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**Consultation on the Spectrum Outlook 2018 to 2022**

**Comments of  
Xplornet Communications Inc.**

**February 16, 2018**

## INTRODUCTION

1. Xplornet Communications Inc. welcomes this opportunity to comment on Innovation, Science and Economic Development Canada's (ISED) *Consultation on the Spectrum Outlook 2018 to 2022*.
2. This consultation comes at an important juncture in the evolution of the telecommunications industry in Canada. Wireless technology is becoming increasingly important in the delivery of broadband access services to Canadians. The phenomenal growth in the consumption of video services via the Internet is expected to continue unabated over the next several years leading to a requirement for more bandwidth and hence, more spectrum.
3. This is not just the case for the mobile wireless market. It is equally true of fixed wireless and satellite services that are increasingly used to serve Canadians in both rural and urban centres. In rural areas, low population densities make other technologies prohibitively expensive to deliver high-speed broadband services. In urban centres, fixed wireless deployments are increasingly being used to establish Canada's first 5G networks.
4. The most recent Cisco VNI Forecast underlines the significant growth of fixed residential internet traffic in Canada in the coming years.<sup>1</sup> By 2021, Internet household traffic is projected to generate 142.6 GB per month – an increase of almost 2.7 times from the 63.6 GB per month in 2016. In Canada, there will be 2 million households (18.6% of all Internet households) generating more than 500 GB per month of data in 2021, with over 650 households generating more than a terabyte of data per month.<sup>2</sup> Meanwhile, Canada's "fixed/Wi-Fi" household traffic will comprise 54.1% of total Internet traffic in 2021, while mobile Internet traffic will comprise just 5.6%.<sup>3</sup>
5. Despite these trends, Xplornet notes that all significant spectrum allocations in the last 5 years have focused on mobile needs. This trend continues with only one of twenty-three questions in this Spectrum Outlook mentioning fixed wireless service.
6. Given the finite nature of spectrum, ISED must take steps following this consultation to make available more fixed spectrum, more multi-use spectrum, and promote the efficient use of spectrum between mobile, fixed and satellite uses.
7. Xplornet believes that the Spectrum Outlook places too much emphasis on the need for mobile spectrum. There has already been a considerable amount of spectrum devoted to this use over the past decade, as ISED explicitly notes in its

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<sup>1</sup> Cisco VNI Forecast, [http://www.cisco.com/c/m/en\\_us/solutions/service-provider/vni-forecast-highlights.html#](http://www.cisco.com/c/m/en_us/solutions/service-provider/vni-forecast-highlights.html#)

<sup>2</sup> Ibid.

<sup>3</sup> Ibid.

consultation document.<sup>4</sup> In the years ahead, co-use of spectrum for fixed and mobile applications needs to be expanded to make more efficient use of the spectrum and to serve the needs of fixed broadband users, a new approach needs to be taken to the allocation of spectrum and more fixed wireless spectrum needs to be licensed. More co-operation and co-ordination between carriers will be required to efficiently co-use spectrum. By way of example, the same amount of spectrum is not required to serve major arterial transportation routes, as is required to serve urban areas. For one thing, video transmissions will be much rarer events on these highways where most users are driving a vehicle. This means that large Tier-4 areas around urban areas often waste valuable spectrum outside the urban core. Consideration should be given to licensing smaller urban areas and requiring separate licences with less spectrum to cover areas outside the urban core. This would free up spectrum that could be used to serve residents in these areas with higher capacity fixed wireless services. Since the large incumbent carriers hold multiple licences that cover these routes, this entails a significant waste of valuable spectrum.

8. The need for additional spectrum for fixed wireless use is not a uniquely rural requirement. Xplornet noted recently with interest the announcement by TELUS and Huawei that will launch a user-trial fixed wireless service in urban centres. The announcement was heralded as the first of its kind in Canada, and aims to provide a “fibre-like cellular Internet experience” with download speeds of 2 Gbps using a fixed wireless-to-the-home solution.<sup>5</sup>
9. This trend underlines the need for more co-use of spectrum for fixed applications to meet the needs of users. It also calls for more efficient use of spectrum in the face of increasing demand. Xplornet is concerned that too much licensed spectrum is either lying dormant or is being under-utilized in certain geographic areas. ISED needs to spend more effort on investigating usage levels of licensed spectrum and ensuring that the spectrum it licenses is put to good use. Those providers who do not effectively put licensed spectrum to use, should lose it.
10. Finally, the Outlook devotes considerable attention to unlicensed spectrum. While unlicensed spectrum may have a role to play in the delivery of services at for example, Wi-Fi hotspots, it is generally not a long-term solution to the provision of services by carriers. Its availability is too uncertain for the delivery of high quality services to consumers and businesses in Canada on a consistent basis. In addition, coordination issues are complex and generally result in an unreliable service. One new area in which Wi-Fi may prove useful is in the delivery of new Licence Assisted Access (LAA) which is discussed further below.
11. The consultation paper also discusses new ways to manage the allocation of spectrum through real time allocation. While this might have limited utility for

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<sup>4</sup> *Consultation on the Spectrum Outlook 2018 to 2022*, p.3.

<sup>5</sup> Huawei Launches 5G Wireless-to-the-home trial with TELUS,  
<https://mobilesyrup.com/2018/02/14/huawei-launches-5g-wireless-home-trial-telus/>.

some industry players such as Google, it will generally not provide a solution to the capacity needs of carriers delivering a high quality, always available service to consumers and businesses. For most users, a reliable and available service is the very foundation of a carrier-grade service. Investors require licence-certainty to make the substantial, long term infrastructure investment decisions necessary to provide a reliable service. Furthermore, databases operated by corporations are ill-equipped to manage spectrum in the public interest.

12. In summary, Xplornet urges ISED to adopt a forward-looking Spectrum Outlook which takes the following core principles into account:

- (a) *Do no harm* – any new policies should not erode the significant narrowing of the urban-rural divide that has occurred in the last decade;
- (b) That spectrum policy must address the needs of ALL Canadians and cannot continuously favour urban mobile consumers to the detriment of rural fixed and mobile broadband consumers;
- (c) Spectrum use by fixed broadband carriers continues to increase more dramatically, on a quantum of bandwidth basis, just as dramatically as mobile broadband, particularly in rural Canada, and ISED therefore must take steps in its Spectrum Outlook to promote more flexible use of spectrum for both fixed and mobile use;
- (d) That ISED should revisit its policies to encourage the efficient use of spectrum, such as the “use it or lose it” policy, to be tougher on providers in cases where licensed spectrum is clearly being underutilized; and
- (e) That licensed spectrum continues to be the focus of Canada’s spectrum outlook and that as much licensed spectrum be released so that providers can invest in their networks to meet the ever-growing needs of Canadians.

## **A principled approach to releasing spectrum**

**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?**

Xplornet notes that in its introduction to this consultation ISED identifies three “pillars” that matter to Canadian families and businesses:

- Quality: supporting networks to allow for the latest technologies to be deployed;
- Coverage: enabling services available to Canadians where they live and work; and

- Prices: encouraging services that are affordably priced.

Xplornet endorses these goals and has worked tirelessly to achieve them in a constantly evolving industry since the company was founded over 10 years ago.

With regards to the first goal, Xplornet endorses the stated objectives in this consultation paper. Supporting networks to allow the latest technologies to be deployed will require a flexible approach because the technologies deployed and the way the technologies are deployed may not be the same in all areas of the country. For example, LTE technology is used primarily for mobile services in urban areas but it is used primarily for fixed broadband services in rural areas. Initial 5G trials using small cell and fixed wireless technology is further blurring the lines separating urban from rural, and fixed from mobile.

In assessing the Canadian marketplace and developing licensing regimes, ISED must consider the different uses of spectrum. Approximately 80% of Canadians live in urban or near-urban areas that will likely be able to access broadband through wired technologies, such as cable or fiber networks, while 15% live in rural areas that are more efficiently served using fixed wireless broadband. The remaining 5% of Canadians live in areas where satellites are likely the more efficient way to provide broadband service. As a result, LTE networks are carrying primarily mobile traffic in urban areas and primarily fixed broadband traffic in rural areas.

This drives a dramatic contrast in the sizes of the urban and rural wireless networks. Xplornet's LTE fixed wireless network alone carries more data per month than either of the mobile networks of Bell or TELUS which collectively serve 17.9 million Canadians. Despite this, recent spectrum auctions by ISED continue to focus on mobile needs.

One policy does not fit all. Xplornet acknowledges that the large mobile carriers may require more spectrum in urban areas to meet the concentrated demand. However, any policy that seeks to address these urban needs is very unlikely to work appropriately in rural areas. For more than a decade, ISED's spectrum policies have largely focused on the 80% of urban Canadians and have not acknowledged the significant differences in rural Canada. With the introduction of new applications and 5G networks, Xplornet believes now must be the time to change that.

Going forward, ISED must approach spectrum licensing differently by:

- 1.) Allowing flexible use of spectrum which may be different in urban and rural regions;
- 2.) Allocating specific spectrum for rural broadband to address the immediate capacity demands;
- 3.) Taking a new view on geographic boundaries for licences that separate high and low density population areas and abandon the notion that urban licences must include highways into the countryside which, as mentioned above, results in multiple licences covering the same routes, wasting valuable spectrum that could

be used to serve residents and businesses with high-speed fixed wireless services;

- 4.) Encouraging co-operation and co-ordination to minimize interference at the boundaries between different spectrum uses; and
- 5.) Incenting retirement of old technologies that inefficiently consume spectrum for a dwindling number of customers.

The paper also addresses the very important technological advances that are being made in the satellite sphere. High throughput satellites (HTS) are already in service in Canada and newer technologies are on the way. These satellites have the potential to greatly increase the capacity of broadband service in areas that have to date been largely underserved. This is particularly important for persons in remote and rural areas with very low population densities who, like other Canadians, want access to data-rich video content.

The second pillar identified in ISED's Spectrum Outlook consultation paper regards coverage – the enabling of services available to Canadians where they live and work. Innovations in satellite technology will play an important role in delivering service to Canadians who do not have access to terrestrial broadband services. ISED's focus on new satellite technology is critical, as it will play a vital role in meeting the CRTC's universal service objective of 50 Mbps download, 10Mbps upload by 2026. In order for satellites to play this vital role, there will be a requirement for additional spectrum.

Xplornet notes that there is very little discussion of fixed wireless services in the Spectrum Outlook. While most of the focus over the past decade has been on mobile spectrum, fixed wireless technology plays an important role in serving lower density communities that do not have access to high-speed broadband delivered via co-axial cable or fibre. Like consumers and businesses in higher density areas, Canadians in these areas are consuming more data and want access to the same video services. Cisco reports that demand for data capacity will increase from 63.3GB per month in 2016 to 142.6 GB per month in 2021 - a compound annual growth rate of 22%.<sup>6</sup> Fixed wireless service providers need to have access to sufficient spectrum to meet this growth rate. Without it, rural communities will not keep up with Canada's larger urban centres and the ability of rural providers to meet the CRTC's universal service objective will be in serious jeopardy.

With regards to the third pillar - encouraging services that are affordably priced - Xplornet urges the Commission to address the high licence fees associated with spectrum used for backhaul facilities. In the case of lower density communities, this is of particular concern. All fixed wireless traffic must be backhauled. The current spectrum licence fees have to be recovered from Canadians and in lower density communities where there are fewer customers over which to spread these costs. In addition, the distances over which traffic must be backhauled tend to be greater. These

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<sup>6</sup> Supra footnote 1.

spectrum costs have a direct impact on the price of broadband services to these communities.

If ISED is serious about reducing the cost of service to Canadians, it has the ability to reduce spectrum licence fees for backhaul. Another step that ISED can take is to overhaul its microwave licensing regime, which is still based on circuit-switched technology in an era of broadband data technology. This regime should be updated in order to better enable carriers to use microwave for data backhaul.

As regards new ways to allocate spectrum more efficiently, Xplornet does not favour a licence-exempt dynamic access mechanism for access to the 28 GHz, 37-40 GHz and 37-37.6 GHz bands. It is impossible to plan capital expenditures under such a system, which is a necessary precondition to raising capital to deploy networks. An operator would never know how much spectrum it has to work with from minute-to-minute under this system. While theoretically interesting, it does not allow for practical capacity planning to provide Canadian customers with a consistent quality of service, particularly at peak usage times by parties offering carrier services that must meet service commitments.

A better option may lie in Licensed Assisted Access (LAA) which uses carrier aggregation in the downlink to combine LTE in unlicensed spectrum (5 GHz) with LTE in the licensed band. This aggregation of spectrum provides for a fatter pipe with faster data rates and more responsive user experience. For example, a mobile operator using LAA can support Gigabit Class LTE with as little as 20 MHz of licensed spectrum. By maintaining a persistent anchor in the license spectrum that carries all of the control and signaling information, the user experience is both seamless and reliable. In Canada, TELUS tested this technology in the fall of 2017 on a live commercial network.<sup>7</sup>

Xplornet believes that this type of approach can be repeated with other spectrum adjacent to the 3.5 GHz band to help relieve the pressure that demand is placing on that band.

## **Overall impact on commercial mobile spectrum requirements in Canada**

**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.**

While Xplornet acknowledges that demand for mobile bandwidth is increasing, the focus of ISED's spectrum outlook on mobile traffic growth should not be to the exclusion of fixed spectrum users. The truth is that all data usage is increasing and will continue to increase at a very rapid rate. As noted above, consumers of fixed wireless services desire access to the same data-rich services as urban users.

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<sup>7</sup> Leading-edge technology achieves wireless speeds of nearly 1Gbps in TELUS' downtown Vancouver "5G Living Lab, <https://www.telus.com/en/about/news-and-events/media-releases/leading-edge-technology-achieves-wireless-speeds>.

Cisco's 2015 VNI Forecast identifies more than half of the online activity produced by smartphone users offloads to a fixed connection. This is expected to increase in the years ahead.<sup>8</sup>

As a result, as mobile traffic grows, so too does fixed traffic. Steps must be taken to ensure adequate spectrum for all types of technologies used to provide broadband services to Canadians, including fixed wireless. The truth is that fibre backhaul is not cost-effective in extending service to many low-density communities in disparate parts of Canada. Wireless broadband, both backhaul and last mile, will continue to serve as the engine that will drive the provision of high-speed access services to many communities to meet the Government of Canada's and the CRTC's objectives for a higher level of service in the years ahead.

In the past decade, ISED has licenced 648 MHz of mobile spectrum. Xplornet is concerned that some of this spectrum is not being used efficiently. While ISED has attached deployment conditions on each type of spectrum it has licensed, these have been rather low level commitments and, with some minor exceptions, have not been enforced by ISED.

Xplornet believes that ISED's position as the manager of spectrum requires it to assess the degree to which the spectrum it has licensed in the past continues to be efficiently used. Where this is not the case, a spectrum reclamation initiative should be undertaken or incentives offered to encourage reclamation by operators.

**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?**

Like other carriers, Xplornet intends to make use of small cell deployment to make more efficient use of the spectrum it holds. It will do so even in smaller communities whenever efficient use of spectrum is required to meet consumer demand.

Xplornet also expects that improvements in multiple-input and multiple-output, or MIMO will increase the efficient use of spectrum.

Xplornet continues to anticipate that the growth of video will continue to drive capacity requirements for fixed broadband connections. Cisco's most recent VNI Forecast indicates that Canada's fixed and Wi-Fi consumption will account for over 54% of total Internet traffic in 2021.<sup>9</sup>

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<sup>8</sup> Cisco VNI Global Fixed and Mobile Internet Traffic Forecasts, <https://www.cisco.com/c/en/us/solutions/service-provider/visual-networking-index-vni/index.html>.

<sup>9</sup> CiscoVNI Forecast 2016, [https://www.cisco.com/c/m/en\\_us/solutions/service-provider/vni-forecast-highlights.html#](https://www.cisco.com/c/m/en_us/solutions/service-provider/vni-forecast-highlights.html#).

Canada's Fixed/Wi-Fi was 52.1% of total Internet traffic in 2016, and will be 54.1% of total Internet traffic in 2021. Mobile data traffic will also continue to grow - but will still only amount to about 5.6% of total Internet traffic.

Xplornet also intends to compete, innovate and invest in a 5G ecosystem. The IOT has already started with machine to machine (MTM) services growing at a rapid rate. It will not take long for these services to place additional demands on spectrum usage. ISED's consultation on 5G is therefore timely. However, one should not overemphasize the impact of IOT in the near term. While IOT devices will increase in number at a rapid rate, initial usage levels per device are likely to be low.

**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?**

As indicated above, Xplornet intends to deploy small cells in order to make more effective use of its spectrum in the face of increasing demand for data-rich services. While Xplornet does not yet have direct experience with the effectiveness of these measures, they are expected to make more efficient use of the spectrum in keeping with the theory of networks and the re-use of spectrum.

In addition, Xplornet has been converting customers to LTE wireless from legacy platforms to allow the spectrum in the older networks to be put to work more efficiently with the new LTE equipment. Traffic management policies and cell densification also help support the efficient use of spectrum.

### **5.3.4 Overall impact on licence-exempt spectrum requirements in Canada**

**Q5 – Do you agree with the above assessment of demand for licence-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.**

While it is true that many more devices will be connected using Wi-Fi, particularly in home environments or in hotspots, Xplornet is not convinced that significant amounts of new spectrum will be required to facilitate this development. Most of these transmitters will be of very limited range, thereby accommodating re-use of the spectrum that is available. Outside of these uses, 5G spectrum is expected to carry the bulk of IOT traffic using small cells, with significant re-use of spectrum. In addition, the IOT devices will utilize little bandwidth compared to most broadband applications. While the number of such devices is expected to grow exponentially, actual bandwidth requirements will not be a major factor, at least in the next five years.

Xplornet does not favour a dramatic expansion of licence-exempt spectrum. From a carrier perspective, it is better to have control of licensed spectrum that permits commitment to service availability and quality of service. This is not possible with

licence-exempt service. In addition, co-ordination in this realm is difficult, especially in urban or near-urban areas where there can be a number of users.

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

As indicated above, Xplornet is strongly against the use of a database type approach to spectrum sharing, as has been developed by Google in the United States. Google and other database operators are motivated to provide a cheap means of delivering content to consumers and have little regard for the needs of carriers to provide network services that meet specific quality of service requirements. The dynamic database approach does not lend itself to attracting investment to support network operations. This requires carriers to secure licensed spectrum that is available in defined amounts to support projected business operations. Investors and carriers require certainty of availability. Moreover, Xplornet questions the motives of private data base companies to manage spectrum in the public interest while balancing the spectrum requirements of different types of carriers.

Notwithstanding the foregoing, Xplornet does recognize that in some regions of Canada there is currently inefficient use of licensed spectrum. This is currently the case in the greater Toronto area where the big mobile carriers have secured all of the mobile spectrum in the Tier 4 area but have left pockets of this large area unserved by terrestrial facilities. The lack of new spectrum for fixed terrestrial applications has left some customers without access to broadband service and has left Xplornet to serve them using valuable satellite resources, which should not be required so close to Canada's largest city.

A multi-faceted approach to spectrum shortages and increasing demand is required. As a starting point, Canada's largest carriers, who are holding large amounts of spectrum need to be pressured to justify their continued holdings. Spectrum audits by ISED may be one way to examine the problem. All carriers should be required to demonstrate that they are squeezing all of the use they can out of their existing spectrum.

While incremental efficiencies have been achieved with newer technology (i.e., 4G improving upon 3G), spectral efficiency alone is insufficient to meet the expected growth in demand. Xplornet has been consistently re-farming its spectrum but there is minimal evidence that the large incumbents have been doing the same at a similar pace.

Secondly, there has been zero incremental spectrum made available for fixed broadband over the past few years and there is very little discussion of fixed broadband in the Spectrum Outlook. With Cisco forecasting data to grow at a compound rate of 22% per annum over the next few years, there can be no doubt that additional spectrum resources need to be made available. Much of the Government of Canada's and the CRTC's plans for broadband expansion in Canada will depend on fixed wireless and satellite technology – both for 5G trials and for rural expansion. Expectations will not be met if there is not enough spectrum made available to succeed with these projects.

Finally, new policies must be developed to increase the efficiency of spectrum particularly in the heavily populated Tier 4 areas. As mentioned above, LAA holds out the promise of one approach whereby unused spectrum in adjacent bands can be used to bolster the capacity and speed of licensed spectrum, as required. However, to succeed, this approach will need spectrum to be identified for this purpose.

**Q7 – What existing licence-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 licence-exempt bands? If so, what bands will see the most impact from these applications?**

Xplornet does not know which bands will see the most evolution or which IOT applications will have the largest impact on the existing licence-exempt bands. Canada is at an early stage in the introduction of the IOT and it would be imprudent to identify one application as more important than others. IOT is a concept that will enable countless services and applications. What we do know is there will be a proliferation in the quantity of applications which will drive the use of all bands, including unlicensed, to meet capacity demands.

**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?**

Yes. This trend will continue and it will negatively impact congestion. It will affect all Wi-Fi bands. Wi-Fi is already increasingly congested in urban areas. This can only get worse. Demand may get to a stage where it undermines the use of Wi-Fi as a means for relieving pressure on other bands using LAA.

**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?**

Xplornet agrees with ISED's assessment that although there is an expectation of 8% growth by 2020, existing MSS spectrum is likely sufficient to meet this demand in Canada.

**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**

Xplornet agrees with ISED that satellite demand for C-Band spectrum is likely to decline over the next few years, freeing up spectrum for fixed wireless and mobile applications. This is an important source of spectrum that could help to relieve the pressure on existing fixed wireless spectrum.

## **b) Ku-band**

Xplornet agrees with ISED that robust demand for Ku-band spectrum is not likely. Existing levels of usage will likely be maintained.

## **c) Ka-band**

Xplornet agrees with ISED that significant demand for the Ka-band is expected with increased use by HTS systems to deliver broadband Internet access to rural and remote areas of Canada. As ISED is aware, Xplornet already has four high throughput satellites (HTS) using Ka band spectrum in orbit, which have enabled the company to offer significantly more broadband capacity to its customers.

### **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?**

The biggest obstacle faced by satellite providers of broadband services is a lack of capacity. This is being addressed by HTS technology. Satellite capacity demands are likely to grow faster than terrestrial services due to these capacity constraints. However, with new satellites being brought online, consumers will have access to faster services and more data, provided spectrum is made available to meet these needs.

HTS technology is already available in Canada and Xplornet has launched four satellites to date. The EchoStar XIX (Jupiter 2) satellite was successfully launched in December 2016 and started serving new and existing customers in May 2017. Significant work has been ongoing in preparation for the start of commercial services on ViaSat-2, which launched in June 2017 and is scheduled for commercial availability in the first half of 2018.

Xplornet has the exclusive rights to all Canadian residential broadband capacity on these satellites, which are the two highest capacity broadband satellites ever launched.

HTS technology is expected to run into the same spectrum issues as terrestrial spectrum. Demand for satellite services is increasing as speeds and capacity improve. Low orbit satellites have the same problem as HTS because they are trying to jam as much efficiency into their bands as well. They are similarly limited by spectrum and demand continues to increase. Satellite networks will not be a solution to all terrestrial demand.

C-band spectrum is a natural candidate for LAA - but only if it is made available for this purpose.

Higher band spectrum (KA band 24+ GHZ) are potential sources of increased spectrum for HST. When ISED is looking at a band plan for millimetre wave, it should consider its possible use for increasing HST satellite capacity.

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

Broadband Internet is the most important priority for the period 2018 - 2022. It is most important because of the potential that it provides for rural and remote access to government and health services, business development prospects and entertainment services.

While video broadcasting is a significant use, it is increasingly an entertainment service and demand for this service is expected to decline as more Canadians use broadband Internet access to obtain their video entertainment services.

While satellite is an important use for backhaul services, particularly for satellite communities that have no other means of communications, the number of satellite communities is not expected to increase and may possibly decline if other preferred methods of backhaul are expanded to these areas, as discussed further below.

Satellite is not the preferred option for backhaul by most carriers if other means are available to provide backhaul on an economic basis.

**Overall impact on backhaul spectrum requirements in Canada**

**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.**

Xplornet generally agrees with ISED's assessment of demand for backhaul in the next five years. However, Xplornet notes ISED's omission of backhaul for fixed, as well as mobile commercial service. As ISED is aware, there is considerable use of fixed wireless to serve rural and remote communities with lower density populations. All of these towers require backhaul. While fibre is typically the best technology for backhaul, it is often not the best fit technology due to cost, topography and climate considerations. There is currently a scarcity of spectrum for backhaul purposes and demand is expected to grow as data consumption will triple over the next five years.

As indicated above, the cost of backhaul is a particular problem for providers of service to rural and remote communities with lower density populations. An initiative to reduce the cost of backhaul spectrum for service to these regions would go directly to the bottom line enabling a lower priced service for consumers. The price of spectrum is something that is within ISED's control.

**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?**

Xplornet expects to continue to use a microwave backhaul in remote and rural areas. It will use fibre, where available at a reasonable price. It does not expect this mix to change.

A key requirement as higher-speed data services are provided will be for data rich microwave backhaul. Building out fiber will not be economical in many rural areas leaving microwave as the principal option. Two things will be required if this is going to come to fruition: 1) access to municipal rights of way and support structures will need to be readily available and 2) ISED must re-think its legacy microwave backhaul licensing regime concentrating more on data and less on circuit switched voice. The pending review of the *Telecommunications Act* will provide the Government with an opportunity to revise the existing laws regarding access to municipal property and support structures. The Spectrum Outlook provides ISED with the opportunity to rethink its microwave policy in a manner which enables providers of wireless Internet access services to make more efficient use of microwave.

**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?**

Xplornet does not view this as primarily a technology issue. Xplornet and so many other providers across Canada have the technology. What is needed is the spectrum.

Readily available and inexpensive access to microwave spectrum is a key to addressing backhaul, particularly in rural areas. The current licensing regime is antiquated in light of developments in the industry. ISED can also help by looking at licensing millimetre spectrum for backhaul.

**Q16 – Will the demand for commercial mobile, licence-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?**

As indicated above, Xplornet sees increasing demand for fixed wireless services at faster speeds and in greater capacity as driving the demand for backhaul services. In many rural areas and for communities on the Canadian Shield and in remoter areas of Canada, fiber will not be the answer for cost-effective backhaul. Satellite backhaul is also an expensive option and, except in the remotest areas, is unlikely to be the solution. This leaves microwave. The licensing regime for microwave needs to be overhauled and recast with a focus on data rather than switched circuit. Licence fees need to be structured to make this spectrum economical to serve the areas of Canada that are considered to be under-served at this time.

**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?**

Xplornet sees this issue less about specific spectrum frequencies and bands and more about regional availability of broadband services.

In the coming years there will be increasing demand for fixed wireless services at faster speeds and greater capacity. This is true both in rural Canada, where Canada's geography necessitates fixed wireless connections, and urban Canada, where 5G trials are already occurring using fixed wireless to the home technology.

What is clearly needed is more spectrum for fixed wireless services to meet this need. This will not happen in the context of auctions of spectrum that can be used for exclusively mobile purposes.

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

Xplornet believes that allowing flexible provision of fixed and mobile services within the same frequency band will make more efficient use of the spectrum available, particularly in rural areas and in less densely populated communities. This would help to alleviate the current shortage of spectrum for fixed wireless services which predominate in these areas. Xplornet believes that it will be possible for carriers to co-ordinate their usage in a manner that enables the more efficient use of spectrum.

**Summary of potential frequency bands**

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

Xplornet generally agrees with ISED's assessment on the bands being considered internationally for commercial mobile, fixed satellite or licence exempt subject to the further comments below.

As much as possible new spectrum should be multi-purpose. The distinction between fixed and mobile services is blurring with most carriers offering both types of services. The spectrum is high bandwidth, capable of being used for either service. In addition, it should be possible to segment satellite use in the C-band in a manner that permits the offering of terrestrial services in the same band, subject to coordination requirements.

As discussed above, Xplornet is concerned that too great an emphasis is being placed on licence exempt applications. Licence exempt spectrum is not the best use of spectrum for carriers like Xplornet that need to provide a carrier level of service (both availability and quality) that meets customer expectations. Without licensed spectrum, available at all times, carriers are not able to deliver a consistent service.

For the same reasons, Xplornet does not believe that dynamic allocation models will be useful for more than a handful of carriers that need service for short periods of time without accompanying service standards.

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

**Provide supporting rationale for your responses.**

**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**

Xplornet believes the 800 MHz spectrum should be designated for both mobile and fixed wireless use. The propagation characteristics make it a good terrestrial alternative to fill in coverage gaps from 3500 MHz or 2500 MHz spectrum in areas with dense tree cover or rolling hills. Further, this spectrum can be paired with a satellite broadband service to mitigate latency. Given a technology ecosystem already exists to put this spectrum to use immediately for rural broadband, Xplornet would encourage ISED to make the 800 MHz spectrum available within the next 12 months.

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

There are developments in Europe that ISED should take note of regarding use of the C-Band (3400 - 4200 MHz) to augment capacity. In Xplornet's view, the consultation on 3500 MHz spectrum in Canada should consider doing likewise.

Bands 42 and 43 are being considered for global LTE standards. Unfortunately, operators in Canada are impaired from taking full advantage from taking full advantage of this spectrum due to Canada's existing band plan that currently segmented in too many ways.

There is inefficient allocation of Bands 42 and 43 (3400-3800). There is 100 MHz wasted on the upper end of Band 43 and the lower band of 42. At each end there is spectrum where it remains unclear whether it is being used efficiently, and therefore ISED should give consideration to whether that spectrum could be licensed.

Canada needs to follow international standards for band plan design to the greatest extent possible in order to take advantage of the ecosystem for wireless gear and to make for more interoperability internationally.

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

Xplornet generally favours an approach to spectrum licensing that does not limit the use of the spectrum to a particular purpose. Carriers should be at liberty to put the spectrum to the best use they can. They will choose spectrum based on its characteristics to provide the desired service. They should not be required to use the spectrum for specific services, provided interference issues are addressed.

For its part, Xplornet will require spectrum in each of three broad categories:

- Sub-1 GHz
- 1900 - 4200 MHz
- Millimeter Wave (24 GHz and above)

The specific spectrum band in each of these broad categories of spectrum is not as important as the requirement to have some spectrum in each of these broad categories. Each of these broad bands provides a different utility which a carrier now requires to participate as a competitor in the provision of telecommunications services to Canadians, particularly mobile and fixed mobile services. Below 1 GHz provides extended coverage, which is excellent in rural areas; above 24 GHz is excellent for high capacity in densely populated areas but has shorter range; 1900 to 4200 MHz has some attributes of each of the other categories.

In order to deliver on ISED's stated goals in respect of quality, coverage and price in rural communities across Canada, Xplornet and wireless broadband providers like Xplornet must be afforded access to spectrum in each of these broad categories. Exclusion from any of them will come at a detriment to rural Canadians.

Spectrum caps should be applied to each broad category of spectrum for each carrier in order to afford equitable access to each for all competitors.

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

Not at this time. However, given the evolution of the global telecommunications sector there is no doubt that the introduction of new technologies and international standards will impact the timing of release of spectrum bands in the coming years.