SEASIDE WIRELESS COMMUNICATIONS

Comments for

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Consultation on the Spectrum Outlook 2018 to 2022

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SPECTRUM CONSIDERATIONS AND RECOMMENDATIONS

Introduction

Seaside Wireless Communications uses fixed-wireless technology to serve the 10,000 hardest-to-reach households and businesses in the northern half of Nova Scotia. Our network spans 30,000 square kilometers of rugged, sparsely populated terrain, from the Cape Breton Highlands to the Tantramar Marsh at the New Brunswick border.

Our success illustrates the crucial role of fixed-wireless in meeting coverage challenges in the Canadian landscape.

The outcome of this ISED Consultation on the Spectrum Outlook 2018 to 2022 is critical to the future of our company and our industry. At stake is the essential tool for achieving ISED's goal of universal coverage in rural and northern Canada, at the ambitious bandwidth targets set by the CRTC.

Without continued equitable access to the 3400-4200 MHz band, and an end to spectrum hoarding by Canada's largest telecom companies, fixed-wireless internet service providers will be artificially hamstrung, unable to progress beyond, or even maintain, speeds of 10 Mbps.

Background

Founded in 2008, Seaside is the largest provider of fixed-wireless internet service in Nova Scotia. From 2008 to 2013, we partnered with the provincial government's *Broadband for Rural Nova Scotia* (BRNS) project to deliver broadband to 10,000 households and businesses throughout rural portions of 10 Nova Scotia counties. The BRNS project set a service standard of 1.5 Mbps down and 0.5 Mbps up. It relied primarily on 900 MHz Canopy technology. Seaside achieved virtually 100 percent coverage across this network territory.

We are now in the final year of an ISED *Connecting Canadians* project that will make significantly higher internet speeds available to approximately 15,000 current and potential subscribers. This project relies on LTE technology in the 3475-3700 MHz spectrum. Access to this licensed spectrum is essential to its continued success.

More than $60 million has been invested in our network, including significant contributions from the federal and provincial governments. Our network infrastructure includes:

- More than 360 communications towers stretching from Amherst on the New Brunswick border to Meat Cove at the northern tip of Cape Breton;
- Fibre links to the Canadian internet backbone at Front Street in Toronto; and
- A variety of radio technologies providing a range of propagation characteristics in the 900 MHz, 2.4 GHz, 3.65 GHz and 5.8 GHz frequencies.

Government Objectives

Governments at all levels are intensely focused on achieving internet access at 21st Century speeds throughout rural and northern Canada. For many rural politicians and community leaders, it is a matter of consuming interest, eclipsing all other constituent concerns.

ISED's *Connecting Canadians* program has invested up to $305 million to provide more than 280,000 rural and remote households with high-speed broadband service at a minimum 5/1 Mbps. ISED's *Connect to Innovate* program is investing a further $500 million in rural or remote communities with a focus on new backbone infrastructure projects that connect public institutions like schools, hospitals, and First Nation band offices. Both programs encourage private investment that enhances rural and northern broadband service levels.

In Nova Scotia, citizen pressure for improved rural broadband has become the Number 1 community priority at meetings with municipal officials and provincial politicians. It holds important implications for economic development, youth retention, real estate values, business viability, tourism, health, and education. The pressure manifests itself in the growing number of municipal and provincial initiatives to address inequities in broadband services. ISED programs and policies have played a central role in these efforts.

Following its recent review of Canadaian telecommunications services, the CRTC established a universal service objective: Canadians should enjoy access to broadband internet services at download speeds of at least 50 Mbps, and upload speeds of at least 10 Mbps, regardless of where they live.

This goal is aspirational. The CRTC acknowledges that such speeds are not currently economical in many rural and northern areas. It notes that regulatory bodies in the United States and other countries have set a more modest target of 25 Mbps. The commission expects it may take up to 15 years before technological developments enable cost-effective 50/10 Mbps service levels for all Canadians.

Aspirational targets serve a real purpose. In partnership with governments at all levels, Seaside has set its sights on achieving the 50/10 Mbps standard. The

Connecting Canadians project has made 10/1 Mbps available to most of our customers. *Connect to Innovate* is will expand the availability of these speeds. We are now directing our focus to even higher service speeds. The success of our efforts will depend on the outcome of these consultations.

Technology options

There are three ways to deliver broadband service, all of which play important complementary roles:

1. Wired connections, via coaxial cable or fibre
2. Fixed-wireless microwave transmission
3. Satellite feeds.

Wired connections are optimal in high-density urban and suburban neighborhoods, but too costly to deploy in low-density rural areas.

Fixed-wireless can serve sparsely populated regions at much lower costs with ever increasing speeds.

Satellite delivery fills an important last-mile niche for the most remote and hard-to-reach customers, but suffers from high latency and bandwidth caps.

Role of Fixed-Wireless

Fixed-wireless technology is currently on a path to provide speeds up to 25 Mbps down and 2 Mbps up. It is the most economical solution for wide-area rural coverage. We believe it is the key component in the toolkit by which government and industry can achieve affordable broadband coverage throughout rural and northern regions. Seaside has demonstrated this in the 10 counties of northern Nova Scotia and Cape Breton.

Approximately 200 WISPs provide internet services to more than 300,000 subscribers across Canada. These are mostly independent operators who connect last mile households, businesses, and institutions in places where large telecommunications companies have deemed wired connections, whether by coaxial cable or fibre, to be prohibitively expensive.

Like Seaside, Canadian WISPs typically make use of available license-exempt spectrum such as 900 MHz, 2.4 GHz, and 5.8 GHz, supplemented by lightly licensed spectrum in the 3.65 GHz band.

A shadow hovers over the wireless internet service industry, however. To take advantage of recent technological advances in fixed-wireless delivery, WISPs

like Seaside must be able to access adequate bands of spectrum within the 3400-4200 MHz range. Although spectrum in the 3475-3650 MHz range is ostensibly reserved for fixed wireless use, in practice WISPs have received little or no access to these frequencies.

Current Spectrum Allocations

ISED's database shows more than 900 3500 MHz licenses in active use across Canada, plus a further 947 licenses for 3650-3700 MHz, 17 of which are held by Seaside. Two telecommunications companies, Inukshuk and Xplornet, currently hold more than 80 percent of all the 3500 MHz licenses across the country. In Atlantic Canada, these two companies enjoy a virtual monopoly over 3500 MHz licenses.

Because of this monopoly position, the 3500 Mhz spectrum remains substantially underused in the geographic areas of interest to Seaside. Inukshuk and Xplornet have repeatedly rebuffed our applications for subordinate licensing on grounds of continued uncertainty about future ISED policy pending consultation (SLPD-006-17).

We acknowledge the growing demand for spectrum owing to growth in mobile data transmission. We recognize the benefits of international policy harmonization where feasible. We are not opposed to some form of equitable sharing of 3400-4200 MHz spectrum, provided it avoids serious impacts on internet speeds in rural and northern Canada. Such impacts will be inevitable if adequate spectrum isn't reserved for fixed-wireless applications. In Nova Scotia, this policy decision will affect more than 35,000 rural households and businesses.

One possibility is to allow mobile use of the 3400-4200 MHz range in dense urban areas, while reserving this band for fixed wireless use in rural areas. The two can easily co-exist. But the case for restricting rural use of these frequencies to fixed wireless is overwhelming. Mobile service providers have many frequency options. Fixed-wireless WISPs do not.[1]

Seaside has been able to serve a growing number of subscribers with higher speeds and a wider choice of service packages, using the narrow, 3650-3700 MHz band. Our ability to continue meeting demand is now limited. This band is

[1] We think Canadian TV white-space spectrum will be helpful to WISPs in the future. White-space propagation characteristics will help us reach those of our 900 MHz customers who are unable to get LTE signals. But product development for white space is in its infancy. At least initially, equipment will be pricey, and advanced features such as MU-MIMO and Beamforming probably won't be available. Since white-space spectrum will be license-exempt, and will use a database to determine frequency and bandwidth availability in any given area, we cannot be sure it will permit speeds over 10 Mbps. The 3400-4200 MHz spectrum remains our best bet for achieving the ISED and CRTC goals.

already at capacity in many areas. In order to fulfill our current commitments to deliver up to 25 Mbps service, and to take the next step of delivering up to 40 Mbps, the only solution is increased access to spectrum, access to a broader number of channels within at least the 3400-3700 MHz range, and preferably the broader 3400-4200 MHz range.

Maintaining a competitive and affordable marketplace

In Seaside's marketplace, consumer affordability is a key consideration. Nova Scotia is the third most rural province in Canada. In wages as in internet speeds, Canada has a sharp urban-rural divide. According to Statistics Canada, the average wage of a Canadian worker in a large urban areas tops $900 per week, while in rural areas, average earnings range from $680 to $760.[2]

If WISPs are to remain viable, let alone competitive, we must have access to 3400-4200 MHz spectrum so we can continue converting technological advances into higher speeds and innovative services. Failure to ensure the viability of WISPs will encourage the monopolistic and anti-competitive environment government policy has sought to eliminate. Competition in the rural marketplace is at stake in these consultations.

In some cases, WISPs may be criticized for having underused their rights to the 3500 MHz band. Three factors underlie this observation:

- At the time of the spectrum auction, the fixed-wireless industry was in its infancy
- Large telecommunications companies dominated the auction
- Fixed-wireless technology has only recently reached a stage that permits WISPs to exploit the 3400-4200 MHz spectrum cost-effectively.

It is difficult to overstate the importance of assuring an adequate, effective, and affordable allocation of 3400-4200 MHz spectrum for fixed-wireless operators like Seaside. It is essential. Without equitable access, there will be no prospect of achieving the goals set out by ISED and the CRTC.

In Seaside's case, continued denial of access to the 3500 MHz band (and the broader 3400-4200 MHz range) will mean that ISED and Seaside will not fully achieve the shared goals of our $15-million joint investment in the current *Connecting Canadians* project. In the medium term, improved service levels for a potential 15,000 rural customers will not be fully realized. Over the longer term, our inability to optimize broadband service levels throughout a territory spanning half the Province of Nova Scotia will adversely impact the rural Nova Scotia

[2] "Cities and Growth: Earnings Levels Across Urban and Rural Areas: The Role of Human Capital," p. 18. Statistics Canada, January 2010, Ottawa, ON.

economy and our provincial and municipal governments. These losses will diminish competition, with negative impacts on consumer affordability.

Recognizing that ISED receives many worthy but competing demands for spectrum in a digital economy where mobile data transmission is growing rapidly, we have asked ourselves if Seaside's position, recommendations, and requests are fair, reasonable, and justified. We believe they are, for the following reasons:

1. Aside from the 3500 MHz band, there is little, to no licensed spectrum allocated for fixed-wireless applications.
2. Alternative frequencies are few in number, and have limited utility. They are susceptible to signal interference because they are widely used by all manner of unlicensed users (other Wisps, utility providers, wireless home weather stations, Wi-Fi routers, wireless TV set tops, and FHSS and SCADA radios).
3. By contrast, mobile applications already have access to many bands across a wide range of spectra (such as 1900 MHz PCS band, 700 MHz band, 1700/2100 MHz AWS bands, 2600 MHz band).
4. Expanding WISP access to the broader 3400-4200 MHz range is essential for fixed-wireless technology to meet the CRTC's mandated internet service levels of 50/10 Mbps.
5. The demand for mobile access to the 3400-4200 MHz range is confined to crowded urban airwaves where fixed wireless is not a factor. There is no reason why an equitable and efficient division of the available resource cannot be managed on an urban/rural basis.

Although a case can be made for giving some of this spectrum to mobile applications in some urban areas, the arguments for restricting its use to fixed wireless in rural areas are overwhelming. Fixed-wireless WISPs are an essential element in solving the lack of adequate bandwidth in rural and northern Canada. Mobile carriers have viable alternatives in rural areas; fixed WISPs do not.

Failure to assure equitable access to the 3400-4200 MHz band will be a death sentence for the most effective means of bringing modern internet service to rural and northern Canada.

RESPONSE TO ISED QUESTIONS

Q1 – What future changes, if any, should ISED examine with regard to the existing licensing regime to better plan for innovative new technologies and applications and allow for benefits that new technology can offer, such as improved spectrum efficiency?

Wireless ISPs (WISPs) have been successfully deploying equipment operating in the 3.65GHz band for the past decade. The lightly-licensed spectrum registration method this band employs has worked well for Seaside and other WISPs throughout Canada, allowing product offerings to customers without having to operate in interference congested 900MHz and 2.4GHz unlicensed bands. This lightly-licensed licensing regime could be applied successfully to future iterations of the 3400-4200MHz band.

Geolocation databases, similar to the TV Whitespace database structure being employed by both ISED and the FCC, allow for spectrum sharing and should be considered when allotting spectrum for certain applications.

ISED should consider licensing areas smaller than Tier 4. Whether the licensing is done based on the current hexagon sizes, or by some other scale, it would allow for smaller players to enter into purchasing licensed spectrum to provide services. Most WISPs are far smaller than current Tier4 sizes, forcing them to purchase licenses for areas they do not serve, or forgo purchasing the licensed spectrum.

Current license holders are required to meet certain minimum deployment requirements when purchasing spectrum licenses (ex: 3500MHz spectrum - 30% Tier4 population coverage), yet to Seaside's knowledge there is no mechanism in place in which the license holder must present proof of deployment to customers. Seaside believes that license holders should have to present proof of a minimum customer deployment. This will prevent any license holder from only deploying tower equipment and transmitting in an urban populated area to meet minimum population coverage requirements. The current requirements leave the possibility for rural areas not being covered, other service providers unable to access the licensed spectrum, and license holders meeting their deployment requirements.

Q2 –Do you agree with the above assessment on demand for commercial mobile services in the next few years? Is there additional information on demand, which is not covered above, that should be considered? If so, please explain in detail.

Seaside agrees with ISED's assessment on demand for commercial mobile services in the next few years. It is generally accepted that the trend of exponential data consumption across all service platforms will continue over the coming years. However, compared to WISPs such as Seaside, mobile service providers have access and the ability to purchase ever-increasing amounts of spectrum to combat the expected demand growth.

Q3 – What new technology developments and/or usage trends are expected to address traffic pressures and spectrum demand for commercial mobile services? When are these technologies expected to become available?

No comment.

Q4 – Recognizing the trend of increasing commercial mobile traffic, what operational measures (e.g. densification, small cells or advanced traffic management) are being taken to respond to, and support, increasing traffic? To what extent are these measures effective?

No comment.

Q5 – Do you agree with the above assessment of demand for license-exempt spectrum in the next few years? Is there additional information regarding demand, which is not covered above, that should be considered? If so, please explain in detail.

Seaside agrees with ISED's assessment of demand for license-exempt spectrum in the next few years. WISPs rely on license-exempt spectrum to connect households in rural areas throughout Canada. TV Whitespace spectrum in particular will be in high demand by Seaside and many other WISPs in the next five years.

Q6 – What new technologies and/or sharing techniques are expected to aid in relieving traffic pressures and addressing spectrum demand for license-exempt applications? When are these technologies expected to become available?

Dynamic spectrum access will be key in aiding to relieve traffic pressure and addressing spectrum demand for license-exempt applications. Geolocation databases such as the TV Whitespace database allowing the dynamic use of spectrum, and depending upon the results of SMSEs 018-17 and 019-17, would allow these same TVWS devices to dynamically use spectrum in tandem with broadcaster wireless microphones as well as commercial mobile providers. The ability to potentially have three different technologies and services make use of the same spectrum shows how important dynamic spectrum access can be to ISED as well as service providers in the coming years.

Listen before talk (LBT), which is part of the 3GPP LTE standard, was developed to allow LTE to make use of license-exempt spectrum without causing interference to others already transmitting in that spectrum. This feature could also be adapted to other technologies to allow for spectrum sharing.

Q7 – What existing license-exempt frequency bands will see the most evolution in the next five years? Are there any IoT applications that will have a large impact on the existing license-exempt bands? If so, what bands will see the most impact from these applications?

TV Whitespace frequency bands will see a high level of increased usage by WISPs over the coming years due to the repack of 600MHz in the UHF band.

The ongoing trend of deploying smart meters by utilities in the 900MHZ ISM band, as well as indoor 5GHz Wi-Fi connecting IoT devices, will have an impact on both of the mention license-exempt bands, more so in urban areas than rural areas.

Q8 – Will the trend for offering carrier-grade or managed Wi-Fi services continue to increase over the next five years? If so, will this impact congestion in Wi-Fi bands and which bands would be most affected?

Seaside believes that the trend toward offering carrier-grade or managed Wi-Fi will continue to increase over the coming years. This will impact congestion in Wi-Fi bands, with the 5GHz band being most affected.

Q9 – ISED is seeking comments on the above demand assessment for MSS and earth observation applications for the period 2018-2022. Is there additional information on demand, which is not covered above, that should be considered?

No comment.

Q10 – ISED is seeking comments on the above demand assessment for FSS/BSS for the period 2018-2022. Is there additional information on demand, which is not covered above, that should be considered with regards to the below bands?

a. C-band
b. Ku-band
c. Ka-band

No comment.

Q11 – What and how will technology developments and/or usage trends aid in relieving traffic pressures and addressing spectrum demand for satellite services? When are these technologies expected to become available?

No comment.

Q12 – What satellite applications (e.g. broadband Internet, video broadcasting, backhaul, etc.) do you consider a priority for the period 2018-2022?

No comment.

Q13 – Do you agree with the above assessment on demand for backhaul in the next five years? Is there additional information on demand, which is not covered above, that should be considered? If so, please explain in detail.

Seaside agrees that the demand for backhaul will continue to increase over the next five years. This increased demand will be due to increased broadband internet consumption, the introduction of 5G services, continued growth of other mobile services, as well as the growth of IoT devices and services.

Q14 – Backhaul service in Canada is delivered using a variety of solutions, including fibre optics, microwave radio and satellites. What changes, if any, are anticipated to the mix of backhaul solutions employed?

Seaside expects a greater need for access to fiber POPs to combat increased bandwidth consumption by households. While these fiber POPs will help to reduce congestion on microwave backhauls, those microwave backhauls will still be the prominent technology used to backhaul traffic by WISPs in rural areas.

Seaside is aware that ISED is planning to review the current backhaul licensing structure. As such, it should be noted that it is imperative that the review be completed as soon as possible to allow time for industries to implement backhaul changes and additions to meet the demand increases over the coming years.

Current backhaul licensing based on the number of voice channels discourages WISPs from using licensed backhaul spectrum. License pricing that takes into account where the links are located, such as rural areas where fiber does not exist forcing WISPs to have no choice but to use microwave backhaul, the spectral efficiency of the technologies being used, etc. would aid in WISPs meeting the increasing backhaul bandwidth demands.

Q15 – What and how will technology developments and/or usage trends aid in relieving traffic pressures and addressing spectrum demand for backhaul services? When are these technologies expected to become available?

Seaside agrees with ISED's assessment that wireless backhaul plays an essential part in the deployment of numerous telecommunications service providers throughout Canada.

Backhaul technology developments such as carrier aggregation, dynamic spectrum allocation, increased spectral efficiency, MIMO, and beamforming can all play a part in relieving traffic pressures in the next five years.

Q16 – Will the demand for commercial mobile, license-exempt, satellite, or fixed wireless services/applications impact the demand for backhaul spectrum? If so, how and which of these services/applications will create the most impact?

License-exempt, fixed wireless services, as well as commercial mobile are likely to generate the most increased demand for backhaul spectrum as bandwidth demand increases year by year. Satellite will also see an increased demand for backhaul spectrum, but to a lesser extent.

Q17 – Is there a range or ranges of frequencies that will be in higher demand over the next five years? Why is higher demand anticipated for these frequency ranges?

The 3400-4200MHz frequency band will be of particular interest and demand for fixed wireless providers in the next five years. With the emergence of fixed TD-LTE equipment in recent years, many WISPs have deployed this equipment, which currently has the capability of operating in LTE bands 42 and 43 (3400-3800MHz). The outcome of the yet to be scheduled 3400-4200MHz consultation will be key for WISPs being able to offer services which are able to meet the CRTC goal of 50MBps for broadband internet.

Whitespace spectrum 470-698MHz will also be in high demand for WISPs as a means to reach the very last mile customers who currently have little to no broadband connection.

Q18 – Will allowing flexible fixed and mobile services within the same frequency band change how backhaul is planned and used?

No comment.

Q19 – Provide, with rationale, your view of the above assessments on the bands being considered internationally for commercial mobile, fixed, satellite, or license-exempt.

The L-band (1435-1525) is expected to be harmonized internationally as a mobile band. This harmonization will ensure that there is a global technology ecosystem. With little to no use currently in this band in Canada, releasing this spectrum for fixed and mobile use would prove beneficial to both markets, especially if spectrum sharing techniques are employed.

Q20 – ISED is seeking comments on the potential frequency bands for release in table 7:

a. the proposed services and/or applications for each frequency band
b. the potential timing of releasing for each frequency band
c. the priority of the release of the frequency bands

Provide supporting rationale for your responses.

No comment.

Q21 – Are there any other bands that should be considered for release in the next five years for commercial mobile, fixed, satellite, or license-exempt that are not discussed above? Provide rationale for your response.

No comment.

Q22 – Are there specific frequency ranges/spectrum bands that should be made available for specific applications?

Seaside believes that a portion of the 3400-4200MHz band should be set aside for fixed wireless services. While originally the 3500MHz band was designated for fixed wireless, the last 3500MHz consultation ruled that the band will be shared between fixed and mobile services moving forward. ISED has also indicated that a review of the 3400-4200MHz band is necessary due to the inevitable rollout of 5G technology, and while that spectrum would be beneficial to 5G service providers, there are currently hundreds of thousands of households that are, or can be served by WISPs using the same spectrum with technology that is readily available today.

Q23 – Are there any factors that would impact the potential release of these frequency bands between 2018 and 2022?

No comment.