A:

2-1 In areas (shown as Region A in Appendix A) where the MDS spectrum has not been licensed, new BRS licences based on an "exchange" of spectrum usage, as shown in Figure 7 below, will apply.

**Figure 6 - Band plan prior to April 1, 2011,
in areas where the MDS spectrum has not been licensed**

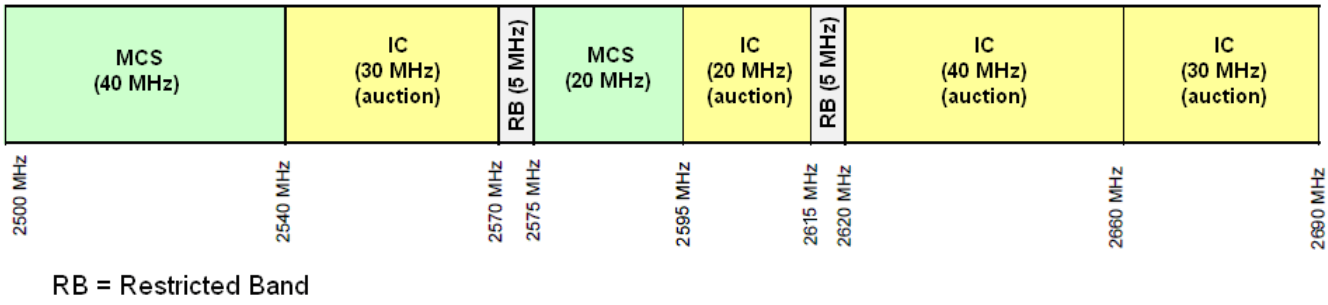
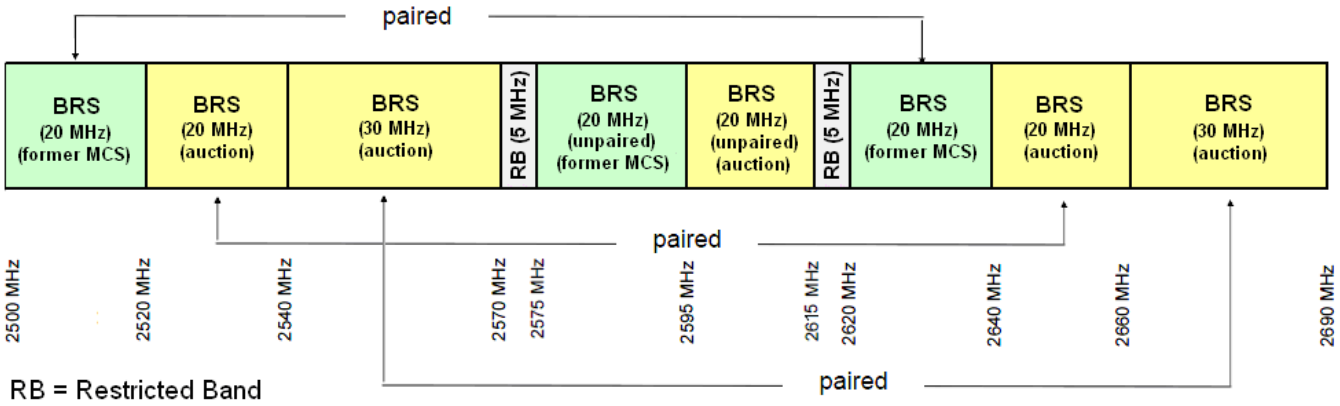


**Figure 7 – BRS band plan as of April 1, 2011,
in areas where the MDS spectrum has not been licensed**



2-2 BRS licences authorizing use of the bands 2500-2520 MHz, 2570-2595 MHz and 2620-2640 MHz will be issued to eligible incumbents.

2-3 The bands 2520-2570 MHz and 2640-2690 MHz (50 + 50 MHz of paired spectrum), and 2595-2620 MHz (25 MHz of unpaired spectrum) will be licensed by the Department, as set out in Part B of this paper.

2-4 Operations of stations by incumbent licensees in the bands 2520-2570 MHz and 2595-2596 MHz (see also Section 2.5 of this paper) are subject to the following conditions:

Incumbent systems in the bands 2520-2570 MHz and 2595-2596 MHz are permitted to continue to operate, but are subject to displacement. Industry Canada may issue a displacement notice on the following basis:

(a) Where a BRS licensee planning to deploy its services in its authorized spectrum identifies specific incumbent station(s) that may prevent their deployment, the BRS licensee can approach the Department with an identification of the areas, the spectrum required and time frames for their deployment that will be affected by an incumbent station(s). Industry Canada will examine the submission and may issue a displacement notice requiring the incumbent licensee to cease or migrate all or part of its operations in order to provide for the timely deployment of BRS systems by the BRS licensee.

(b) The following minimum notification periods will apply:

(i) For incumbent systems operating in Yukon, Northwest Territories and Nunavut, incumbent stations subject to displacement will be afforded a minimum of a two-year notification period; and

(ii) For incumbent systems operating in all other areas within Region A, incumbent stations subject to displacement will be afforded a minimum of a six-month notification period.

(c) Voluntary agreements between the BRS licensees and the incumbent licensees may provide for earlier displacement or for the continued operation of the incumbent systems.

2.3 Mapping of Incumbents in Regions where both the MCS and MDS Spectrum have been Licensed (except in Manitoba)

In Saskatchewan, SaskTel is the current MCS licence holder. The MDS licence was held by YourLink and has subsequently been transferred to Inukshuk. In Ontario, Quebec and British Columbia, Inukshuk (the former MCS licence holder) currently holds a BRS licence in the bands 2500-2535 MHz and 2568-2596 MHz, as well as an interim MCS licence in the band 2535-2568 MHz.

In parts of Ontario, Quebec and British Columbia, Inukshuk (the former MDS licence holder) also holds a BRS licence in the bands 2596-2657 MHz. Other MDS authorizations are currently held by Val Gagné Communications in certain areas of Ontario and by Cablevision T.R.P. Inc. in certain areas of Quebec.

The Department consulted on methods to reorganize the incumbents in the band plan:

1. through voluntary agreements which rely on market forces and mutually beneficial solutions instead of the Department imposing a solution;

2. through the direct reassignment of spectrum licences by the Department; in this case, the MCS and MDS incumbents would be mapped into the new band plan, resulting in each licensee holding 20 + 20 MHz of paired spectrum.

Comments were sought on whether government intervention is required where there are different MCS and MDS incumbents in the same geographic areas. Inukshuk, TELUS, SaskTel, YourLink and the RABC supported the approach to rely on voluntary agreements, unless a situation arises where government intervention becomes necessary. In support of this approach, SaskTel and YourLink[15] (the respective MCS and MDS incumbents in Saskatchewan) indicated that they had developed a good working relationship and were already discussing the issues, options and alternatives for transitioning the networks of both SaskTel and YourLink to the new band plan. On the other hand, Pacomm and QMI recommended that the government directly reassign the bands.

The Department notes that, regardless of whether a reassignment of licences is required, the amount of spectrum available for auction will not be affected. The only available spectrum for auction will be the returned spectrum (i.e. 2540-2570 MHz and 2660-2690 MHz).

Industry Canada, therefore, supports the approach to allow the MCS and MDS incumbents to reconfigure their current spectrum holdings through voluntary agreements in the bands 2500-2540 MHz and 2570-2660 MHz. The Department, however, recognizes that government intervention could be required should voluntary agreements not be reachable by incumbent operators. In such cases, the Department may intervene, upon request by any incumbent operator, and reassign licences in order to effect the band plan (shown in Figure 9 below) and transition timeline.

2.3.1 Physical Migration Date

2.3.1.1 Bands 2540-2570 MHz and 2660-2690 MHz

SaskTel and YourLink each indicated that it would take up to three years to complete the transition, due to both their extensive existing network deployments across Saskatchewan and to the complexities of planning and coordinating the transition of both networks to the new band plan without disrupting service to customers.

As mentioned, Industry Canada recognizes the challenges associated with the physical migration of existing systems and their impact on users. In order to minimize such impact, the Department agrees that existing systems will not be required to be displaced unless and until it becomes necessary. Therefore, it has been decided that the transition policy included in Section 2.3.2 will apply. Accordingly, incumbent licensees are advised to begin planning and implementing their migration plan in a timely manner.

2.3.1.2 Bands 2500-2540 MHz and 2570-2660 MHz (where displacement notice is required)

As discussed above, in the bands 2500-2540 MHz and 2570-2660 MHz, incumbents will be permitted to reconfigure their current spectrum holdings through voluntary agreements. Affected operators are encouraged to come to mutually acceptable arrangements that include considerations on physical migration date(s) in these bands. In the absence of an agreement, the Department may, upon request by any affected incumbent, be asked to intervene. In such case, the transition policy included in Section 2.3.2 will apply.

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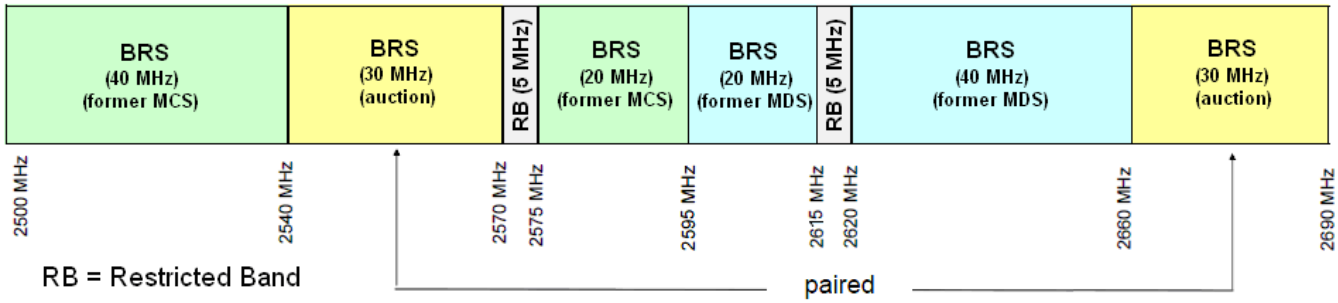
[15] YourLink's MDS licence has been transferred to Inukshuk.

2.3.2 Decisions

Decisions applicable to Region B in Appendix A:

3-1 In areas (shown as Region B in Appendix A) where both the MCS and MDS spectrum have been licensed (except in Manitoba), new BRS licences based on the BRS band plan shown in Figure 8 below will apply.

Figure 8 - BRS band plan, in areas where incumbents hold both MCS and MDS spectrum as of April 1, 2011



3-2 BRS licences authorizing the use of bands 2500-2540 MHz and 2570-2660 MHz will be issued to eligible incumbents.

3-3 The bands 2540-2570 MHz and 2660-2690 MHz (30 + 30 MHz of paired spectrum) are to be licensed by the Department as set out in Part B of this paper.

3-4 Operations of stations by incumbent licensees in the bands 2540-2570 MHz and 2660-2690 MHz (see also Section 2.5 of this paper) are subject to the following conditions:

Incumbent systems in the bands 2540-2570 MHz and 2660-2690 MHz are permitted to continue to operate, but are subject to displacement. Industry Canada may issue a displacement notice on the following basis:

(a) Where a BRS licensee planning to deploy its services in its authorized spectrum identifies specific incumbent station(s) that may prevent their deployment, the BRS licensee can approach the Department with an identification of the areas, the spectrum required and time frames for their deployment that will be affected by an incumbent station(s). Industry Canada will examine the submission and may issue a displacement notice requiring the incumbent licensee to cease or migrate all or part of its operations in order to provide for the timely deployment of BRS systems by the BRS licensee.

(b) The following minimum notification periods will apply:

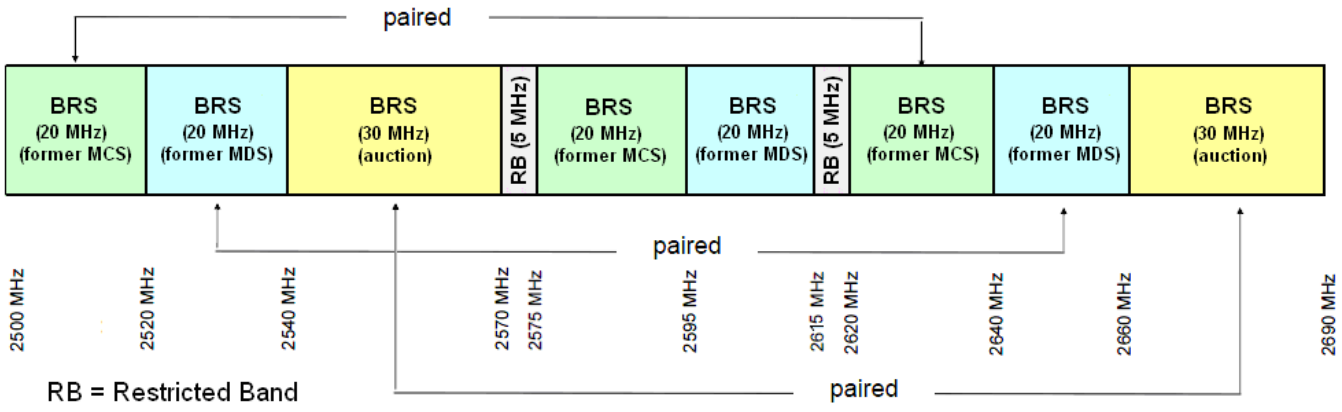
(i) For incumbent systems operating in all areas within Region B, incumbent stations subject to displacement will be afforded a minimum of a six-month notification period.

(c) Voluntary agreements between the BRS licensees and the incumbent licensees may provide for earlier displacement or for the continued operation of the incumbent systems.

3-5 In the bands 2500-2540 MHz and 2570-2660 MHz, incumbents are encouraged to enter into voluntary agreements that would facilitate the use of paired spectrum consistent with the BRS band plan (as shown in Figure 5). Such agreements are to be submitted to Industry Canada for approval; new BRS spectrum licences will be issued accordingly.

3-6 The affected parties may request that the Department intervene should they fail to come to an agreement as per Decision 3-5 above. In such cases, the Department may reassign licences in order to effect the band plan as shown in Figure 9. Incumbents will be afforded a minimum of a six-month notification period to migrate their systems to the BRS band plan.

Figure 9 –BRS band plan (where Industry Canada is required to intervene to facilitate the use of paired spectrum)



2.4 Manitoba (shown as Region C in Appendix A)

In DGSO-001-10, Industry Canada announced its decision to grandfather all site-specific MCS licences (see Appendix B) in Manitoba (shown as Region C in Appendix A). The BRS licence in the band 2596-2657 MHz is currently held by Inukshuk.

In DGSO-001-10, the Department sought comments on its proposal to mandate the exchange of 20 MHz of the MDS spectrum for 20 MHz of the MCS spectrum.

QMI supported the Department's proposal to mandate the exchange of 20 MHz of the MDS spectrum for 20 MHz of the MCS spectrum, but pointed out the difficulties which could be caused by the maintenance of certain site-specific licences. The RABC, SaskTel and TELUS were of the view that Industry Canada should make all efforts to align the overall use of spectrum with the ITU band plan, which emphasizes the maximization of paired spectrum. However, TELUS maintained that, since incumbents should only retain 30 MHz of spectrum, any mandatory exchange would be of 15 MHz rather than 20 MHz.

MTS Allstream did not specifically comment on the Department's proposed reassignment of licences. Rather, it objected to the decision to grandfather MCS site-specific licences in Manitoba and recommended that the existing MCS licensees in Manitoba be subject to a transition policy to return the MCS spectrum before the planned BRS auction. MTS Allstream contended that indefinite grandfathering overlooks several cost-effective, innovative alternatives to meet the school divisions' needs and proposed to work cooperatively with the school divisions to provide a more effective solution than that which is provided by their current MCS spectrum.

The Department is of the view that a mandatory assignment of a new spectrum licences based on the "exchange" of spectrum usage as described above will facilitate the transition to the new band plan in a timely manner. This approach would also provide for paired spectrum for incumbent(s), which would be consistent with the proposed new band plan.

With respect to MTS Allstream's objections to the grandfathering of site-specific licences in Manitoba, the Department notes that these issues were taken into consideration in the formulation of its June 2010 decision and maintains that the decision with respect to grandfathering site-specific licences in Manitoba remains appropriate. The Department encourages the affected parties to work cooperatively to find mutually acceptable solutions to address their needs.

The following sections (sections 2.4.1 to 2.4.2) do not apply to site-specific licences in Manitoba.

2.4.1 Physical Migration Date - Band 2620-2640 MHz

As discussed previously, the Department recognizes the challenges associated with the physical migration of existing systems and their impact on users. However, to enable the orderly planning and deployment of BRS radio systems, no fixed deadline for the completion of all spectrum exchanges or transactions and physical migration of systems will be imposed at this time. The Department agrees that sufficient time should be given to incumbents in order to update or replace the existing MCS and MDS radio systems with new systems based on the new BRS band plan and new broadband technologies, including the transition of current users to new systems. However, the Department also recognizes that a prolonged migration time can prevent the deployment of new BRS systems. Therefore, it has been decided that the transition policy included in Section 2.4.2 will apply. Accordingly, incumbent licensees are advised to begin planning and implementing their migration plan in a timely manner.

2.4.2 Decisions

Decisions applicable to Region C in Appendix A:

4-1 In Manitoba (shown as Region C in Appendix A), new BRS licences based on an "exchange" of licences authorizing spectrum usage as shown in Figure 11 will apply.

Figure 10 - Spectrum before spectrum exchange in Manitoba

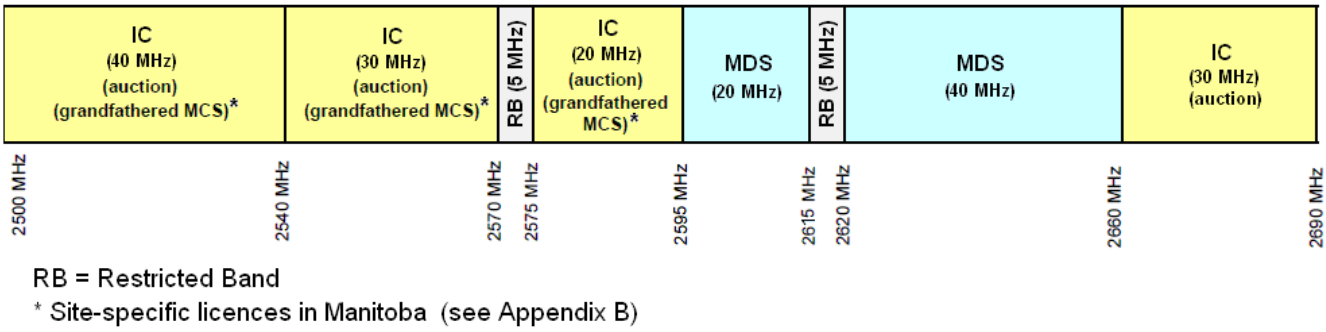
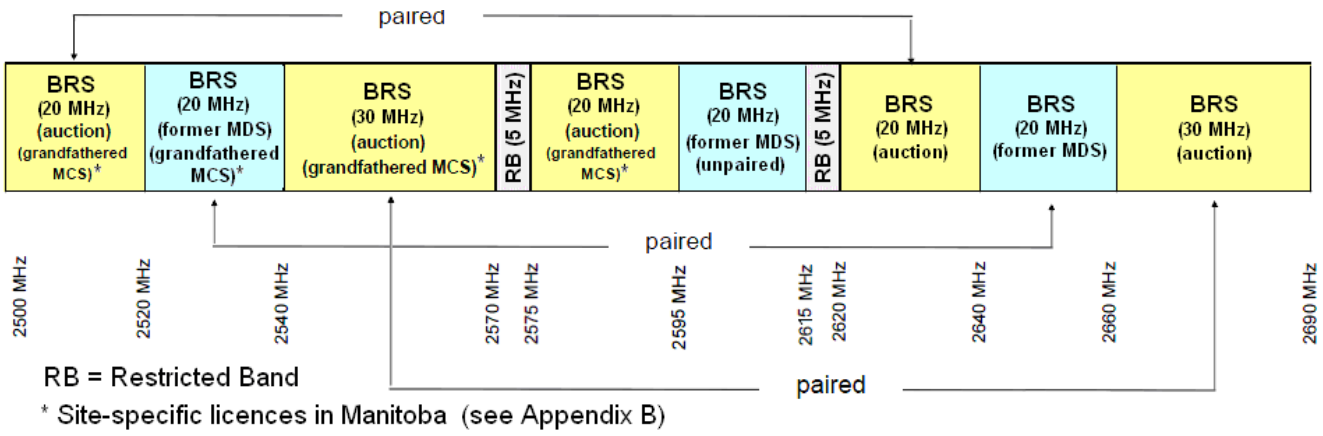


Figure 11 – BRS band plan in Manitoba, as of April 1, 2011



4-2 BRS licences authorizing the use of bands 2520-2540 MHz, 2595-2620 MHz and 2640-2660 MHz will be issued to eligible incumbents.

4-3 The bands 2500-2520 MHz and 2620-2640 MHz (20+20 MHz of paired spectrum), 2540-2570 MHz and 2660-2690 MHz (30 + 30 MHz of paired spectrum), and 2570-2595 MHz (25 MHz of unpaired spectrum) are to be licensed by the Department as set out in Part B of this paper.

4-4 Operations of stations by incumbent licensees in the band 2620-2640 MHz (see also Section 2.5 of this paper) are subject to the following conditions:

Incumbent systems in the band 2620-2640 MHz are permitted to continue to operate, but are subject to displacement. Industry Canada may issue a displacement notice on the following basis:

(a) Where a BRS licensee planning to deploy its services in its authorized spectrum identifies specific incumbent station(s) that may prevent their deployment, the BRS licensee can approach the Department with an identification of the areas, the spectrum required and time frames for their deployment that will be affected by an incumbent station(s). Industry Canada will examine the submission and may issue a displacement notice requiring the incumbent licensee to cease or migrate all or part of its operations in order to provide for the timely deployment of BRS systems by the BRS licensee.

(b) The following minimum notification periods will apply:

(i) For systems operating in all areas within Region C, incumbent stations subject to displacement will be afforded a minimum of a six-month notification period.

(c) Voluntary agreements between the BRS licensees and the incumbent licensees may provide for earlier displacement or for the continued operation of the incumbent systems.

2.5 Interim MCS Licence and Deployment of Services during the Migration Period to the New BRS Band Plan

Although not an issue raised in DGSO-001-10, QMI argued that incumbents in the 2500 MHz band should be prevented from launching new mobile services until after the 2500 MHz auction. In reply comments, TELUS supported such a moratorium, whereas Inukshuk submitted that such a "no head start" rule is entirely unnecessary. Inukshuk pointed out that QMI already holds mobile spectrum licences and is free to implement advanced new mobile broadband services at any time within its licensed territory.

Industry Canada is of the view that, consistent with the 2006 Policy, incumbents should be allowed to deploy new mobile services at any time, so long as they comply with the provisions set out in their current licences. The Department will not impose a moratorium on the deployment of new mobile services by incumbent licensees in bands where incumbents are eligible to obtain new BRS licences in accordance with this decision. However, for the frequency bands that are "returned spectrum," the Department is of the view that no new services (i.e. expansion of existing systems or new mobile service) should be permitted, in order to ensure an orderly transition to the new BRS band plan. The Department notes that during the period when incumbents will be migrating their systems to the new BRS band plan, they may be issued interim annually renewable MCS licences in order to use bands that are part of the "returned spectrum."

Decision:

5-1	In the returned spectrum bands within each specific geographic area, incumbents will be issued interim MCS licences, renewable on an annual basis. As part of the licensing conditions of the interim MCS licence, incumbents will not be permitted to expand beyond their current operation in those bands; as well, no mobile service will be permitted.

2.6 Other Incumbents

2.6.1 Incumbents' Fixed Systems in Alberta, British Columbia and Quebec

In June 1999, through DGRB-006-99, the Department issued *Multipoint Communications Systems in the 2500 MHz Range, Policy and Licensing Procedures*. This paper included provisions to make available the 2500 MHz band for MCS. In addition, there were provisions dealing with the treatment of incumbent fixed systems in the band. Some of these systems remain in operation in Calgary, Alberta, and certain areas of British Columbia and Quebec (see Appendix C).

Currently, there is one system in operation in the band 2686-2690 MHz in Calgary. Pursuant to DGRB-006-99, this system was provided with four years of protection (beginning in 1999), with a minimum notification period of two years before potential displacement. Upon request by an MCS licensee, the Department would have provided the incumbent licensee with a notice of displacement where necessary.

In British Columbia and Quebec, there are some systems in operation in the frequency range 2525.5-2588.25 MHz. These systems were permitted to continue their operation unless their presence precluded the establishment of an MCS system. In such cases, a displacement period of two years to vacate the band was provided.

The Department notes that, to date, it has not received any request from incumbent MCS licensees to displace any of the systems in Alberta, British Columbia or Quebec.

Therefore, the Department has decided that the transition policy included in Section 2.6.3 will apply.

2.6.2 CRTC Licence-Exempt Broadcasting Stations

Pursuant to DGSO-001-10, CRTC licence-exempt broadcasting stations in rural areas will not be eligible for conversion to BRS and are subject to the transition policy set out in DGSO-001-10, Section 5.1.4, repeated below. These stations (as of November 2010) are listed in Appendix D.

"CRTC licence-exempt broadcasting stations in rural areas will not be eligible for conversion to BRS and will be subject to a transition policy whereby:

- they may continue to operate in accordance with their current authorization;
- no additional authorizations in spectrum or geographic area will be considered by the Department;

- should the MDS operation prevent the deployment of a BRS system, the BRS licensee must identify to Industry Canada the stations and frequencies that may prevent its BRS deployment;
- Industry Canada will notify the MDS operator and the latter may continue to operate for up to two years following the date of the notice; and
- after the two-year notification period, the MDS operator must vacate the spectrum or operate on a no-protection, non-interference basis."

2.6.3 Decisions

Decisions:

6-1 Operation of fixed systems by incumbent fixed service (FS) licensees in Alberta, British Columbia and Quebec (see Appendix C) are subject to the following conditions:

Incumbent fixed systems are permitted to continue to operate, but are subject to displacement. Industry Canada may issue a displacement notice on the following basis:

(a) Where a BRS licensee planning to deploy its services in its authorized spectrum identifies specific incumbent fixed station(s) that may prevent their deployment, the BRS licensee can approach the Department with an identification of the areas, the spectrum required and time frames for their deployment that will be affected by an incumbent fixed station(s). Industry Canada will examine the submission and may issue a displacement notice requiring the incumbent fixed station licensee to cease or migrate all or part of its operations in order to provide for the timely deployment of BRS systems by the BRS licensee.

(b) The following minimum notification periods will apply:

(i) For incumbent systems operating in Alberta, British Columbia and Quebec, fixed stations subject to displacement will be afforded a minimum of a two-year notification period.

(c) Voluntary agreements between the new licensees and the incumbents FS licensees may provide for earlier displacement or for the continued operation of the FS systems.

Part B – Consultation on a Policy and Technical Framework on New BRS Licences

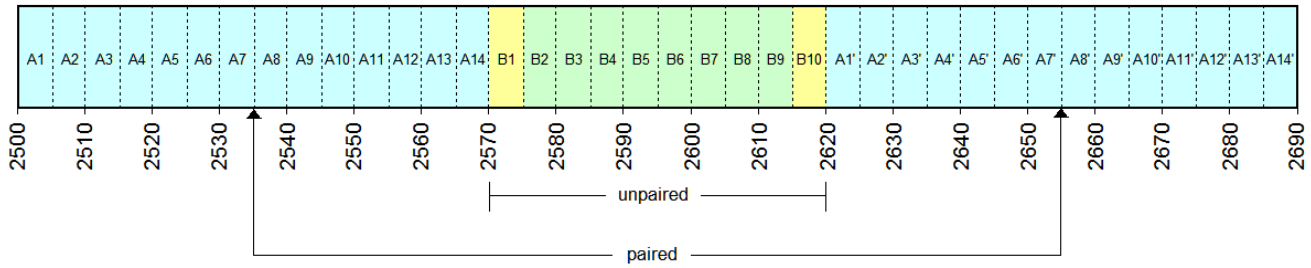
The balance of this paper deals with the process for licensing the spectrum that will be available after expiry of the MCS/MDS licences and the incumbent's conversion to BRS licences as set out in Part A. The Department intends to initiate a licensing process using an auction to select entities to which authorizations may be issued to use the available spectrum.

3. Spectrum Packaging for Licensing

3.1 Spectrum available for auction

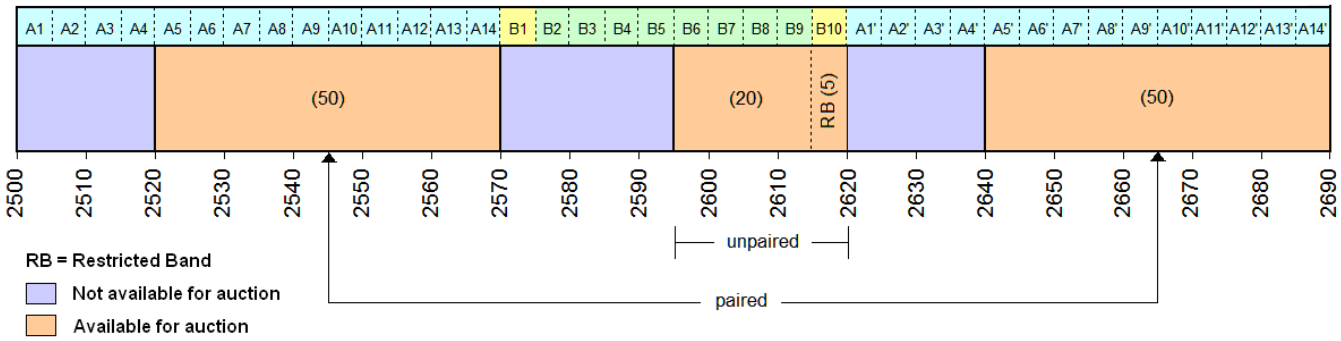
Building on the concept that recently developed technologies for the 2500 MHz band are based on bandwidths that are multiples of 5 MHz, the Department has used the 5 MHz block grid for referencing purposes. It is not meant to prejudge the outcome of the consultation with respect to appropriate block sizes, and should not be interpreted as a channel plan.

Figure 12 – 2500 MHz Spectrum Grid (for referencing purposes only)



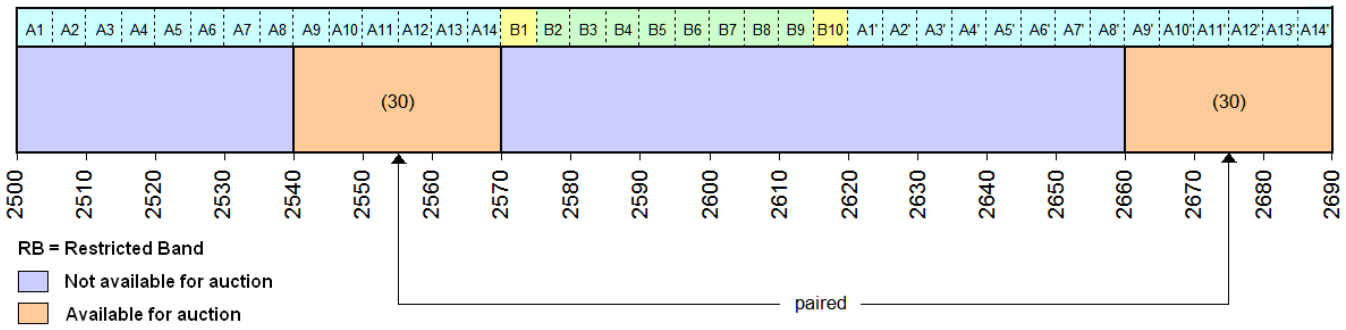
In regions (shown as Region A in Appendix A) where the MDS spectrum has not been licensed, the bands available for auction are 2520-2570/2640-2690 MHz (A5-A14/A5'-A14') of paired spectrum and 2595-2620 MHz (B6-B10) of unpaired spectrum. Block size options for the paired spectrum are multiples of the basic unit of 5 + 5 MHz pairs (for example, 5 + 5 MHz, 10 + 10 MHz, 15 + 15 MHz, etc.) in various combinations and arrangements to total 50 + 50 MHz paired spectrum. Block size options for the unpaired spectrum are multiples of the basic unit of 5 MHz to total 25 MHz of spectrum.

Figure 13 – Spectrum available for auction in regions (shown as Regions A in Appendix A) where the MDS spectrum has not been licensed



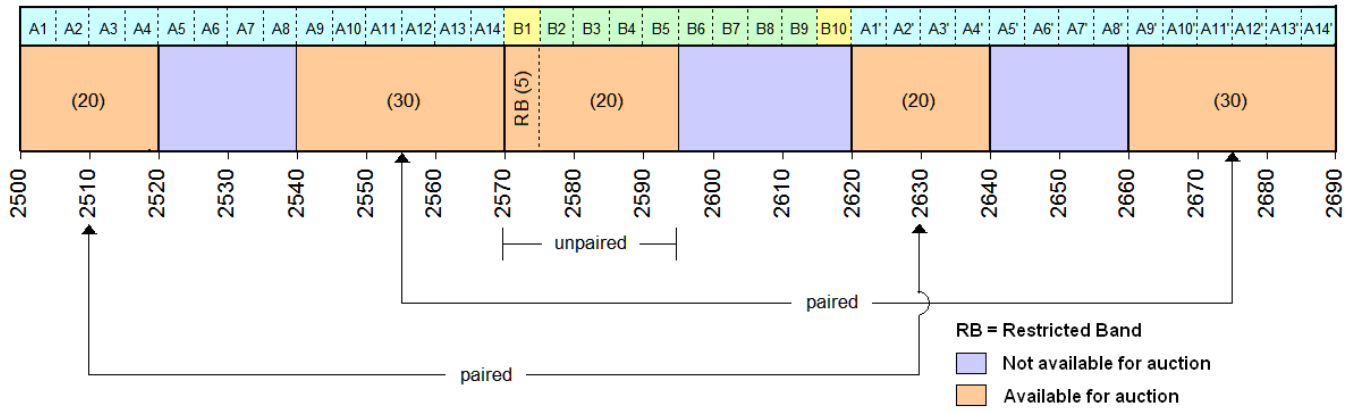
In regions (shown as Region B in Appendix A) where both the MCS and MDS spectrum have been licensed, the bands available for auction are 2540-2570/2660-2690 MHz (A9-A14/A9'-A14') of paired spectrum. Block size options for the paired spectrum are multiples of the basic unit of 5 + 5 MHz in various combinations and arrangements to total 30 + 30 MHz paired spectrum.

Figure 14 – Spectrum available for auction in regions (shown as Region B in Appendix A) where both the MCS and the MDS spectrum have been licensed



In Manitoba (shown as Region C in Appendix A), the bands available for auction are 2500-2520/2620-2640 MHz (A1-A4/A1'-A4'), 2540-2570/2660-2690 MHz (A9-A14/A9'-A14') of paired spectrum and 2570-2595 MHz (B1-B5) of unpaired spectrum. Block size options for the paired spectrum are multiples of the basic unit of 5 + 5 MHz in various combinations and arrangements to total 20 + 20 MHz and 30 + 30 MHz paired spectrum. Block size options for the unpaired spectrum are multiples of the basic unit of 5 MHz to total 25 MHz of spectrum.

Figure 15 – Spectrum available for auction in Manitoba (shown as Region C in Appendix A)



3.2 Block sizes

The amount of spectrum assigned to wireless operators helps to determine their ability to deliver high-quality services to consumers and manage the bandwidth required to handle increasing traffic volume from the uptake of mobile Internet services. The 2500 MHz frequency band offers a substantial amount of spectrum (190 MHz) to provide aggregated bandwidth.

At this time, there are at least three technology options for the deployment of new networks by BRS spectrum licence holders, namely FDD-based Long-Term Evolution (LTE), TDD-based LTE, or TDD-based WiMAX. It is also expected that new user devices will be able to operate in multi-bands using multi-modes.

While it is possible for some technologies (e.g. LTE and WiMAX) to operate with relatively narrow channels (e.g. 5 MHz), these technologies will deliver greater efficiencies when operating with wider channels of 20 MHz or more. In other words, the wider the channel, the greater the data speeds and spectral efficiencies. For this reason, industry experts have recommended that regulators license "4G" spectrum *"in as wide radio channels as possible."*[16] In light of the efficiencies associated with wider channels, the ITU has recommended that IMT-Advanced radio interface technologies provide support for *"scalable bandwidth up to and including 40 MHz."*[17] Accordingly, while LTE will support channel widths of up to 20 MHz, LTE-Advanced will support channel widths of up to 40 MHz.[18] The need to license relatively wide contiguous blocks of spectrum is underscored in an environment where globally harmonized mobile spectrum is scarce.

The Department recognizes that different bidders will have different spectrum requirements. For example, some may wish to acquire large contiguous blocks of spectrum, whereas others may prefer small blocks of spectrum. If blocks sizes are too small, it might increase the risk of band fragmentation for bidders wishing to acquire large contiguous blocks. On the other hand, certain auction designs can facilitate the building of contiguous blocks. It should be noted that smaller block sizes may provide the market with the flexibility to meet the diverse needs of various bidders. In addition, there may be different spectrum requirements in the paired spectrum versus the unpaired spectrum blocks. Furthermore, the size of blocks could affect the auction process, including the auction design.

Consultation:

In preparation for the future licensing of the 2500 MHz spectrum, the Department seeks comments on the following:

1-1 Should the block sizes be uniform in size?

(a) If a uniform size is preferred, what size should be considered?

(b) If a mix of block sizes is preferred, what combinations and arrangements should be considered?

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[16] *Transitioning to 4G: 3GPP Broadband Evolution to IMT-Advanced*, Rysavy Research/3G Americas, September 2010, page 22.

[17] *Report ITU-R M.2134: Requirements related to technical performance for IMT-Advanced radio interface(s)*, 2008, page 5.

[18] *HSPA to LTE-Advanced*, *supra* note 2, pages 94 and 98.
http://www.rysavy.com/Articles/2009_09_3G_Americas_RysavyResearch_HSPA-LTE_Advanced.pdf
See also *Report ITU-R M.2134, supra* note 8.

1-2 In the specific geographic regions discussed above and shown in Appendix A, which block size option(s) should be adopted and why is this option(s) preferred over the other options? Should the combinations and arrangements of block sizes be the same or different in different areas? Provide supporting rationale.

Provide comments separately for paired and unpaired spectrum blocks.

3.3 Tier Sizes for BRS Spectrum

Licences for spectrum in the 2500 MHz band will be established in accordance with the *Service Areas for Competitive Licensing*[19] document, which outlines the general service areas that are proposed for an auction. The defined geographic areas have been categorized under "service area tiers" that are based on Statistics Canada's Census Divisions and Subdivisions. The definition of the service areas within these tiers and accompanying maps and data tables are available on Industry Canada's website.

As different wireless services and applications are best suited to different service areas, four tiers of service areas have been established. Tier 1 is a single national service area. Tier 2 consists of 14 large service areas covering all of Canada. There are eight Tier 2 service areas that have provincial/territorial boundaries, and six that are within Ontario and Quebec. Tier 3 contains 59 smaller regional service areas and Tier 4 comprises 172 localized service areas. The population associated with each service area is based on Statistics Canada census information.

In general, Tier 1 and Tier 2 licences have typically been used for mobile services, whereas Tier 3 and Tier 4 have been typically used for licensing fixed services. AWS spectrum was licensed using a mixture of Tier 2 and Tier 3 service areas.

In DGSO-001-10, the Department decided that Tier 3 service areas would be used for the conversion of eligible MCS and MDS authorizations to BRS spectrum licences, except where two MCS licensees (Inukshuk and SSI) hold MCS spectrum licences with geographic service areas in northern Canada that are equivalent to Tier 4 service areas. Inukshuk's licence has already been converted to a Tier 4 BRS licence. SSI's MCS licences will be converted to two Tier 4 BRS licences.

Licensing the 2500 MHz spectrum based on larger geographic areas would provide more flexibility for bidders and may result in fewer neighbouring service providers, translating into less coordination between licensees and more effective use of radio spectrum. Moreover, large service areas could foster larger regional mobile services, which could reduce the number of roaming arrangements between licensees.

Larger geographic service areas would also enable the development of efficient large-scale networks due to economies of scale. Wireless mobile networks are capital-intensive. Considerable

[19] Service Areas for Competitive Licensing: http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/h_sf01627.html

capital and operational costs are required for items not directly related to the provision of wireless coverage in the field (research and development, network interconnection(s), operation and support systems, marketing, etc.). These costs need to be supported from services marketed to a sufficiently large subscriber base. Furthermore, a large or national footprint may be an asset when marketing high mobility services.

Licensing based on smaller tier sizes provides additional flexibility to bidders, who can concentrate on the geographic markets of most interest, or aggregate smaller service areas into larger regions corresponding to their business needs. This may result in potential lower costs for bidders if the smaller markets (rural and remote areas) are unbundled from the high-density, high-revenue areas. It may also enable smaller local service providers to afford the less costly licences and provide services in their communities.

As part of this consultation, the Department seeks comments on which tier size or combination of tier sizes should be used for licensing spectrum in the 2500 MHz band.

With respect to the development of Tier 3 service areas, a situation exists where both Lloydminster, Alberta, and Lloydminster, Saskatchewan, fall within the Edmonton Tier 3 service area (3-44). In its comments in response to DGSO-001-10, SaskTel argued that this service area should be amended so as to include Lloydminster, Saskatchewan, within a Saskatchewan Tier 3 service area. In *Service Areas for Competitive Licensing*,[20] the Department explained why it had intentionally made this and three other minor deviations from provincial border lines in its establishment of Tier 4 (and thus Tier 3) boundaries. The Department stated that minor deviations were made around provincial borders to reflect certain wireline service areas and to avoid having a service area boundary cut through a population centre, so as to minimize potential interference problems. The Department considers that this rationale continues to be valid and, therefore, although there are exceptional circumstances surrounding the conversion of SaskTel's licence to BRS, the tier areas established in *Service Areas for Competitive Licensing* will not be modified. The Department, however, encourages discussions between affected licensees to facilitate the provision of BRS service in these areas.

The questions below seek comments on tier sizes. Comments pertaining to tier sizes as they relate to the promotion of service deployment in remote and rural areas are not considered within Section 3.3 and should be addressed within the responses to Section 4.2 of this consultation.

Consultation:

2-1	The Department seeks comments on whether the licensing of 2500 MHz spectrum should be based on uniform tier sizes across all spectrum blocks, or on a mixture of tier sizes.
2-2	Based on your answer above, if a uniform tier size is preferred, what tier size should be adopted? If a mixture of tiers is preferred, please indicate the proposed tier(s) for each spectrum block.

[20] http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf05969.html

Provide supporting arguments for your responses to the above questions.

4. Promoting Competition

Industry Canada will use an auction mechanism to select entities eligible to be issued spectrum licences in both the 700 MHz and the 2500 MHz bands. Auctions are a transparent, fair and efficient spectrum assignment mechanism. The *Framework for Spectrum Auctions in Canada* notes that there are various measures available in an auction to promote a competitive marketplace if required, notably spectrum caps and set-asides.

Developments in the 700 MHz and the 2500 MHz bands demonstrate that both are suitable for the deployment of advanced mobile/broadband networks and services to meet growing user demands. In the recent consultation DGSO-001-10, it is noted that BRS comprises a wide range of applications, primarily data, multimedia, Internet Protocol (IP)-based applications and broadband Internet access using post third generation (3G) technologies.

Those participating in the 700 MHz and 2500 MHz auctions may see a benefit in acquiring a combination of spectrum in both bands to complement existing networks and/or deploy new networks and services, whereas others may not. Measures involving spectrum in both the 700 MHz and 2500 MHz bands could be adopted either in a combined auction format or separately if the two auctions are conducted individually.

To this end, general policy-related issues, such as drivers for spectrum demand, the possible need to promote competition in the Canadian wireless services market and specific mechanisms applicable to both the 700 MHz and 2500 MHz auctions, are addressed in the 700 MHz consultation document. Interested parties are encouraged to provide their comments pertaining to these issues through the 700 MHz consultation process.[21] Comments for the 700 MHz consultation are due on February 28, 2011, and reply comments are due on March 30, 2011. Issues, including the consideration of any mechanisms that may be required to address competition specifically in the 2500 MHz band, will be addressed within this paper.

As part of the current consultation, the Department seeks views on the mechanisms specifically related to the 2500 MHz band, in light of the band plan decisions announced in Part A of this paper.

4.1 Spectrum Aggregation Limits and Spectrum Set-Asides

Recognizing that there are various mechanisms in a licensing process that can be used to promote competition, the Department has intervened in the past by using mechanisms such as spectrum aggregation limits (spectrum caps) and spectrum set-asides to foster competition. The same options could be considered should the Department decide that specific measures are necessary to promote competition in the wireless service market.

[21] In particular, see sections 4 and 7 of the 700 MHz consultation.

4.1.1 Spectrum Aggregation Limits (Spectrum Caps)

Spectrum aggregation limits (spectrum caps) restrict the amount of spectrum that any eligible bidder and its affiliates can purchase in a particular geographical region.

A spectrum cap was set for the 2001 PCS auction, effectively allowing for the entry of two new licensees. The cap had been applied to the combination of cellular (800 MHz), PCS (at 2 GHz) and other similar high-mobility radiotelephony services in the 800 MHz range, such as enhanced specialized mobile radio (ESMR), in order to ensure that new entrants had access to sufficient spectrum to effectively compete with the existing carriers. The cap was subsequently removed in 2004 due, in large part, to the opening of several other mobile bands and the convergence occurring with similar services and technologies.

Spectrum caps have also been used to prevent excessive concentration of spectrum at the time of opening new bands for competitive services. Such an aggregation limit was employed in the licensing of the 2.3 GHz and 3.5 GHz bands and remained in effect for a period of two years following the close of the auction.

Setting the right cap amount is critical. If the limit is too low, there may not be enough spectrum to satisfy the business needs of some companies. If it is set too high, it might fail to fulfill the goal of preventing spectrum concentration. Another factor to be considered when applying a spectrum cap is how it should be applied, e.g. whether the cap should apply only to the spectrum being auctioned, to spectrum that is held across one or more bands, or whether it should apply differently across various bidders. How it is applied could constrain the efficient allocation of the spectrum.

Possible options for implementation of a spectrum cap may include:

(a) spectrum to be licensed in individual bands (700 MHz separately from 2500 MHz);
(b) a combination of spectrum to be licensed in both bands (700 MHz and 2500 MHz); and
(c) a combination of spectrum to be licensed, as well as spectrum assigned by existing licences in bands available for commercial mobile systems (Cellular, PCS, AWS, BRS), e.g. spectrum below 1 GHz.

Industry Canada recognizes that different licensed service areas for Cellular, PCS, AWS and BRS may raise difficulties for the possible implementation of spectrum caps involving more than one spectrum band.

4.1.2 Spectrum Set-Aside

A spectrum set-aside as part of an auction occur*s* where eligibility to bid for a specific block is limited to entities that meet predefined criteria. A set-aside was used in the 2008 AWS licensing process where only new entrants, defined as participants holding less than 10% of the national wireless market, were permitted to bid on three (3) of the available eight (8) blocks of spectrum. Restrictions were also imposed to ensure that the licences arising from set-aside spectrum would not be transferred to companies that did not meet the “new entrant” criterion for a period of five (5) years from the date of issuance.

A set-aside mechanism is established in the context of specific block(s) sizes and geographic dimension of the licences. Ideally, where there is more than one set-aside block, they should be side by side so that eligible bidders could acquire contiguous spectrum, both spectrally and geographically. Having a set-aside block(s) ensures that one or more designated entities will be a successful bidder; however, qualified entities still have to bid competitively among themselves for the set-aside spectrum. The size of the set-aside is also a consideration in that it should be a sufficient amount of spectrum so that a designated entity could provide competitive services to Canadians. Restrictions on secondary market transactions and transferability on set-aside spectrum may need to be imposed for a specific time frame to limit opportunities for economic arbitrage of spectrum licences.

Should the Department decide to implement one of these measures, it will need to determine who should be subject to the spectrum aggregation limit or who would be eligible to access the set-aside spectrum during the auction, for example, solely the bidder, or also the bidders' affiliates and associated entities.

The following questions seek comments as to which mechanisms could be used to promote competition specifically in the 2500 MHz band.

Consultation:

3-1 If the Department determines that there is a need for measures to promote competition in the wireless services market, which of the above mechanisms would be most appropriate in the 2500 MHz band and why should this mechanism be considered over the other? Comments should also indicate if further restrictions should apply.

In light of your response above, and recognizing that pending decisions on block sizes and tier sizes could influence your response:

3-2 (a) If the Department were to implement spectrum aggregation limits (caps), should a cap apply to the 2500 MHz band? If a cap is necessary:

(i) What should be the size of the cap and should this be specific to either the paired and/or unpaired spectrum bands?

(ii) Should bidders and their affiliates or associates share the cap?

(iii) How long should the cap remain in effect?

(b) If the Department were to implement a set-aside in the 2500 MHz auction:

(i) Who should be entitled to bid in the set-aside block(s), and should the entitled bidders be restricted to bidding on the set-aside only?

(ii) How much spectrum should be set-aside and which block(s) should be set-aside?

(iii) If the set-aside were to include multiple blocks of spectrum, should these blocks be contiguous?

(iv) What restrictions should be put in place to ensure that policy objectives are met (for example, should trading of the set-aside be restricted for a given time period)?

3-3 Are there other mechanisms that should be considered in the 2500 MHz band to promote competition? If so, how should such mechanisms be applied in this band?

3-4 The Government of Canada has undertaken a consultation on potential changes to the foreign investment restrictions that apply to the telecommunications sector. How would the adoption of any of the proposed changes affect your responses to the questions above?

Please provide supporting evidence and rationale for all responses.

3-5 The Department is seeking specific spectrum usage information from current commercial mobile licensees and entities interested in acquiring commercial mobile spectrum:

Do you plan to use the 2500 MHz spectrum acquired in the auction with, or on behalf of, another entity, which may participate in the auction? If yes, with which entity?

Your comments to this question will be treated as confidential provided that they are submitted separately (e.g. in an appendix) and clearly marked as "Confidential."

4.2 Promoting Service Deployment in Rural Areas

One of the objectives of the *Telecommunications Act* is to promote the availability of reliable and affordable telecommunications service to all regions of Canada. However, Canada's geography and widely dispersed population can render it difficult to make a business case for the deployment of advanced, innovative services in some rural and remote areas of the country. Consequently, some sparsely populated areas of the country may not have access to the advanced broadband services needed to prosper in today's digital economy.

Several government initiatives have been developed to promote and advance the availability of advanced services, or broadband connectivity in rural and remote areas.

As a component of *Canada's Economic Action Plan*, the Broadband Canada: Connecting Rural Canadians program aims to support the provision of essential broadband connectivity infrastructure to Canadians in remote and rural areas by providing an incentive to Internet service providers to extend their networks. The program's goal is to extend broadband service to as many unserved and underserved Canadian households as possible. In addition, the CRTC recently approved the use of deferral accounts towards investments for deployments of broadband services in unserved communities.[22]

[22] Telecom Decision CRTC 2010-637, Follow-up to Telecom Decision 2008-1 – Proposal by Bell Aliant Regional Communications, Limited Partnership and Bell Canada to dispose of the funds remaining in their deferral account, 31 August 2010, as amended by Telecom Decision CRTC 2010-805, Bell Canada – Applications to review and vary certain determinations in Telecom Decision 2010-637 concerning the use of high-speed packet access wireless technology and the deferral account balance, 29 October 2010;

Telecom Decision CRTC 2010-638, Follow-up to Telecom Decision 2008-1 – Proposal by MTS Allstream Inc. to dispose of the funds remaining in its deferral account, 31 August 2010; and

The recent *Consultation Paper on a Digital Economy Strategy for Canada* sought views on how the government could best ensure that rural and remote communities are not left behind in terms of access to advanced networks, as well as views on the suggested priority areas for attention in these regions.

Industry Canada continues to seek advice and consider options for promoting deployment in rural, remote and low-density areas, both within specific auction processes and within a broader policy context, noting that the challenges encountered in such areas can vary based on several factors, including geography, population density and the state of the marketplace.

Through other consultations initiated by Industry Canada, some respondents have identified access to spectrum as an impediment to the deployment of advanced services in rural areas. Since 1999, the Department has used auctions to assign spectrum in situations where spectrum demand exceeds supply. In addition to the auction process, there exist several options for stakeholders to access spectrum in rural or remote areas. For example, a spectrum licensee may apply to transfer its licence(s) in whole or in part (divisibility), in both the bandwidth and geographic dimensions. This creates an opportunity for those interested in providing service in rural areas to approach current licensees to discuss a mutually beneficial commercial arrangement for access to spectrum already licensed. There has been some secondary market activity in the PCS, 2500 MHz and 3500 MHz bands, as well as in the 24 GHz and 38 GHz bands in the past where the Department approved applications for licence transfers and divisions, as well as subordinate licence applications. Upon receipt of an application signed by both interested parties, the Department verifies that the licensee and transferee meet the eligibility criteria and all other conditions of licence, technical or otherwise, prior to consideration for ministerial approval. Upon approval, the necessary changes to the related licences are implemented.

Within an auction process, an opportunity exists where parties wishing to serve various rural or remote communities within a tier area can form a bidding consortium and enter the auction with the goal of obtaining a licence and then having each consortium member provide service to a portion of the licensed tier area.

In the *Consultation on the Revisions to the Framework for Spectrum Auctions in Canada and Other Related Issues*, some stakeholders provided comments in favour of the development of a smaller tier that separates rural and urban areas. They suggested that this would reduce barriers to the provision of rural service. However, most argued that Tier 4 should be the smallest subdivision, further noting that smaller tier sizes would not facilitate a viable and sustainable business case and would increase the complexity of frequency coordination issues.

Another option for accessing spectrum is outlined in Radio System Policy RP-19, *Policy for the Provision of Cellular Services by New Parties.*[23] This policy allows for new parties who propose services in areas that are unserved or underserved to apply for a licence for spectrum already licensed to a cellular incumbent. Where mutually agreeable arrangements cannot be established between the two

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Telecom Decision CRTC 2010-639, Follow-up to Telecom Decision 2008-1 – Proposal by TELUS Communications Company to dispose of the funds remaining in its deferral accounts, 31 August 2010.

[23] RP-19 - *Policy for the Provision of Cellular Services by New Parties* (http://www.ic.gc.ca/eic/site/smt-gst.nsf/vwapj/rp019.pdf/$FILE/rp019.pdf)

parties, new parties may apply through the RP-19 process for consideration. In addition, some PCS spectrum remains available for licensing on a first-come, first-served basis.

In the 700 MHz consultation, the Department is seeking comments on the challenges and specific problems affecting the deployment of broadband services in low-density rural and/or remote areas, as well as comments on whether there is a need for further regulatory measures or changes to existing regulatory rules to facilitate service deployment in these areas that remain unserved and/or underserved. Should participants in the 2500 MHz consultation wish to submit comments in response to those questions (which are included in Section 8 of the 700 MHz consultation, "Promoting Service Deployment in Rural Areas"), they should do so in the 700 MHz consultation. Comments in that consultation are due on February 28, 2011, and reply comments are due on March 30, 2011.

The Department notes that several incumbent operators have already deployed systems in rural areas using the 2500 MHz band. The following question seeks comments on whether specific measures could be adopted within the 2500 MHz spectrum auction process to ensure further deployment of BRS in rural and/or remote areas.

Consultation:

4-1 Comments are sought on specific measures that could be adopted within the 2500 MHz spectrum auction process to ensure further deployment of BRS in rural and remote areas (e.g. roll-out conditions, tier structure, etc.).

5. Auction Timing

In parallel with the preparatory work to license spectrum in the 2500 MHz band, Industry Canada has also begun preparatory work towards the licensing of the spectrum in the 700 MHz band. The Department must consider stakeholder requirements with regard to both bands. For example, consideration of the extent to which stakeholders perceive 2500 MHz and 700 MHz spectrum to be substitutes and/or complements of each other, and the extent to which these perceptions may vary across stakeholders.

In this regard, the Department is seeking views on the most appropriate timing for auction processes as part of the licensing for these bands. Respondents are requested to provide their comments through the 700 MHz consultation process.[24]

[24] See Question 10-1 in the 700 MHz consultation paper.

6. Next Steps

Following a decision on the questions raised in this consultation paper, including a possible joint auction and licensing process of the 2500 MHz and 700 MHz spectrum, Industry Canada will initiate a consultation on the licensing framework of the 2500 MHz spectrum. This will include, but not be limited to:

(1) auction design, rules and attributes;
(2) discussion regarding opening bids;
(3) implementation details of government intervention to enhance competition, if applicable; and
(4) licence conditions.

7. Submitting Comments

Respondents are requested to provide their comments in electronic format (WordPerfect, Microsoft Word or Adobe PDF) to the following e-mail address: Spectrum.Planning@ic.gc.ca, along with a note specifying the software, version number and operating system used.

In addition, respondents are asked to number their paragraphs for ease of referencing. Submissions should also include an executive summary using a standardized report format (maximum five (5) pages, double-spaced in 12-point font).

Written submissions should be addressed to Manager, Mobile Spectrum Planning, Engineering, Planning and Standards Branch, Industry Canada, 300 Slater Street, Ottawa, Ontario K1A 0C8.

All submissions should cite the *Canada Gazette*, Part I, the publication date, the title and the notice reference number (SMSE-005-11). Parties should submit their comments no later than April 9, 2011, to ensure consideration. Soon after the close of the comment period, all comments received will be posted on Industry Canada's Spectrum Management and Telecommunications website at http://www.ic.gc.ca/spectrum.

The Department will also provide interested parties with the opportunity to reply to comments from other parties. Reply comments will be accepted until May 9, 2011.

Following the initial comment period, the Department may, at its discretion, request additional information if needed to clarify significant positions or new proposals. In such a case, the reply comment deadline would be extended.

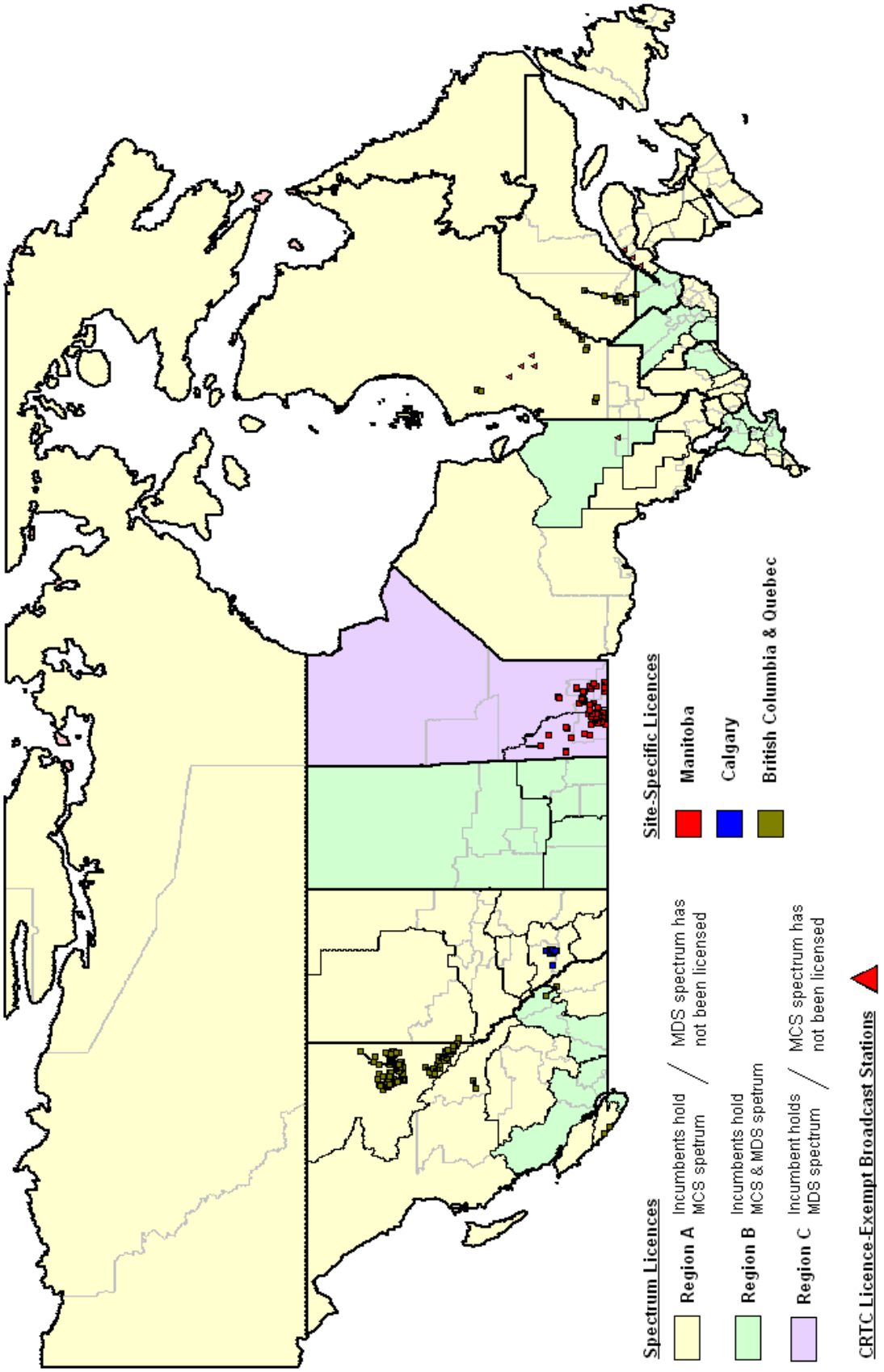
8. Obtaining Copies

All spectrum-related documents referred to in this paper are available on the Spectrum Management and Telecommunications website at www.ic.gc.ca/spectrum.

For further information concerning the process outlined in this document or related matters, contact:

Manager, Mobile Spectrum Planning
Engineering, Planning and Standards Branch
Industry Canada
300 Slater Street
Ottawa, Ontario K1A 0C8
Telephone: 613-990-4720
Fax: 613-952-5108
E-mail: Spectrum.Planning@ic.gc.ca

Appendix A - Map of Incumbents in the 2500 MHz Band



Appendix B - List of site-specific MCS licences in Manitoba (as of November 2010)

Licensee	Location	TX FREQ (MHz)	RX FREQ (MHz)	Latitude	Longitude	Corresponding Tier 3 Area	Corresponding Tier 4 area
BORDER LAND SCHOOL DIVISION	DOMINION CITY, MB-SCHOOL ITV SYSTEM	2502.25	2563.75	490827	970957	3-39	4-110
BORDER LAND SCHOOL DIVISION	VITA, MANITOBA-SCHOOL ITV SYSTEM	2503.75	2562.25	490746	963347	3-39	4-110
BORDER LAND SCHOOL DIVISION	WOODMORE, MANITOBA-ITV REPEATER	2562.25	2503.75	490804	965358	3-39	4-110
BORDER LAND SCHOOL DIVISION	WOODMORE, MANITOBA-ITV REPEATER	2563.75	2502.25	490804	965358	3-39	4-110
HANOVER SCHOOL DIVISION #15	NIVERVILLE MB-COLLEGIATE ITV SYSTEM	0	2569.75	493605	970218	3-39	4-110
HANOVER SCHOOL DIVISION #15	NIVERVILLE MB-COLLEGIATE ITV SYSTEM	0	2571.25	493605	970218	3-39	4-110
HANOVER SCHOOL DIVISION #15	NIVERVILLE MB-COLLEGIATE ITV SYSTEM	0	2581	493605	970218	3-39	4-110
HANOVER SCHOOL DIVISION #15	NIVERVILLE MB-COLLEGIATE ITV SYSTEM	0	2587	493605	970218	3-39	4-110
HANOVER SCHOOL DIVISION #15	NIVERVILLE MB-COLLEGIATE ITV SYSTEM	2505.25	0	493605	970218	3-39	4-110
HANOVER SCHOOL DIVISION #15	GRUNTHAL, MAN.-SCHOOL ITV SYSTEM	0	2569.75	492409	965137	3-39	4-110
HANOVER SCHOOL DIVISION #15	GRUNTHAL, MAN.-SCHOOL ITV SYSTEM	0	2571.25	492409	965137	3-39	4-110
HANOVER SCHOOL DIVISION #15	GRUNTHAL, MAN.-SCHOOL ITV SYSTEM	0	2575	492409	965137	3-39	4-110
HANOVER SCHOOL DIVISION #15	GRUNTHAL, MAN.-SCHOOL ITV SYSTEM	0	2581	492409	965137	3-39	4-110
HANOVER SCHOOL DIVISION #15	GRUNTHAL, MAN.-SCHOOL ITV SYSTEM	2502.25	0	492409	965137	3-39	4-110
HANOVER SCHOOL DIVISION #15	STEINBACH, MANITOBA-RSS ITV SYSTEM	0	2502.25	493058	964113	3-39	4-110
HANOVER SCHOOL DIVISION #15	STEINBACH, MANITOBA-RSS ITV SYSTEM	0	2503.75	493058	964113	3-39	4-110
HANOVER SCHOOL DIVISION #15	STEINBACH, MANITOBA-RSS ITV SYSTEM	0	2505.25	493058	964113	3-39	4-110
HANOVER SCHOOL DIVISION #15	STEINBACH, MANITOBA-RSS ITV SYSTEM	2569.75	0	493058	964113	3-39	4-110
HANOVER SCHOOL DIVISION #15	STEINBACH, MANITOBA-RSS ITV SYSTEM	2571.25	0	493058	964113	3-39	4-110
HANOVER SCHOOL DIVISION #15	STEINBACH, MANITOBA-RSS ITV SYSTEM	2575	0	493058	964113	3-39	4-110
HANOVER SCHOOL DIVISION #15	STEINBACH, MANITOBA-RSS ITV SYSTEM	2581	0	493058	964113	3-39	4-110
HANOVER SCHOOL DIVISION #15	STEINBACH, MANITOBA-RSS ITV SYSTEM	2587	0	493058	964113	3-39	4-110
HANOVER SCHOOL DIVISION #15	LANDMARK, MAN-COLLEGIATE ITV SYSTEM	0	2569.75	494008	964913	3-39	4-111
HANOVER SCHOOL DIVISION #15	LANDMARK, MAN-COLLEGIATE ITV SYSTEM	0	2571.25	494008	964913	3-39	4-111
HANOVER SCHOOL DIVISION #15	LANDMARK, MAN-COLLEGIATE ITV SYSTEM	0	2575	494008	964913	3-39	4-111
HANOVER SCHOOL DIVISION #15	LANDMARK, MAN-COLLEGIATE ITV SYSTEM	0	2587	494008	964913	3-39	4-111
HANOVER SCHOOL DIVISION #15	LANDMARK, MAN-COLLEGIATE ITV SYSTEM	2503.75	0	494008	964913	3-39	4-111
Inukshuk Wireless Partnership	WINNIPEG, MANITOBA-TD CENTRE	2533	0	495344	970822	3-39	4-111
Inukshuk Wireless Partnership	WINNIPEG, MANITOBA-TD CENTRE	2539	0	495344	970822	3-39	4-111
Inukshuk Wireless Partnership	WINNIPEG, MANITOBA-TD CENTRE	2551	0	495344	970822	3-39	4-111
Inukshuk Wireless Partnership	WINNIPEG, MANITOBA-TD CENTRE	2557	0	495344	970822	3-39	4-111
Inukshuk Wireless Partnership	WINNIPEG, MAN.-SUBSCRIBER STATIONS	0	2533	495345	970821	3-39	4-111
Inukshuk Wireless Partnership	WINNIPEG, MAN.-SUBSCRIBER STATIONS	0	2539	495345	970821	3-39	4-111
Inukshuk Wireless Partnership	WINNIPEG, MAN.-SUBSCRIBER STATIONS	0	2551	495345	970821	3-39	4-111
Inukshuk Wireless Partnership	WINNIPEG, MAN.-SUBSCRIBER STATIONS	0	2557	495345	970821	3-39	4-111
Inukshuk Wireless Partnership	ELIE, MANITOBA-CHMI TV TX SITE	2533	0	495226	974427	3-39	4-111
Inukshuk Wireless Partnership	ELIE AREA, MAN.-SUBSCRIBER STATIONS	0	2533	495406	974532	3-39	4-111

Licensee	Location	TX FREQ (MHz)	RX FREQ (MHz)	Latitude	Longitude	Corresponding Tier 3 Area	Corresponding Tier 4 area
Inukshuk Wireless Partnership	SELKIRK, MANITOBA	2533	0	500924	965839	3-39	4-111
Inukshuk Wireless Partnership	SELKIRK AREA, MAN.-SUBSCRIBER STNS.	0	2533	500837	965303	3-39	4-111
Inukshuk Wireless Partnership	CHATFIELD, MANITOBA	2533	0	504945	973333	3-39	4-112
Inukshuk Wireless Partnership	CHATFIELD AREA, MAN-SUBSCRIBER STNS	0	2533	504702	973417	3-39	4-112
Inukshuk Wireless Partnership	HAYFIELD, MANITOBA-CKX TV TX SITE	2533	0	494005	1000042	3-40	4-114
Inukshuk Wireless Partnership	HAYFIELD, MANITOBA-CKX TV TX SITE	2539	0	494005	1000042	3-40	4-114
Inukshuk Wireless Partnership	BRANDON AREA, MAN-SUBSCRIBER STNS.	0	2533	495049	995710	3-40	4-114
Inukshuk Wireless Partnership	BRANDON AREA, MAN-SUBSCRIBER STNS.	0	2539	495049	995710	3-40	4-114
Inukshuk Wireless Partnership	NEWDALE, MANITOBA	2533	0	502038	1001109	3-40	4-114
Inukshuk Wireless Partnership	MINNEDOSA/SHOAL LAKE, MB-SUBSC STNS	0	2533	502106	1001214	3-40	4-116
Inukshuk Wireless Partnership	RIDING MOUNTAIN, MANITOBA	2533	0	502840	993450	3-40	4-116
Inukshuk Wireless Partnership	RIDING MTN AREA, MB-SUBSCIBER STNS.	0	2533	503155	992800	3-40	4-116
Inukshuk Wireless Partnership	BALDY MOUNTAIN, MANITOBA	2533	0	512814	1004312	3-40	4-116
Inukshuk Wireless Partnership	DAUPHIN AREA, MAN.-SUBSCRIBER STNS.	0	2533	510858	1000300	3-40	4-116
Inukshuk Wireless Partnership	FOXWARREN, MANITOBA	2533	0	503114	1010425	3-40	4-116
Inukshuk Wireless Partnership	FOXWARREN AREA, MAN-SUBSCRIBER STNS	0	2533	503102	1010907	3-40	4-116
Prairie Rose School Division	ELIE, MANITOBA-ST. PAUL COLLEGIATE	2521	0	495427	974534	3-39	4-111
Prairie Rose School Division	ELIE, MANITOBA-ST. PAUL COLLEGIATE	2545	0	495427	974534	3-39	4-111
Prairie Rose School Division	ST.FRANCOIS MB-BARRICKMAN COL. SCH.	0	2521	495609	973617	3-39	4-111
Prairie Rose School Division	ST.FRANCOIS MB-BARRICKMAN COL. SCH.	0	2545	495609	973617	3-39	4-111
Prairie Rose School Division	ST.EUSTACHE MB - IBERVILLE COL. SCH.	0	2521	495819	974118	3-39	4-111
Prairie Rose School Division	ST.EUSTACHE MB - IBERVILLE COL. SCH.	0	2545	495819	974118	3-39	4-111
Prairie Rose School Division	ST.FRANCOIS MB - LAKESIDE COL. SCH.	0	2521	495440	973355	3-39	4-111
Prairie Rose School Division	ST.FRANCOIS MB - LAKESIDE COL. SCH.	0	2545	495440	973355	3-39	4-111
Prairie Rose School Division	ST.FRANCOIS MB - MAXWELL COL. SCH.	0	2521	495714	973848	3-39	4-111
Prairie Rose School Division	ST.FRANCOIS MB - MAXWELL COL. SCH.	0	2545	495714	973848	3-39	4-111
Prairie Rose School Division	ELIE MB - WALDHEIM COLONY SCHOOL	0	2521	495136	974949	3-39	4-111
Prairie Rose School Division	ELIE MB - WALDHEIM COLONY SCHOOL	0	2545	495136	974949	3-39	4-111
PRAIRIE ROSE SCHOOL DIVISION	CARMAN, MB-CARMAN COLLEGIATE (IITV)	2569	0	493011	975946	3-39	4-113
PRAIRIE ROSE SCHOOL DIVISION	CARMAN, MB-CARMAN COLLEGIATE (IITV)	2569	0	493011	975946	3-39	4-113
PRAIRIE ROSE SCHOOL DIVISION	CARMAN, MB-CARMAN COLLEGIATE (IITV)	2574.25	2505.25	493011	975946	3-39	4-113
PRAIRIE ROSE SCHOOL DIVISION	CARMAN, MB-CARMAN COLLEGIATE (IITV)	2577.25	2502.25	493011	975946	3-39	4-113
PRAIRIE ROSE SCHOOL DIVISION	MIAMI, MAN-MIAMI COLLEGIATE (IITV)	0	2569	492222	981414	3-39	4-113
PRAIRIE ROSE SCHOOL DIVISION	MIAMI, MAN-MIAMI COLLEGIATE (IITV)	2505.25	2574.25	492222	981414	3-39	4-113
PRAIRIE ROSE SCHOOL DIVISION	ELM CREEK, MB-ELM CREEK COLL (IITV)	0	2569	494027	980011	3-39	4-113
PRAIRIE ROSE SCHOOL DIVISION	ELM CREEK, MB-ELM CREEK COLL (IITV)	2502.25	2577.25	494027	980011	3-39	4-113
Prairie Rose School Division	ELIE MB - BON HOMME COLONY SCHOOL	0	2521	495233	975330	3-39	4-115
Prairie Rose School Division	ELIE MB - BON HOMME COLONY SCHOOL	0	2545	495233	975330	3-39	4-115

Licensee	Location	TX FREQ (MHz)	RX FREQ (MHz)	Latitude	Longitude	Corresponding Tier 3 Area	Corresponding Tier 4 area
Prairie Rose School Division	POPLAR PT MB - POPLAR PT COL. SCH.	0	2521	500227	975641	3-39	4-115
Prairie Rose School Division	POPLAR PT MB - POPLAR PT COL. SCH.	0	2545	500227	975641	3-39	4-115
PRAIRIE SPIRIT SCHOOL DIVISION #50	ST. CLAUDE, MANITOBA-ITV SYSTEM	0	2539.3	493936	982050	3-39	4-113
PRAIRIE SPIRIT SCHOOL DIVISION #50	ST. CLAUDE, MANITOBA-ITV SYSTEM	2564.15	0	493936	982050	3-39	4-113
PRAIRIE SPIRIT SCHOOL DIVISION #50	SWAN LAKE, MANITOBA-ITV SYSTEM	0	2582.7	492447	984733	3-40	4-114
PRAIRIE SPIRIT SCHOOL DIVISION #50	SWAN LAKE, MANITOBA-ITV SYSTEM	2518.9	0	492447	984733	3-40	4-114
PRAIRIE SPIRIT SCHOOL DIVISION #50	SOMERSET, MANITOBA-ITV SYSTEM	0	2582.7	492427	983936	3-40	4-114
PRAIRIE SPIRIT SCHOOL DIVISION #50	SOMERSET, MANITOBA-ITV SYSTEM	2501.05	0	492427	983936	3-40	4-114
PRAIRIE SPIRIT SCHOOL DIVISION #50	MANITOU, MANITOBA-IITV SYSTEM	0	2582.7	491206	983234	3-40	4-114
PRAIRIE SPIRIT SCHOOL DIVISION #50	MANITOU, MANITOBA-IITV SYSTEM	2505.25	0	491206	983234	3-40	4-114
PRAIRIE SPIRIT SCHOOL DIVISION #50	GLENORA, MANITOBA-IITV REPEATER	0	2566.25	491507	990931	3-40	4-114
PRAIRIE SPIRIT SCHOOL DIVISION #50	GLENORA, MANITOBA-IITV REPEATER	0	2582.7	491507	990931	3-40	4-114
PRAIRIE SPIRIT SCHOOL DIVISION #50	GLENORA, MANITOBA-IITV REPEATER	2513.65	0	491507	990931	3-40	4-114
PRAIRIE SPIRIT SCHOOL DIVISION #50	GLENORA, MANITOBA-IITV REPEATER	2539.3	0	491507	990931	3-40	4-114
PRAIRIE SPIRIT SCHOOL DIVISION #50	CARTWRIGHT, MANITOBA-IITV SYSTEM	0	2539.3	490553	992008	3-40	4-114
PRAIRIE SPIRIT SCHOOL DIVISION #50	CARTWRIGHT, MANITOBA-IITV SYSTEM	2566.25	0	490553	992008	3-40	4-114
PRAIRIE SPIRIT SCHOOL DIVISION #50	GLENBORO, MANITOBA-IITV SYSTEM	0	2582.7	493330	991655	3-40	4-114
PRAIRIE SPIRIT SCHOOL DIVISION #50	GLENBORO, MANITOBA-IITV SYSTEM	2507.35	0	493330	991655	3-40	4-114
PRAIRIE SPIRIT SCHOOL DIVISION #50	BALDUR, MANITOBA-IITV SYSTEM	0	2582.7	492308	991418	3-40	4-114
PRAIRIE SPIRIT SCHOOL DIVISION #50	BALDUR, MANITOBA-IITV SYSTEM	2516.28	0	492308	991418	3-40	4-114
PRAIRIE SPIRIT SCHOOL DIVISION #50	PILOT MOUND, MANITOBA-IITV SYSTEM	0	2582.7	491209	985401	3-40	4-114
PRAIRIE SPIRIT SCHOOL DIVISION #50	PILOT MOUND, MANITOBA-IITV SYSTEM	2503.15	0	491209	985401	3-40	4-114
PRAIRIE SPIRIT SCHOOL DIVISION #50	BRUXELLES, MANITOBA-IITV HUB SITE	0	2501.05	492944	985200	3-40	4-114
PRAIRIE SPIRIT SCHOOL DIVISION #50	BRUXELLES, MANITOBA-IITV HUB SITE	0	2503.15	492944	985200	3-40	4-114
PRAIRIE SPIRIT SCHOOL DIVISION #50	BRUXELLES, MANITOBA-IITV HUB SITE	0	2505.25	492944	985200	3-40	4-114
PRAIRIE SPIRIT SCHOOL DIVISION #50	BRUXELLES, MANITOBA-IITV HUB SITE	0	2507.35	492944	985200	3-40	4-114
PRAIRIE SPIRIT SCHOOL DIVISION #50	BRUXELLES, MANITOBA-IITV HUB SITE	0	2510.5	492944	985200	3-40	4-114
PRAIRIE SPIRIT SCHOOL DIVISION #50	BRUXELLES, MANITOBA-IITV HUB SITE	0	2513.65	492944	985200	3-40	4-114
PRAIRIE SPIRIT SCHOOL DIVISION #50	BRUXELLES, MANITOBA-IITV HUB SITE	0	2516.28	492944	985200	3-40	4-114
PRAIRIE SPIRIT SCHOOL DIVISION #50	BRUXELLES, MANITOBA-IITV HUB SITE	0	2518.9	492944	985200	3-40	4-114
PRAIRIE SPIRIT SCHOOL DIVISION #50	BRUXELLES, MANITOBA-IITV HUB SITE	2582.7	0	492944	985200	3-40	4-114
PRAIRIE SPIRIT SCHOOL DIVISION #50	NOTRE DAME DE LOURDES, MB-IITV RPTR	0	2564.15	493449	983756	3-40	4-114
PRAIRIE SPIRIT SCHOOL DIVISION #50	NOTRE DAME DE LOURDES, MB-IITV RPTR	0	2568.35	493449	983756	3-40	4-114
PRAIRIE SPIRIT SCHOOL DIVISION #50	NOTRE DAME DE LOURDES, MB-IITV RPTR	0	2582.7	493449	983756	3-40	4-114
PRAIRIE SPIRIT SCHOOL DIVISION #50	NOTRE DAME DE LOURDES, MB-IITV RPTR	2510.5	0	493449	983756	3-40	4-114
PRAIRIE SPIRIT SCHOOL DIVISION #50	NOTRE DAME DE LOURDES, MB-IITV RPTR	2539.3	0	493449	983756	3-40	4-114
PRAIRIE SPIRIT SCHOOL DIVISION #50	TREHERNE, MANITOBA-IITV SYSTEM	0	2539.3	493720	984154	3-40	4-114
PRAIRIE SPIRIT SCHOOL DIVISION #50	TREHERNE, MANITOBA-IITV SYSTEM	2568.35	0	493720	984154	3-40	4-114

Licensee	Location	TX FREQ (MHz)	RX FREQ (MHz)	Latitude	Longitude	Corresponding Tier 3 Area	Corresponding Tier 4 area
PRAIRIE SPIRIT SCHOOL DIVISION #50	HOLLAND, MANITOBA-OAKRIDGE COLONY	0	2539	493558	984800	3-40	4-114
PRAIRIE SPIRIT SCHOOL DIVISION #50	CYPRESS RIVER, MB-CYPRESS R COLONY	0	2539	493447	990910	3-40	4-114
PRAIRIE SPIRIT SCHOOL DIVISION #50	TREHERNE MANITOBA-SHADY LANE COLONY	0	2539	494422	983908	3-40	4-114
PRAIRIE SPIRIT SCHOOL DIVISION #50	BALDUR, MANITOBA-TRI LEAF COLONY	0	2539	492014	991354	3-40	4-114
PRAIRIE SPIRIT SCHOOL DIVISION #50	PILOT MOUND, MAN.-WINDY BAY COLONY	0	2539	492052	985400	3-40	4-114
PRAIRIE SPIRIT SCHOOL DIVISION #50	GLENBORO, MANITOBA-MILLSHOF COLONY	0	2539	493559	992029	3-40	4-114
ST JAMES ASSINIBOIA SCHOOL DIV #2	WINNIPEG, MB.-STURGEON CREEK SCHOOL	2509	0	495312	971607	3-39	4-111
ST JAMES ASSINIBOIA SCHOOL DIV #2	WINNIPEG, MB.-STURGEON CREEK SCHOOL	2515	0	495312	971607	3-39	4-111
ST JAMES ASSINIBOIA SCHOOL DIV #2	WINNIPEG, MB.-STURGEON CREEK SCHOOL	2563	0	495312	971607	3-39	4-111
ST JAMES ASSINIBOIA SCHOOL DIV #2	WINNIPEG, MB-JOHN TAYLOR COLLEGIATE	0	2509	495326	971849	3-39	4-111
ST JAMES ASSINIBOIA SCHOOL DIV #2	WINNIPEG, MB-JOHN TAYLOR COLLEGIATE	0	2515	495326	971849	3-39	4-111
ST JAMES ASSINIBOIA SCHOOL DIV #2	WINNIPEG, MB-JOHN TAYLOR COLLEGIATE	0	2563	495326	971849	3-39	4-111
ST JAMES ASSINIBOIA SCHOOL DIV #2	WINNIPEG, MAN.-ST JAMES COLLEGIATE	0	2509	495239	971317	3-39	4-111
ST JAMES ASSINIBOIA SCHOOL DIV #2	WINNIPEG, MAN.-ST JAMES COLLEGIATE	0	2515	495239	971317	3-39	4-111
ST JAMES ASSINIBOIA SCHOOL DIV #2	WINNIPEG, MAN.-ST JAMES COLLEGIATE	0	2563	495239	971317	3-39	4-111

Appendix C - List of Site-specific incumbent fixed service licensees in Alberta, British Columbia and Quebec (as of November 2010)

Alberta:

Licensee	Location	TX FREQ (MHz)	RX FREQ (MHz)	Latitude	Longitude	Corresponding Tier 3 Area	Corresponding Tier 4 Area
CHUM SATELLITE SERVICES	CALGARY, AB (3330 17 AVENUE SE)	0	2688	510215	1145919	3-47	4-134
CHUM SATELLITE SERVICES	CALGARY, AB 150-6 AVE SW	2688	0	510252	1140352	3-47	4-136
CHUM SATELLITE SERVICES	CALGARY, ALBERTA-2721 80 AVENUE SW	0	2688	505855	1135949	3-47	4-136
CHUM SATELLITE SERVICES	CALGARY, AB 300-1919 SIROCCO DR. SW	0	2688	510205	1141004	3-47	4-136
CHUM SATELLITE SERVICES	CALGARY, AB (1921 UXBRIDGE DR NW)	0	2688	510407	1140801	3-47	4-136
CHUM SATELLITE SERVICES	CALGARY, AB 11 CASTLERIDGE BLVD NE	0	2688	510554	1135733	3-47	4-136
CHUM SATELLITE SERVICES	CALGARY, ALTA.-6449 CROWCHILD TR SW	0	2688	505947	1140707	3-47	4-136
CHUM SATELLITE SERVICES	CALGARY, ALTA.-4122 BRENTWOOD RD NW	0	2688	510537	1140820	3-47	4-136
CHUM SATELLITE SERVICES	CALGARY, ALBERTA-540 16 AVENUE NE	0	2688	510401	1140321	3-47	4-136
CHUM SATELLITE SERVICES	CALGARY, AB (123 - 11 AVENUE SW)	0	2688	510234	1140404	3-47	4-136
CHUM SATELLITE SERVICES	CALGARY, ALTA-5505 SHAGANAPPI TR NW	0	2688	510542	1140844	3-47	4-136
CHUM SATELLITE SERVICES	CALGARY, AB (1600 - 90 AVENUE SW)	0	2688	505824	1140554	3-47	4-136
CHUM SATELLITE SERVICES	CALGARY, ALBERTA-4104 9 STREET SE	0	2688	510032	1140219	3-47	4-136
CHUM SATELLITE SERVICES	CALGARY, ALBERTA-6912 29 AVENUE NW	0	2688	510445	1141111	3-47	4-136
CHUM SATELLITE SERVICES	CALGARY, AB 11012 MACLEOD TL SOUTH	0	2688	505719	1140416	3-47	4-136
CHUM SATELLITE SERVICES	CALGARY, AB (14815 BANNISTER RD SE)	0	2688	505511	1140405	3-47	4-136
CHUM SATELLITE SERVICES	CALGARY, ALTA.-4215 EDMONTON TR. NE	0	2688	510525	1140314	3-47	4-136
CHUM SATELLITE SERVICES	CALGARY, AB (1832 - 52 STREET SE)	0	2688	510213	1135729	3-47	4-136
CHUM SATELLITE SERVICES	CALGARY, ALBERTA-239 MIDPARK WAY SE	0	2688	505446	1140403	3-47	4-136
CHUM SATELLITE SERVICES	CALGARY, AB-10325 BONAVENTURE DR SE	0	2688	505752	1140414	3-47	4-136
CHUM SATELLITE SERVICES	CALGARY AB-755 LAKE BONAVISTA DR SE	0	2688	505632	1140251	3-47	4-136
CHUM SATELLITE SERVICES	CALGARY, ALBERTA-751 3 STREET SW	0	2688	510246	1140414	3-47	4-136
CHUM SATELLITE SERVICES	CALGARY, AB (135 SOUTHLAND DR SE)	0	2688	505752	1140405	3-47	4-136
CHUM SATELLITE SERVICES	CALGARY, ALBERTA-1422 17 AVENUE SW	0	2688	510216	1140539	3-47	4-136

British Columbia and Quebec:

Licensee	Location	TX FREQ (MHz)	RX FREQ (MHz)	Latitude	Longitude	Corresponding Tier 3 Area	Corresponding Tier 4 Area
BELL ALIANT REGIONAL COMM. INC.	MONT APICA (RR)	2588	2358	475842	712550	3-09	4-030
BELL ALIANT REGIONAL COMM. INC.	ST ANDRE DE METABETCHOUAN	2588	2358	482107	715429	3-10	4-063
BELL ALIANT REGIONAL COMM. INC.	METABETCHOUAN (CH. CARON)	2588	2358	482307	715207	3-10	4-028
BELL ALIANT REGIONAL COMM. INC.	ALMA (RR)	2358	2588	483432	713335	3-10	4-028
BELL ALIANT REGIONAL COMM. INC.	ALMA (RR)	2358	2588	483432	713335	3-10	4-028
BELL ALIANT REGIONAL COMM. INC.	ALMA (RR)	2358	2588	483432	713335	3-10	4-028
BELL ALIANT REGIONAL COMM. INC.	ALMA (RR)	2358	2588	483432	713335	3-10	4-028
BELL ALIANT REGIONAL COMM. INC.	ST NAZAIRE (RANG NO 8)	2588	2358	483720	712944	3-10	4-028
BELL ALIANT REGIONAL COMM. INC.	ST HENRI DE TAILLON,CH PLAGE WILSON	2588	2358	483754	714733	3-10	4-028
BELL ALIANT REGIONAL COMM. INC.	L'ASCENSION (RANG NO 7)	2588	2358	484052	713751	3-10	4-028
BELL ALIANT REGIONAL COMM. INC.	LAC DES GRANDES POINTES	2581	2351	490918	712741	3-10	4-063
BELL ALIANT REGIONAL COMM. INC.	LAC DES GRANDES POINTES	2588	2358	490918	712741	3-10	4-063
BELL ALIANT REGIONAL COMM. INC.	CHUTES DES PASSES	2351	2581	495105	711023	3-10	4-063
CHANTIERS CHIBOUGAMAU LTEE	MONT CARBONNEAU, QC	2351.25	2581.25	501241	734100	3-10	4-063
CHANTIERS CHIBOUGAMAU LTEE	MONT CARBONNEAU, QC	2358.25	2588.25	501241	734100	3-10	4-063
CHANTIERS CHIBOUGAMAU LTEE	BUDEMONT, QC	2581.25	2351.25	503842	731019	3-10	4-063
CHANTIERS CHIBOUGAMAU LTEE	BUDEMONT, QC	2588.25	2358.25	503842	731019	3-10	4-063
CHANTIERS CHIBOUGAMAU LTEE	MONT BOURBEAU, QC	2588.25	2358.25	495654	742041	3-17	4-066
CHANTIERS CHIBOUGAMAU LTEE	CAMP CLAVERIE, QC	2581.25	2351.25	502830	732438	3-17	4-066
CHANTIERS CHIBOUGAMAU LTEE	TOURNEMINE LA TOUR, QC	2358.25	2588.25	505353	725210	3-17	4-066
Northwestel Inc.	GERRY HEYER CAMP BC	2351.25	2581.25	562552	1222744	3-58	4-169
Northwestel Inc.	FEDERAL RANCH BC	2351.25	2581.25	562618	1222341	3-58	4-169
Northwestel Inc.	GRAHAM RIVER FARMS BC	2351.25	2581.25	562745	1222047	3-58	4-169
Northwestel Inc.	INDIAN UNION PECIFIC BC	2351.25	2581.25	562854	1221928	3-58	4-169
Northwestel Inc.	COLT CREEK REPEATER BC	2581.25	2351.25	562931	1222322	3-58	4-169
Northwestel Inc.	COLT CREEK REPEATER BC	2588.25	2358.25	562931	1222322	3-58	4-169
Northwestel Inc.	SAM CRAIK BC	2351.25	2581.25	562936	1221550	3-58	4-169
Northwestel Inc.	NEWCAL ENERGY	2588.25	2358.25	562947	1213759	3-58	4-169
Northwestel Inc.	MONTEITH CREEK REPEATER BC	2344.25	2574.25	563000	1220357	3-58	4-169
Northwestel Inc.	MONTEITH CREEK REPEATER BC	2351.25	2581.25	563000	1220357	3-58	4-169
Northwestel Inc.	MACCABEE FARM BC	2574.25	2344.25	563030	1220000	3-58	4-169
Northwestel Inc.	CRYSTAL SPRING FARM (UDO) BC	2351.25	2581.25	563037	1221315	3-58	4-169
Northwestel Inc.	FRIEDENS FARM BC	2574.25	2344.25	563049	1215148	3-58	4-169
Northwestel Inc.	NEW INDIAN RESERVE BC	2574.25	2344.25	563049	1215757	3-58	4-169
Northwestel Inc.	GEORGE GIENIE BC	2351.25	2581.25	563050	1220840	3-58	4-169
Northwestel Inc.	ART MCLEAN RANCH	2351.25	2581.25	563058	1221103	3-58	4-169
Northwestel Inc.	CRYSTAL SPRING FARM (WITZEL) BC	2351.25	2581.25	563102	1221740	3-58	4-169
Northwestel Inc.	GRAHAM HALFWAY RIVER SUBDIVISION BC	2351.25	2581.25	563112	1221532	3-58	4-169

Licensee	Location	TX FREQ (MHz)	RX FREQ (MHz)	Latitude	Longitude	Corresponding Tier 3 Area	Corresponding Tier 4 Area
Northwestel Inc.	ALBERT SCHOLL BC	2574.25	2344.25	563144	1215555	3-58	4-169
Northwestel Inc.	LENNOX, BC	2588.25	2358.25	563309	1211628	3-58	4-169
Northwestel Inc.	PURSUIT, BC	2588.25	2358.25	563336	1213548	3-58	4-169
Northwestel Inc.	LENNOX RES, BC	2588.25	2358.25	563340	1211629	3-58	4-169
Northwestel Inc.	NOVA, BC	2588.25	2358.25	563458	1211517	3-58	4-169
Northwestel Inc.	DEADHORSE CREEK BC	2588.25	2358.25	563516	1214601	3-58	4-169
Northwestel Inc.	DAVE SIMPSON BC	2351.25	2581.25	563539	1222605	3-58	4-169
Northwestel Inc.	BRUCE SIMPSON BC	2351.25	2581.25	563630	1222706	3-58	4-169
Northwestel Inc.	M MCLEOD, BC	2351.25	2581.25	563814	1222750	3-58	4-169
Northwestel Inc.	D MEGER, BC	2351.25	2581.25	563817	1222752	3-58	4-169
Northwestel Inc.	SIEMER, BC	2351.25	2581.25	563822	1204118	3-58	4-169
Northwestel Inc.	JOHN KITTS	2337.25	2567.25	563825	1213013	3-58	4-169
Northwestel Inc.	DONALD KRUSE BC	2588.25	2358.25	563826	1214916	3-58	4-169
Northwestel Inc.	KOBES BC	2588.25	2358.25	563828	1213932	3-58	4-169
Northwestel Inc.	THEISSEN, BC	2588.25	2358.25	563915	1212551	3-58	4-169
Northwestel Inc.	BLUEBERRY FARMS, BC (SUB)	2337.25	2567.25	564008	1212821	3-58	4-169
Northwestel Inc.	BLUEBERRY FARM BC	2567.25	2337.25	564015	1212827	3-58	4-169
Northwestel Inc.	BLUEBERRY FARM BC	2588.25	2358.25	564015	1212827	3-58	4-169
Northwestel Inc.	CHELLE, BC	2588.25	2358.25	564025	1211801	3-58	4-169
Northwestel Inc.	EVERGREEN, BC	2588.25	2358.25	564032	1212139	3-58	4-169
Northwestel Inc.	WEIBE RANCH	2588.25	2358.25	564054	1212201	3-58	4-169
Northwestel Inc.	SCOBIE, BC	2351.25	2581.25	564159	1223128	3-58	4-169
Northwestel Inc.	STADLER, BC	2351.25	2581.25	564217	1203709	3-58	4-169
Northwestel Inc.	EVERGREEN ACRES, BC	2588.25	2358.25	564219	1212306	3-58	4-169
Northwestel Inc.	BLUEBERRY BC	2358.25	2588.25	564307	1214554	3-58	4-169
Northwestel Inc.	TRASK, BC	2351.25	2581.25	564337	1223257	3-58	4-169
Northwestel Inc.	TALISMAN, BC	2588.25	2358.25	564414	1213859	3-58	4-169
Northwestel Inc.	RUTZ, BC	2351.25	2581.25	564811	1203545	3-58	4-169
Northwestel Inc.	AMOCO, BC	2567.25	2337.25	564938	1222145	3-58	4-169
Northwestel Inc.	DUTCHIK, BC	2567.25	2337.25	565000	1223708	3-58	4-169
Northwestel Inc.	RILEY BURSETH, BC	2567.25	2337.25	565126	1223826	3-58	4-169
Northwestel Inc.	PEE JAYS, BC	2351.25	2581.25	565307	1203321	3-58	4-169
Northwestel Inc.	CAROL, BC	2567.25	2337.25	565347	1223931	3-58	4-169
Northwestel Inc.	BABKIRK, BC	2588.25	2358.25	565407	1215430	3-58	4-169
Northwestel Inc.	WAYNE MILLS, BC	2567.25	2337.25	565410	1223844	3-58	4-169
Northwestel Inc.	DARRELL MILLS, BC	2567.25	2337.25	565413	1223934	3-58	4-169
Northwestel Inc.	MACCABE MILLIGAN, BC	2351.25	2581.25	565518	1204450	3-58	4-169
Northwestel Inc.	MARSHALL MILLS, BC	2567.25	2337.25	565519	1224004	3-58	4-169
Northwestel Inc.	DUKE ENERGY BEG, BC	2567.25	2337.25	565607	1220455	3-58	4-169
Northwestel Inc.	ZEKE	2581.25	2351.25	565718	1212514	3-58	4-169
Northwestel Inc.	ZEKE	2588.25	2358.25	565718	1212514	3-58	4-169
Northwestel Inc.	UNOCAL, BC	2588.25	2358.25	565721	1215503	3-58	4-169
Northwestel Inc.	BORING RANCH, BC	2567.25	2337.25	565726	1224152	3-58	4-169
Northwestel Inc.	KARL OSYMUELLER, BC	2567.25	2337.25	565813	1221914	3-58	4-169
Northwestel Inc.	TOWNSEND CREEK BC	2553.25	2323.25	565918	1221008	3-58	4-169
Northwestel Inc.	TOWNSEND CREEK BC	2588.25	2358.25	565918	1221008	3-58	4-169
Northwestel Inc.	HEADWATERS RANCH, BC	2567.25	2337.25	565926	1223713	3-58	4-169
Northwestel Inc.	LLOYD SIMPSON, BC	2567.25	2337.25	570053	1225327	3-58	4-169
Northwestel Inc.	BRIAN, BC	2567.25	2337.25	570107	1222125	3-58	4-169
Northwestel Inc.	GUTTNER, BC	2567.25	2337.25	570157	1224615	3-58	4-169
Northwestel Inc.	KENNEDY, BC	2567.25	2337.25	570221	1223102	3-58	4-169
Northwestel Inc.	DILLE, BC	2574.25	2344.25	570221	1223107	3-58	4-169
Northwestel Inc.	PINK MOUNTAIN MOTOR INN, BC	2567.25	2337.25	570223	1223039	3-58	4-169
Northwestel Inc.	PINK MOTOR, BC	2574.25	2344.25	570223	1223039	3-58	4-169
Northwestel Inc.	SIMPSON CAMP, BC	2567.25	2337.25	570407	1223912	3-58	4-169
Northwestel Inc.	ELLEN SIMPSON, BC	2567.25	2337.25	570413	1223827	3-58	4-169
Northwestel Inc.	PINK MOUNTAIN BC	2323.25	2553.25	570416	1225227	3-58	4-169
Northwestel Inc.	PINK MOUNTAIN BC	2337.25	2567.25	570416	1225227	3-58	4-169
Northwestel Inc.	SPORTSMAN INN, BC	2567.25	2337.25	570435	1223452	3-58	4-169
Northwestel Inc.	S AND S, BC	2567.25	2337.25	570438	1223334	3-58	4-169

Licensee	Location	TX FREQ (MHz)	RX FREQ (MHz)	Latitude	Longitude	Corresponding Tier 3 Area	Corresponding Tier 4 Area
Northwestel Inc.	MAE'S KITCHEN, BC	2567.25	2337.25	570452	1223516	3-58	4-169
Northwestel Inc.	CNRL - MILLIGAN	2351.25	2581.25	570822	1203916	3-58	4-169
Northwestel Inc.	ATICK CREEK BC	2323.25	2553.25	570955	1224025	3-58	4-169
Northwestel Inc.	ATICK CREEK BC	2344.25	2574.25	570955	1224025	3-58	4-169
Northwestel Inc.	WESTCOAST SIKANNI, BC	2567.25	2337.25	571207	1230042	3-58	4-169
Northwestel Inc.	JEDNEY, BC	2323.25	2553.25	571333	1221322	3-58	4-169
Northwestel Inc.	JEDNEY, BC	2330.25	2560.25	571333	1221322	3-58	4-169
Northwestel Inc.	DON GORDON, BC	2574.25	2344.25	571500	1224317	3-58	4-169
Northwestel Inc.	SHELLY CLARKE, BC	2574.25	2344.25	571740	1224745	3-58	4-169
Northwestel Inc.	NOVA GAS, BC	2574.25	2344.25	572012	1224020	3-58	4-169
Northwestel Inc.	COASTAL, BC	2574.25	2344.25	572020	1224029	3-58	4-169
Northwestel Inc.	PRIME WEST ENERGY, BC	2560.25	2330.25	572031	1220208	3-58	4-169
Northwestel Inc.	LENNOX CAMP	2574.25	2344.25	572251	1212530	3-58	4-169
Northwestel Inc.	ANADARKO, BC	2567.25	2337.25	572315	1222345	3-58	4-169
Northwestel Inc.	CRESTAR, BC	2574.25	2344.25	573108	1205219	3-58	4-169
Northwestel Inc.	GLEAM BC	2344.25	2574.25	573154	1211322	3-58	4-169
Northwestel Inc.	GLEAM BC	2351.25	2581.25	573154	1211322	3-58	4-169
Northwestel Inc.	KAHNTAH, BC	2574.25	2344.25	580114	1203224	3-58	4-169
TELEBEC, DIVISION DE BELL ALIANT	MILE 72, QC	2545.5	2315.5	492658	780712	3-17	4-066
TELEBEC, DIVISION DE BELL ALIANT	JOUTEL	2315.5	2545.5	492715	781926	3-17	4-066
TELEBEC, DIVISION DE BELL ALIANT	CHAPAIS	2295.5	2525.5	494640	745038	3-17	4-066
TELEBEC, DIVISION DE BELL ALIANT	LAC OPEMISCA	2525.5	2295.5	495003	745849	3-17	4-066
TELEBEC, DIVISION DE BELL ALIANT	BAIE JAMES (LG2, AEROPORT)	2525.5	2295.5	533741	774137	3-17	4-066
TELEBEC, DIVISION DE BELL ALIANT	LG 2, RR, QUEBEC	2295.5	2525.5	534705	773659	3-17	4-066
TELUS Communications Company	SPILLIMACHEEN BC	2535	2305	505400	1162037	3-50	4-149
TELUS Communications Company	GOLDEN BC	2305	2535	511625	1165917	3-51	4-163
TELUS Communications Company	BEAVERLY BC	2299	2529	534826	1225749	3-57	4-167
TELUS Communications Company	TABOR MOUNTAIN BC	2529	2299	535444	1222706	3-57	4-167
TELUS Communications Inc.	MT OZZARD, BC	2535	2305	485733	1252935	3-54	4-155
TELUS Communications Inc.	TOFINO BC	2305	2535	490846	1255400	3-54	4-155
WESTCOAST ENERGY INC.	DEVON (10-12-63-12W6M) ALBERTA	2351	2581	542611	1194016	3-49	4-148
WESTCOAST ENERGY INC.	COMPASS HILL BC	2574	2344	542923	1200107	3-58	4-169
WESTCOAST ENERGY INC.	COMPASS HILL BC	2581	2351	542923	1200107	3-58	4-169
WESTCOAST ENERGY INC.	A4659 (D-78-B/93-I-9 BP4) BC	2574	2344	543359	1201302	3-58	4-169
WESTCOAST ENERGY INC.	A4658 (D-13-G/93-I-9 BP1) BC	2351	2581	543547	1200921	3-58	4-169
WESTCOAST ENERGY INC.	A4256 (B-57-G/93-I-9 BP3) BC	2351	2581	543743	1201229	3-58	4-169
WESTCOAST ENERGY INC.	A4254 (A-65-E/93-I-9 BP2) BC	2351	2581	543805	1202539	3-58	4-169
WESTCOAST ENERGY INC.	AS20 (WAPITI BURLINGTON) BC	2574	2344	543931	1203531	3-58	4-169
WESTCOAST ENERGY INC.	AS32 (WAPITI AMOCO) BC	2574	2344	544011	1203039	3-58	4-169
WESTCOAST ENERGY INC.	LITTLE PRAIRIE BC	2344	2574	544022	1202904	3-58	4-169
WESTCOAST ENERGY INC.	LITTLE PRAIRIE BC	2344	2574	544022	1202904	3-58	4-169
WESTCOAST ENERGY INC.	LITTLE PRAIRIE BC	2344	2574	544022	1202904	3-58	4-169
WESTCOAST ENERGY INC.	LITTLE PRAIRIE BC	2358	2588	544022	1202904	3-58	4-169
WESTCOAST ENERGY INC.	AS33 (SOUTH GRZ BURLINGTON) BC	2574	2433	544444	1204232	3-58	4-169
WESTCOAST ENERGY	AS22 (SOUTH GRZ	2358	2588	544629	1203348	3-58	4-169

Licensee	Location	TX FREQ (MHz)	RX FREQ (MHz)	Latitude	Longitude	Corresponding Tier 3 Area	Corresponding Tier 4 Area
INC.	CNRL) BC						
WESTCOAST ENERGY INC.	RED WILLOW BC (D-13-H/94-I-15)	2358	2588	545153	1203016	3-58	4-169
WESTCOAST ENERGY INC.	AS 10 (MR50)	2351	2581	545158	1210725	3-58	4-169
WESTCOAST ENERGY INC.	AS21 (NORTH GRZ CNRL) BC	2574	2344	545339	1204004	3-58	4-169
WESTCOAST ENERGY INC.	AS28 (BABCOCK CNRL) BC	2358	2588	545444	1205859	3-58	4-169
WESTCOAST ENERGY INC.	LBV 53 BC	2351	2581	545640	1210857	3-58	4-169
WESTCOAST ENERGY INC.	AS 9 (MR49)	2351	2581	545651	1210930	3-58	4-169
WESTCOAST ENERGY INC.	THUNDER MOUNTAIN BC	2567	2337	545715	1203535	3-58	4-169
WESTCOAST ENERGY INC.	THUNDER MOUNTAIN BC	2588	2358	545715	1203535	3-58	4-169
WESTCOAST ENERGY INC.	THUNDER MOUNTAIN BC	2588	2358	545715	1203535	3-58	4-169
WESTCOAST ENERGY INC.	HERMAN MTN BC	2567	2337	545942	1210718	3-58	4-169
WESTCOAST ENERGY INC.	HERMAN MTN BC	2581	2351	545942	1210718	3-58	4-169
WESTCOAST ENERGY INC.	A5262 (D-66-D/93-P-2) BC	2567	2337	550320	1205644	3-58	4-169
WESTCOAST ENERGY INC.	BULLMOOSE (MR16) BC	2344	2574	550858	1212708	3-58	4-169
WESTCOAST ENERGY INC.	CHAMBERLAIN BC (MR47)	2581	2351	550919	1213905	3-58	4-169
WESTCOAST ENERGY INC.	PERRY CREEK BC	2337	2567	550945	1210829	3-58	4-169
WESTCOAST ENERGY INC.	PERRY CREEK BC	2344	2574	550945	1210829	3-58	4-169
WESTCOAST ENERGY INC.	HILL 4290 BC	2567	2337	551014	1205211	3-58	4-169
WESTCOAST ENERGY INC.	WEST SUKUNKA (MR48) BC	2567	2337	551311	1214018	3-58	4-169
WESTCOAST ENERGY INC.	WEST SUKUNKA (MR48) BC	2581	2351	551311	1214018	3-58	4-169
WESTCOAST ENERGY INC.	BULLMOOSE CREEK BC	2574	2344	551335	1212406	3-58	4-169
WESTCOAST ENERGY INC.	BULLMOOSE CREEK BC	2574	2344	551335	1212406	3-58	4-169
WESTCOAST ENERGY INC.	BULLMOOSE CREEK BC	2581	2351	551335	1212406	3-58	4-169
WESTCOAST ENERGY INC.	SOUTH SUKUNKA (MR20) BC	2337	2567	551801	1214103	3-58	4-169
WESTCOAST ENERGY INC.	BURNT RIVER BC	2581	2351	551858	1220207	3-58	4-169
WESTCOAST ENERGY INC.	SUKUNKA JUNCTION NORTH BC	2351	2581	552036	1213926	3-58	4-169
WESTCOAST ENERGY INC.	SUKUNKA JUNCTION NORTH BC	2358	2588	552036	1213926	3-58	4-169
WESTCOAST ENERGY INC.	BRAZION CREEK BC	2574	2344	552140	1215827	3-58	4-169
WESTCOAST ENERGY INC.	BRAZION CREEK BC	2581	2351	552140	1215827	3-58	4-169
WESTCOAST ENERGY INC.	AS19 (D-49-F/93-P-5) BC	2581	2351	552222	1215103	3-58	4-169
WESTCOAST ENERGY INC.	KWOEN PLANT, BC	2358	2588	552302	1214159	3-58	4-169
WESTCOAST ENERGY INC.	BRAZION PLANT (MR56) BC	2344	2574	552355	1220831	3-58	4-169
WESTCOAST ENERGY INC.	COMMOTION CREEK BC	2358	2588	553102	1215414	3-58	4-169
WESTCOAST ENERGY INC.	WABI BC	2588	2358	554006	1213459	3-58	4-169

Appendix D - List of CRTC Licence-exempt Broadcasting Stations in Quebec and Ontario (as of November 2010)

Licensee	Location	FREQ (MHz)	Latitude	Longitude	Corresponding Tier 3 Area	Corresponding Tier 4 area
Club Social La Grande	Camp Eastmain 1	2542	521130	760427	3-17	4-066
Club Social La Grande	Camp Eastmain 1	2548	521130	760427	3-17	4-066
Club Social La Grande	Camp Eastmain 1	2554	521130	760427	3-17	4-066
Club Social La Grande	Camp Eastmain 1	2560	521130	760427	3-17	4-066
Club Social La Grande	Camp Eastmain 1	2566	521130	760427	3-17	4-066
Club Social La Grande	Camp Eastmain 1	2572	521130	760427	3-17	4-066
Club Social La Grande	Camp Eastmain 1	2578	521130	760427	3-17	4-066
Club Social La Grande	Camp Eastmain 1	2584	521130	760427	3-17	4-066
Club Social La Grande	Camp Eastmain 1	2590	521130	760427	3-17	4-066
Club Social La Grande	Camp Eastmain 1	2596	521130	760427	3-17	4-066
Club Social La Grande	Camp Eastmain 1	2602	521130	760427	3-17	4-066
Club Social La Grande	Camp Eastmain 1	2608	521130	760427	3-17	4-066
Club Social La Grande	Camp Eastmain 1	2614	521130	760427	3-17	4-066
Club Social La Grande	Camp Eastmain 1	2620	521130	760427	3-17	4-066
Club Social La Grande	Camp Eastmain 1	2626	521130	760427	3-17	4-066
Club Social La Grande	Camp Eastmain 1	2632	521130	760427	3-17	4-066
Club Social La Grande	Camp Eastmain 1	2638	521130	760427	3-17	4-066
Club Social La Grande	Camp Eastmain 1	2644	521130	760427	3-17	4-066
Club Social La Grande	Camp Eastmain 1	2650	521130	760427	3-17	4-066
Club Social La Grande	Camp Eastmain 1	2656	521130	760427	3-17	4-066
Club Social La Grande	Camp Eastmain 1	2662	521130	760427	3-17	4-066
Club Social La Grande	Camp Eastmain 1	2668	521130	760427	3-17	4-066
Club Social La Grande	Camp Eastmain 1	2674	521130	760427	3-17	4-066
Club Social La Grande	Camp Eastmain 1	2680	521130	760427	3-17	4-066
Club Social La Grande	Némiscau	2542	514219	760200	3-17	4-066
Club Social La Grande	Némiscau	2548	514219	760200	3-17	4-066
Club Social La Grande	Némiscau	2554	514219	760200	3-17	4-066
Club Social La Grande	Némiscau	2560	514219	760200	3-17	4-066
Club Social La Grande	Némiscau	2566	514219	760200	3-17	4-066
Club Social La Grande	Némiscau	2572	514219	760200	3-17	4-066
Club Social La Grande	Némiscau	2578	514219	760200	3-17	4-066
Club Social La Grande	Némiscau	2584	514219	760200	3-17	4-066
Club Social La Grande	Némiscau	2590	514219	760200	3-17	4-066
Club Social La Grande	Némiscau	2596	514219	760200	3-17	4-066
Club Social La Grande	Némiscau	2602	514219	760200	3-17	4-066
Club Social La Grande	Némiscau	2608	514219	760200	3-17	4-066
Club Social La Grande	Némiscau	2614	514219	760200	3-17	4-066
Club Social La Grande	Némiscau	2620	514219	760200	3-17	4-066
Club Social La Grande	Némiscau	2626	514219	760200	3-17	4-066
Club Social La Grande	Némiscau	2632	514219	760200	3-17	4-066
Club Social La Grande	Némiscau	2638	514219	760200	3-17	4-066
Club Social La Grande	Némiscau	2644	514219	760200	3-17	4-066
Club Social La Grande	Némiscau	2650	514219	760200	3-17	4-066
Club Social La Grande	Némiscau	2626	514219	760200	3-17	4-066
Club Social La Grande	Némiscau	2662	514219	760200	3-17	4-066
Club Social La Grande	Némiscau	2668	514219	760200	3-17	4-066
Club Social La Grande	Némiscau	2674	514219	760200	3-17	4-066
Club Social La Grande	Némiscau	2680	514219	760200	3-17	4-066
Club Social La Grande	Campement Sarcelle	2596	523656	764123	3-17	4-066
Club Social La Grande	Rupert	2542	514753	752304	3-17	4-066
Club Social La Grande	Rupert	2548	514753	752304	3-17	4-066
Club Social La Grande	Rupert	2554	514753	752304	3-17	4-066
Club Social La Grande	Rupert	2560	514753	752304	3-17	4-066
Club Social La Grande	Rupert	2566	514753	752304	3-17	4-066
Club Social La Grande	Rupert	2572	514753	752304	3-17	4-066
Club Social La Grande	Rupert	2578	514753	752304	3-17	4-066
Club Social La Grande	Rupert	2584	514753	752304	3-17	4-066
Club Social La Grande	Rupert	2590	514753	752304	3-17	4-066
Club Social La Grande	Rupert	2596	514753	752304	3-17	4-066
Club Social La Grande	Rupert	2602	514753	752304	3-17	4-066
Club Social La Grande	Rupert	2608	514753	752304	3-17	4-066
Club Social La Grande	Rupert	2614	514753	752304	3-17	4-066

Licensee	Location	FREQ (MHz)	Latitude	Longitude	Corresponding Tier 3 Area	Corresponding Tier 4 area
Club Social La Grande	Rupert	2620	514753	752304	3-17	4-066
Club Social La Grande	Rupert	2626	514753	752304	3-17	4-066
Club Social La Grande	Rupert	2632	514753	752304	3-17	4-066
Club Social La Grande	Rupert	2638	514753	752304	3-17	4-066
Club Social La Grande	Rupert	2644	514753	752304	3-17	4-066
Club Social La Grande	Rupert	2650	514753	752304	3-17	4-066
Club Social La Grande	Rupert	2656	514753	752304	3-17	4-066
Club Social La Grande	Rupert	2662	514753	752304	3-17	4-066
Club Social La Grande	Rupert	2668	514753	752304	3-17	4-066
Club Social La Grande	Rupert	2674	514753	752304	3-17	4-066
Club Social La Grande	Rupert	2680	514753	752304	3-17	4-066