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January 19, 2021

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**Subject: Re: Canada Gazette Notice No. SMSE-014-20: Consultation on the Technical and Policy Framework for Licence-Exempt Use in the 6 GHz Band**

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Attached, please find Comments from Rogers Communications Canada Inc. (Rogers) in response to *Canada Gazette*, Part I, December 5, 2020, *Consultation on the Technical and Policy Framework for Licence-Exempt Use in the 6 GHz Band* (SMSE-014-20).

Rogers thanks the Department for the opportunity to provide input on this important issue.

Yours very truly,



Howard Slawner  
Vice President – Regulatory Telecom  
HS/pg

Attach.

Consultation on the Technical and Policy Framework for  
Licence-Exempt Use in the 6 GHz Band  
SMSE-014-20

Comments of  
Rogers Communications Canada Inc.  
January 19, 2021



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## Executive Summary

- E1. Spectrum is a critical input for satisfying the growth in demand for advanced connectivity services in Canada. The 6 GHz band today has been widely deployed across Canada by commercial telecommunication network operators, public safety organizations, broadcasters, and utilities in order to provide critical communications infrastructure. Any material impact to licensed Fixed Services could have significant impacts on the ability for Canadians to connect, particularly in rural areas that may not have technically or economically suitable alternatives. Rogers in particular, as Canada's largest national, single operator wireless provider, relies on licensed 6 GHz wireless backhaul to ensure Canadians from coast-to-coast can make more possible through the power of digital connectivity.
- E2. Innovation, Science and Economic Development Canada (the Department) has an important role to play in ensuring that Canada continues to manage access to radio spectrum in an effective and efficient manner that protects critical incumbent services while harnessing innovation and new technologies to the benefit of all Canadians. Rogers fully supports the Department exploring potential new services to coexist in the 6 GHz band with incumbents. However, it should adopt a measured and phased approach that allows Canadians to access the benefits from new licence-exempt services while ensuring maximum protection for licensed incumbents. For absolute clarity, it is vital that licensed Fixed Services remain protected and able to coexist under any potential changes to the 6 GHz band.
- E3. In order to maximize the social and economic benefits of the 6 GHz spectrum for Canada, the Department should adopt the following three-phase approach:
- **Phase 1.** Take steps to immediately introduce low-power licence-exempt operations in 5925-6425 MHz.
  - **Phase 2.** Introduce standard-power licence-exempt operations under the control of an automated frequency coordination (AFC) system in 5925-6425 MHz after it has at least one (1) year real-world experience in the U.S.
  - **Phase 3.** Defer all decisions on 6425-7125 MHz until after World Radiocommunication Conference 2023.
- E4. Such an approach has significant upside for Canada and no material downsides. First, it will immediately provide 500 MHz of additional mid-band spectrum for licence-exempt services like Wi-Fi to more than accommodate projected growth for years to come. No evidence has been provided demonstrating a need for 1200 MHz of mid-band licence-exempt service. Second, AFC systems are a novel coordination and potential interference management tool that has never been

deployed on a wide-scale. Delaying until it has shown real-world experience in a peer country like the U.S. will allow Canada to gain all the benefits from implementing a fast-follow policy while also providing additional short-term protection for licensed services. Third, although the U.S. has made the full 6 GHz band available for licence-exempt use, many European countries and the UK are only making 5925-6425 MHz available for (low-power) licence-exempt at this time. They are continuing to explore the introduction of licensed mobile and flexible use into the upper portion of the band. By deferring a decision and potentially aligning with a larger global ecosystem, this could allow the Department to adopt a better spectrum policy option that would provide greater benefits to Canadians in the long-term.

- E5. Crucially, deferring a decision on 6425-7125 MHz does not prevent the Department from ultimately allowing licence-exempt operations into all or part of the upper 6 GHz band. However, immediately introducing licence-exempt operations is a decision that is practically irreversible should most of the world move towards a different, superior ecosystem that would provide greater benefits and value to Canadians. Such a measured approach to the 6 GHz band is one that will best meet ISED's stated spectrum management objectives, as it would:
- foster *more* innovation and investment in new wireless technologies and services because of the variety of technology, Quality of Service, and potential sources of investment;
  - support *even* greater choice and affordability of wireless services for consumers and businesses through multiple options for consumers in the band, including some not available using Wi-Fi but only available through licensed services like Fixed Wireless Access, and through greater competition; and,
  - facilitate *greater* deployment and timely availability of wireless broadband Internet across the country through a mix of private and public investment.
- E6. Regardless of how the Department ultimately looks to introduce licence-exempt operations into some or all of the 6 GHz band, incumbent Fixed Service links are critical to on-going operations, especially the provision of cellular services in rural areas and between urban and rural areas. We are pleased that the Department has recognized the need to protect incumbent users.
- E7. For avoidance of any doubt, protecting existing licensed links and indeed continuing to authorize new links in rural areas is a national imperative. There can be no impact on rural licensed 6 GHz Fixed Service links as a result of this decision and nothing that would potentially constrain future growth. Anything to the contrary will put rural Canadians connectivity at risk and worsen the Digital

Divide faced by those who live in rural and remote communities. Should the introduction of licence-exempt services still manage to cause interference issues at either low-power or standard-power, licensed incumbents must have a minimum of a one-year period in urban areas to migrate to another band if ISED ultimately determines such a measure is necessary. However, there can be no contemplation at all of displacing licensed 6 GHz services in suburban and rural areas. Doing so would risk eliminating mobile facilities-based competition between Rogers and the national and regional mobile operators that emerged from the legacy monopoly telephone companies. Rogers' proposed measured and phased approach, however, will help to ensure the optimal spectrum policy for the 6 GHz band to the maximum benefit of all Canadians.

## Introduction

1. Rogers Communications Canada Inc. (Rogers) is pleased to provide Innovation, Science and Economic Development Canada (ISED or the Department) with the following comments in response to *SMSE-014-20: Consultation on the Technical and Policy Framework for Licence-Exempt Use in the 6 GHz Band*<sup>1</sup> (the Consultation), published in the *Canada Gazette*, Part I, December 5, 2020.
2. The 6 GHz band (5925-7125 MHz) is already deployed extensively in Canada to support critical connectivity services for Canadians. The band is used by both terrestrial network operators for licensed Fixed Service (FS) backhaul links and Fixed Satellite Services (FSS), as well as other licensed services. The propagation characteristics at 6 GHz make it a crucial band for terrestrial long-distance data transport, especially in rural areas where fibre backhaul may be technically or economically prohibitive. For certainty, 6 GHz FS usage will continue to materially expand in the near-to-mid-term, even with the various levels of government and the Canadian Radio-television and Telecommunications Commission (CRTC) looking to fund additional fibre transport. There can be no impact on rural licensed 6 GHz FS links as a result of this decision and nothing that would potentially constrain future growth. Advances in spectrum coordination and management technologies may offer new and innovative ways to enhance the utility of the 6 GHz band but the Department must ensure that in opening the band to additional services, incumbents remain protected. Further, immediately opening the entire band to licence-exempt usage risks limiting the options available to the Department to explore sharing with other licensed services in the future. As such, ISED should take a measured and three-phased approach for its 6 GHz spectrum policy.
3. In the first phase, the Department should introduce low-power licence-exempt usage in 5925-6425 MHz as soon as the relevant Standard Radio System Plan (SRSP) and Radio Standards Specification (RSS) have been updated or created. For the second phase, the introduction of standard-power devices under the control of an automated frequency coordination (AFC) system should be introduced into 5925-6425 MHz after AFC-supported usage has been proven in real-world operation to protect licensed incumbent services for at least one (1) year in a peer country (e.g., the U.S.). The third phase, which would determine how to best introduce new services in 6425-7125 MHz, should be deferred until after the International Telecommunication Union's (ITU) World Radiocommunication Conference 2023 (WRC-23) and AFC-supported usage in 5925-6425 MHz has been active in Canada for one (1) year. Such an approach would allow for the

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<sup>1</sup> ISED, *SMSE-014-20: Consultation on the Technical and Policy Framework for Licence-Exempt Use in the 6 GHz Band* (Consultation); <http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf11643.html>.

immediate introduction of an additional 500 MHz of mid-band licence-exempt use to support Wi-Fi 6E and 5G NR-U, while providing a longer period of guaranteed protection to licensed incumbent 6 GHz services and allowing for the introduction of other licensed services in the future or possible expansion of licence-exempt services.

4. Effective spectrum policy frameworks are needed for Canadian network operators to meet the increasing demand for data and innovative new services. According to the CRTC *Communications Monitoring Report 2020*, there was an 18.8% increase in Canadian mobile data usage from 2018 to 2019,<sup>2</sup> with growth on Rogers' mobile network materially greater than the national average. Cisco predicts that Canadian mobile data traffic by 2022 will be equivalent to two times the volume of the entire Canadian Internet in 2005.<sup>3</sup> The trend of wireless traffic growth is likely to increase significantly with the advent of 5th generation (5G) mobile wireless technology, as a result of new services and applications enabled by the ability of 5G to use and provide wireless bandwidth that was previously only available over wired facilities. Ensuring that spectrum continues to be available for current deployments of 5G and future next-generation networks is critical to delivering advanced connectivity.
5. As Canada's largest single national network operator and one of the largest fixed Internet service providers, Rogers knows that network operators require continued and growing access to spectrum to keep pace with Canadians' demand for data services where they live, work, and play. In order to address the dramatic growth in demand for data services, Rogers has already made significant investments to deliver innovative mobile broadband services, expanding Canada's first and largest 5G network, powered by Ericsson, to reach residents and businesses in 160 communities across the country – including Atlantic Canada's first 5G network.<sup>4</sup> On the fixed Internet side, over 68% of Rogers' residential Internet base is using speeds of 100 Mbps or higher and our Ignite Gigabit Internet service, capable of delivering 1Gbps speeds, is available to our entire footprint of over four million homes.<sup>5</sup> We also continue to deliver new innovative solutions and compelling content through our Ignite TV platform, which uses licence-exempt spectrum to provide the convenience of wireless set-top boxes to customers.

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<sup>2</sup> CRTC, *Communications Monitoring Report 2020 – Sector summaries: Retail mobile sector*; <https://crtc.gc.ca/eng/publications/reports/policyMonitoring/2020/cmr2.htm#a4.1>.

<sup>3</sup> Cisco, *VNI Mobile Forecast Highlights, 2017-2022*; [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#).

<sup>4</sup> Rogers, *Atlantic Canada's First 5G Network Expands to Moncton, New Brunswick*, December 2020; <https://about.rogers.com/news-ideas/atlantic-canadas-first-5g-network-expands-to-moncton-new-brunswick/>.

<sup>5</sup> Rogers, *Rogers Communications 2019 Annual Report*, March 2020.



6. Yet, for network operators like Rogers to continue providing Canadians with the most advanced and innovative connectivity solutions, spectrum policy must keep pace. Rogers has been a consistent proponent of the importance of making additional licensed and licence-exempt spectrum available to support innovation, while ensuring incumbent users are still protected. Network operators must maintain and gain access to new spectrum, both interference-free, licensed spectrum bands that is the essential input for their networks, as well as licence-exempt spectrum that allows for the expansion of complementary services and an enhanced customer experience.
7. Facilities-based providers like Rogers continue to make the significant investments required to maintain and grow network infrastructure that enables Canadians to fully participate in the digital economy. Canadian wireless facilities-based network operators made capital investments totaling \$3.1 billion in 2018 increasing at an annual compound rate of 4.4% since 2013 (\$2.5 billion).<sup>6</sup> In 2019, Canadian mobile carriers spent more than \$3.47 billion on 600 MHz spectrum, with Rogers alone investing more than \$1.725 billion.<sup>7</sup> The reserve price for 2020's 3500 MHz auction will be hundreds of millions of dollars and industry analysts estimate that Canada's three national carriers and two largest regionals may collectively spend \$3 billion on new spectrum licences.<sup>8</sup> According to the CRTC, telecommunications investment made in both wireless and wireline networks was \$11.85 billion in 2019 for plant and equipment, a combined capital intensity of 23.2% due to the requirement to maintain and upgrade extensive network infrastructure.<sup>9</sup>
8. These numbers will only continue to grow as, according to a recent report by Accenture, the initial rollout of 5G networks is estimated to require approximately \$26 billion in capital investment, the vast majority of which will be made by Canada's facilities-based mobile wireless service providers.<sup>10</sup> In addition to providing Canadians with the latest technology, wireless industry investments in 5G networks are expected to contribute an estimated \$40 billion to the country's economy and 250,000 permanent new jobs by 2026.<sup>11</sup> However, in order to

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<sup>6</sup> Nordicity, *The Benefits of the Wireless Telecommunications Industry to the Canadian Economy, 2018*; <https://www.cwta.ca/wp-content/uploads/2020/01/The-Benefits-of-the-Wireless-Telecommunications-Industry-to-the-Canadian.pdf>.

<sup>7</sup> ISED, *Auction of Spectrum Licences in the 600 MHz Band*.

<sup>8</sup> Scotiabank, *EQUITY RESEARCH | DAILY EDGE Monday, January 4, 2021*.

<sup>9</sup> CRTC, *Communications Monitoring Report 2020 – Telecommunications Overview: Capital expenditures and capital intensity*; <https://crtc.gc.ca/eng/publications/reports/policyMonitoring/2020/cmr2.htm#a3.1>.

<sup>10</sup> Accenture, *Fuel for Innovation: Canada's Path in the Race to 5G*, pg 16; [https://www.5gcc.ca/wp-content/uploads/2018/06/CWTA-Accenture-Whitepaper-5G-Economic-Impact\\_Updates\\_WEB\\_06-19-2018.pdf](https://www.5gcc.ca/wp-content/uploads/2018/06/CWTA-Accenture-Whitepaper-5G-Economic-Impact_Updates_WEB_06-19-2018.pdf).

<sup>11</sup> Accenture, *ACCELERATING 5G IN CANADA: Benefits for Cities and Rural Communities*, <https://www.accenture.com/acnmedia/PDF-112/Accenture-Accelerating-5G-in-Canada-PoV-2019.pdf>.

enhance consumer experiences and meet evolving mobile usage demands, including to continue expanding network coverage and capacity in rural areas, Canadian spectrum policy, including fees policy, must ensure that spectrum can be effectively deployed within facilities-based terrestrial networks. Smart policies regarding additional licence-exempt access are also necessary to accommodate Canadians' growing number of connected devices and innovative new uses.

9. The strength and resilience of Canada's wireless and wireline facilities-based networks in light of the COVID-19 pandemic have been a point of pride for Canada. However, the pandemic has also highlighted that some Canadians living in rural and remote areas do not always have the same connectivity options, as the economics of fibre transport and last-mile wireline services such as coaxial cable or fibre Internet mean fixed network rollout costs are prohibitive. As the Department decides on a new 6 GHz spectrum policy, it must take a measured and prudent approach, keeping the impact on rural Canadians – who may depend disproportionately on wireless access – front and center.

### **Choice between licensing and licence-exemption**

10. Rogers appreciates that ISED is guided by the policy objectives of the *Telecommunications Act*, and the *Spectrum Policy Framework for Canada* (SPFC), which has the objective to maximize the economic and social benefits that Canadians derive from the use of the radio frequency spectrum. The enabling guidelines of the SPFC state that spectrum management practices, including licensing methods, should respond to changing technology and marketplace demands. In addition, these guidelines state that spectrum policy and management should support the efficient functioning of markets by permitting the flexible use of spectrum to the extent possible, by making spectrum available for use in a timely fashion and by ensuring that appropriate interference protection measures are in place.
11. For the Department, or any spectrum regulator, the choice between licensing a band or exempting it from licensing is always a difficult one. Generally, the market cannot be used to assist in making this decision as demand for licence-exempt usage cannot easily be aggregated into an auction bid or similar market signal. Economic predictions of future value are necessarily speculative and rely on predictions for growth in capacity demand for licence-exempt use, including innovative new uses that may drive demand or the expansion of current licence-exempt services. Understanding the value for technologies such as Wi-Fi is thus challenging. In addition, in Canada, there may be less direct economic activity from Wi-Fi development and manufacturing than the U.S.

12. Licensing a band provides the Department with significant capacity to reallocate the spectrum for different services (e.g., 5.9 GHz FS band; 700 MHz Digital Television; C-Band Fixed Satellite Services; etc.) or introduce new licensed sharing (e.g., Flexible Use Millimetre Wave Bands). Reallocations may be either in response to changing demands for legacy services or to take advantage of technological developments that allow for a more efficient use of the spectrum. However, permitting licence-exempt services provides much less latitude to introduce new services that require the certainty that only licensed spectrum can provide. Licence-exempt bands also are at risk of succumbing to their own “success” and may ultimately suffer from the “tragedy of the commons”. Once a band is opened to licence-exempt usage and devices start using it, it may be too late to chart a new course.
13. In order to maximize the economic and social benefits that Canadians derive from the use of the radio frequency spectrum resource, the Department and network operators must balance the needs of all wireless service providers, equipment providers and consumers. Technologies such as cellular are often complimented by Wi-Fi, which has become the primary broadband communications technology used inside homes and offices. Wi-Fi allows off-loading data from cellular, easing capacity demand on mobile networks; while cellular mobile broadband technologies provide the coverage in areas that Wi-Fi typically cannot reach and also provides higher Quality of Service (QoS) solutions than are possible with Wi-Fi alone.
14. Rogers fully supports the efforts by the Department to make additional spectrum available to new services, including licence-exempt services. As the record shows, in recent years we were supportive of licence-exempt use in the 64-71 GHz frequency band as well as enhancing the usage of the 5150-5250 MHz band by allowing lightly licensed higher power RLAN devices (HPODs). We also support a suitable balance between identifying spectrum for new or additional licensed services and licence-exempt usage. In our view, however, the Department’s Consultation document does not provide material consideration to this balance and there is insufficient evidence provided to support an assumption that the entire 5925-7125 MHz band should be licence-exempt and used (primarily) for Wi-Fi.
15. In our view, there is a strong rationale that the 6 GHz band should be considered in two halves: the lower half of 5925-6425MHz and the upper half of 6425-7125MHz. This rationale is based on two justifications: 1) the size of the two 6 GHz sub-bands; and, 2) the global approaches adopted for the 6 GHz sub-bands:

- i. **Size of the two 6 GHz sub-bands.** Each of these bands offers a large amount of spectrum – larger than the C-band to be awarded for 5G in Canada. Each band is sufficient, by itself, to enable deployment of new systems, and there are unlikely to be economies of scale or other drivers that result in a material benefit from treating the entire 6 GHz band as one entity.
  - ii. **Global approaches adopted for 6 GHz sub-bands.** Around the world, many countries have divided the band as described above. For example, European Union countries and the UK are moving to introduce licence-exempt in the lower part of the band but have yet to make a decision on the upper part. Of significance is the forthcoming consideration at WRC-23 on the use of the upper part of the band and whether it should be licence-exempt or licensed.<sup>12</sup>
16. The case for *immediately* allocating 1200 MHz to licence-exempt use in Canada is not clear. Providing an initial 500 MHz for licence-exempt spectrum on its own would accommodate three new 160 MHz Wi-Fi 6E channels. Three channels provide for good frequency reuse, and 160 MHz bandwidth enables data rates of over 1Gbps where signal-to-interference-plus-noise ratio (SINR) rates are adequate. This will allow for sufficient flexibility for devices to coordinate while long term demand and usage remains unclear.
17. Immediately making 1200 MHz available for licence-exempt is even more difficult to comprehend in rural parts of Canada, where there exists a higher degree of dependence on microwave transport and licensed Fixed Wireless Access (FWA) could make better use of this 6 GHz spectrum. In these areas, the bottle neck is last-mile Internet access, not RLAN spectrum availability. Government efforts to enable a 50/10 Mbps in rural and unserved areas will continue to drive a need for licensed wireless access spectrum.
18. Massive multiple-in multiple-out (MIMO) technology applied in the 6 GHz band can play a major role in reducing the propagation gap with lower bands, enhancing the spectrum efficiency and assisting with the coexistence coordination exercise. In fact, coordination is easier under licensed regimes than the proposed AFC, as coordination (spectrum sharing) between licensed flexible use and FS will in many ways be a standard network planning exercise.
19. Allowing only licensed services in the upper portion of the band will also eliminate any potential risk from low-power licence-exempt usage. While more modern FS

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<sup>12</sup> While WRC-23 is considering 7025-7125 MHz globally and 6425-7025 MHz for Region 1 specifically, it is quite possible that a robust global ecosystem of licensed mobile 6425-7125 MHz will emerge of which Canadians could take advantage.

equipment may have an ability to manage a moderate level of interference, it is likely that older equipment may have zero tolerance in order to ensure 99.9999% reliability, including smaller rural commercial operators and public safety organizations. A sharing regime with Wi-Fi, especially an extravagant amount of spectrum in rural areas, could result in actual harm. As such, permitting only licensed flexible use in the upper portion of the 6 GHz band will not only benefit rural Canadians by enhancing their last-mile access options (mobile or FWA) but also ensure protection of FS links, critical for rural wireless transport.

20. Further, although the Department cites American forecasts for potential economic value of Wi-Fi as support for adding more licence-exempt spectrum, the equipment and service provider ecosystems enjoying these monetary benefits of Wi-Fi do not exist in Canada nearly to the same extent. On the other hand, the Canadian wireless industry's contribution to GDP increased at an annual compound growth rate of 7.1% - from \$34.3 billion (2013) to \$48.2 billion (2018).<sup>13</sup>
21. As the Department itself recognizes in the Consultation document, the upper 6425-7125 MHz portion of the 6 GHz band has been identified as Agenda Item 1.2 for WRC-23, studying whether parts of the 6 GHz band could be identified for International Mobile Telecommunications (IMT) to support (licensed) commercial mobile broadband services.<sup>14</sup> There is great merit in Canada following this deliberation and keeping open the option of joining a global standard for mobile services in this band.
22. Rogers does agree more spectrum for licence-exempt use in Canada is appropriate. Supporting larger channels, such as the 160 MHz channels defined for Wi-Fi 6E to enable higher data rates is a key driver for allocating 6 GHz spectrum to licence-exempt use. We also recognize the recent action of the FCC regarding changes to the 6 GHz band has implications for Canada but believe that a graduated approach to be most appropriate for Canada. Aligning with the U.S. market in the face of imminent commercial licence-exempt 6 GHz products appearing in Canada is facilitated by allocating 5925-6425 MHz for licence-exempt use and adopting similar equipment requirements established by the FCC for devices in this band.
23. There is, however, no urgent need to make a decision on the upper part of the 6 GHz band. As explained further below, the 3500 MHz and 3800 MHz bands in Canada (subject to final aggregation and assignment rules across the entire C-band) should provide sufficient initial mid-band spectrum for licensed cellular 5G

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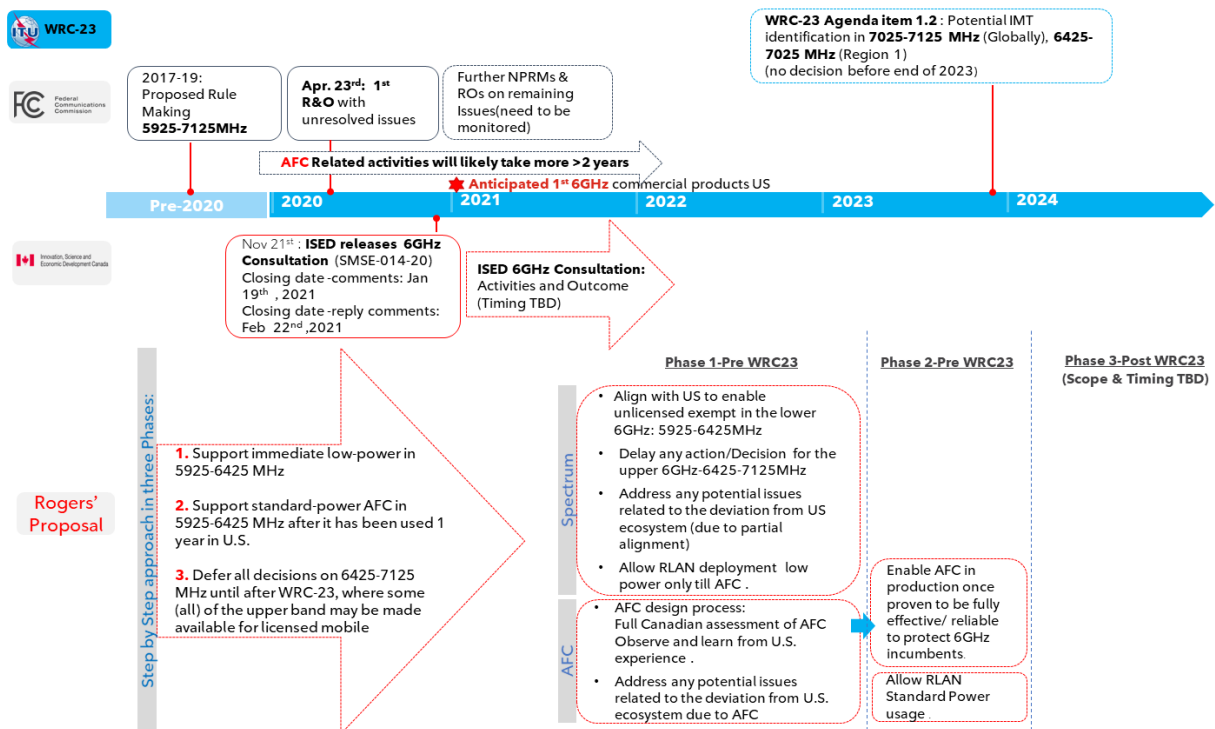
<sup>13</sup> Nordicity, *The Benefits of the Wireless Telecommunications Industry to the Canadian Economy*, 2018.

<sup>14</sup> ISED, *Consultation*, para 21.

until about 2025. Likewise, if the lower part of the 6 GHz band is made available for Wi-Fi then there will be more than ample capacity for unlicensed use over the same time period. Splitting the band into two halves allows for a decision on the upper part to be deferred until there is sufficient evidence to be able to make the optimal spectrum policy decision for Canadians. Further, even should the Department ultimately decide to make additional spectrum available in the upper 6 GHz band, initial lessons learned from the licence-exempt usage in the lower 6 GHz can be used to adjust any rules, where required, to allow for enhanced protection of licensed services and smoother potential introduction of licence-exempt operations in the upper band.

24. Figure 1 below shows a timeline of expected domestic and international regulatory and market milestones over the next few years. As can be seen, Rogers’ proposed three-phase approach will provide ISED with the maximum flexibility to make the best policy decisions in the for Canada in the 6 GHz band.

**Figure 1. Canadian and International timing for the 6 GHz band**



25. We therefore strongly recommend that the Department consider the lower and the upper parts of the 6 GHz band separately rather than assuming the whole band needs to be licensed in the same manner. Crucially, deferring a decision on making the upper portion of the 6 GHz band until after WRC-23 will not preclude the Department from designating some or even all of the spectrum for licence-

exempt well ahead of any estimated demand. However, making all the spectrum licence-exempt immediately will make it effectively impossible to introduce new licensed services, even if incumbent licensed services are sufficiently protected for ongoing operation.

26. This is a critical consideration, as there appears to be limited additional spectrum below the 6 GHz band that could be made available for licensed mobile services in the near to mid-term, especially that could support large channels for multiple competing facilities-based operators that make up the core of Canada's mobile competition policy. While there is some international interest in possible mobile use in the adjacent 7/8 GHz bands, the potential availability remains highly uncertain internationally or in the U.S. at this time.<sup>15</sup> Further, the propagation of the 7/8 GHz band (and potentially the 12 GHz band) would be less favourable than the 6 GHz band for mobile coverage. However, with the desire for 100 MHz channels to maximize efficiency and utility for 5G services, it is clear that allocation of the 3500 MHz and 3800 MHz bands may not be enough. Indeed, depending on how the Department ultimately decides on the assignments of the 3500 MHz and 3800 MHz bands, some or all Canadian mobile networks may be unable to provide a single 100 MHz contiguous channel below mmWave bands.

### **Treatment of incumbents**

27. The ISED proposal for enabling licence-exempt use of the 6 GHz band is prudently aligned, in general, with the recent FCC decisions to open up more spectrum for shared use. As in the U.S., successful spectrum sharing must recognize that incumbent operators of licensed FS links in Canada, including Public Safety, telecommunications providers, broadcasting services, and utilities, be fully protected from unlawful interference caused by licence-exempt devices. All of these incumbents provide Canadians with critically important services vital to their health and welfare, so any disruption of licensed microwave facilities is absolutely unacceptable.
28. Rogers is extremely proud of our role in being Canada's first mobile provider, building a national network to compete with legacy regional monopoly telephone companies. Without any legacy access to wireline fibre transport facilities built across the country under traditional monopolies (as enjoyed by telcos such as Bell and Telus), licensed 6 GHz fixed services for microwave backhaul are crucial to building out and maintaining our national footprint. As the largest single

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<sup>15</sup> Policy Tracker, *The shape of discussions on a possible future mid-band: 7/8 GHz*;  
<https://www.policytracker.com/blog/the-shape-of-discussions-on-a-possible-future-mid-band-7-8-ghz/>.

commercial network operator, Rogers provides mobile services to nearly 11 million Canadians.<sup>16</sup> These services would be at risk should the introduction of licence-exempt services result in interference to licensed fixed links at 6 GHz, especially rural links that provide crucial connectivity to Canadians outside of major urban centres and urban Canadians connecting between urban centres.

29. In addition to the impact to our mobile customers, Rogers is continuing to leverage our extensive network coverage to roll out FWA Internet connectivity in areas that have traditionally only had access to legacy terrestrial dial-up Internet speeds or spotty satellite connections. Any risk to licensed 6 GHz fixed services could result in Canadians living in deep suburban and rural areas having one fewer option to close the Digital Divide and further reduce any chance for them to benefit from facilities-based competition.
30. In the context of this Consultation, Rogers defines “rural” as all Tier 5 service areas that the Department has identified as Rural or Remote as part of its recent *Decision on a New Set of Service Areas for Spectrum Licensing*.<sup>17</sup> Generally, any FS link where either one or both ends of the link is in a Rural or Remote designated Tier 5 area should be considered serving rural Canadians, thus a “rural FS link”. Only FS links where both ends are located within a Metro or Urban designated Tier 5 should be considered as an “urban FS link”.
31. Rogers today operates nearly 1,000 links (over 1,500 frequency pair assignments) in the 6 GHz band. These are primarily used for backhaul purposes where fibre is currently not technically or economically available. Without these 6 GHz FS links, the vast majority of Rogers’ cell sites in rural areas would not be able to operate, resulting in lack of service for customers living, working or travelling in these areas. The 6 GHz band is essential because of the long range provided. If these links had to be replaced with higher frequency spectrum, more than one hop would be required, adding significantly to the expense and requiring new sites to be found for the relay points. Our network expansion plans anticipate adding more links in the 6 GHz band in coming years and upgrading the capacity of many existing links as mobile broadband, FWA, and 5G are deployed to address ever increasing data demand.
32. Any change to the regulatory policy around these links would inevitably decrease the ability of Rogers to provide and expand service in rural areas, in particular compromising our ability to compete with Bell and Telus, who have legacy

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<sup>16</sup> Rogers, *Rogers Communications Reports Third Quarter 2020 Results*, October 22, 2020.

<sup>17</sup> ISED, *Decision on a New Set of Service Areas for Spectrum Licensing*; <https://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf11525.html>.



advantages as regional fixed-line incumbents and share their networks with each other, to the detriment of mobile competition policy and Canadians. As the Department is aware, Bell and Telus essentially operate two regional Radio Access Networks, roughly corresponding with their traditional wireline footprints. They cross-subordinate spectrum and roam on each others network in order to create a national “Belus” network. Thus, the Belus network has not only regularly been able to effectively circumvent auction rules to gain access to more combined spectrum than their competitors, they have also been able to leverage benefits from their legacy monopoly wireline telephone companies. The 6 GHz band is an important network component for facilities-based competition between the national networks.

33. It is also absolutely critical to stress that licensed 6 GHz FS backhaul usage will not only continue to exist for the foreseeable future for both urban and rural areas but that we expect material expansion in suburban and rural areas in the near-to-mid-term to support increased 5G mobile traffic and increased residential Internet usage. Even with the various levels of government and the CRTC looking to fund additional fibre transport to support improved connectivity in unserved and underserved markets, 6 GHz wireless backhaul will continue to be part of a healthy mixture of transport technologies due to the speed of deployment and cost-advantages compared with fibre.
34. Should the Department’s 6 GHz policy ultimately, even if unintentionally, result in the practical displacement of licensed 6 GHz FS links, it would seriously impact network operators. In urban areas, it is likely a manageable, if still expensive, proposition. Displacement of rural licensed 6 GHz links, however, would have disastrous impacts and would sharply increase the Digital Divide for rural Canadians. Even should the Department provide transition funding, which it has generally declined to do, it would require significant time to actually build alternative transport facilities (wireline or wireless), as no alternative FS band exists with similar propagation characteristics to the 6 GHz band.
35. As the below table shows, Rogers has deployed 6 GHz links extensively across Canada in both urban and rural areas in all provinces. The below shows just Rogers, it does not include other commercial network operators, nor public safety or utilities that are also heavy users of licensed 6 GHz wireless backhaul. The evidence clearly demonstrates the potential impact to Canadians across the country should there be any interference from potential licence-exempt operations.

**Table 1. Rogers' licensed 6 GHz links by Province, Urban & Suburban / Rural**

PROV	BC	BC	AB	AB	SK	SK	MB	MB	ON	ON	QC	QC	NB	NB	PEI	PEI	NS	NS	NL	NL	Total	Total	Grand
MARKET	Top 32	Sub / Rural	Top 32	Sub / Rural	Top 32	Sub / Rural	Top 32	Sub / Rural	Top 32	Sub / Rural	Top 32	Sub / Rural	Top 32	Sub / Rural	Top 32	Sub / Rural	Top 32	Sub / Rural	Top 32	Sub / Rural	Top 32	Sub / Rural	Total
Link Count	10	107	30	296	13	43	5	56	24	163	12	83	1	19	0	6	3	17	0	0	98	790	888
L6 Band Count	6	109	33	438	11	45	4	65	13	176	3	58	0	20	0	6	2	11	0	0	72	928	1000
U6 Band Count	14	88	18	109	15	37	3	33	24	113	10	47	1	4	0	2	2	10	0	0	87	443	530
<b>TOTAL</b>	20	197	51	547	26	82	7	98	37	289	13	105	1	24	0	8	4	21	0	0	159	1371	1530

36. For clarity, Rogers does not support any changes to the 6 GHz band that would result in displacement of licensed FS anywhere.<sup>18</sup> However, in the event that the Department ultimately must consider it in the future, licensees should have a minimum of one (1) year from any decision for potential transition in **urban** areas only. Specifically, once AFC has been implemented and should interference issues arise, incumbents must have a minimum one-year period to migrate to another band if ISED determines such a measure is necessary. There however can absolutely be no contemplation of displacement of 6 GHz links outside of urban areas, i.e., rural areas, as the cost to connectivity for rural Canadians (and urban Canadians travelling outside their local areas) would be severe. Deferring the usage of standard-power and AFC's in 5925-6425 MHz until proven will also provide additional protection for licensed usage in that band while providing maximum protection for upper band licensed FS usage in rural areas.

**Potential sharing with other services**

37. As we note, protection of incumbent licensed 6 GHz users is vital; however, in light of the recent decisions by the FCC, it is prudent for the Department to investigate whether it is possible in Canada for new uses of the band to coexist with these links (and other services currently operating in the band). In recent years, the Department has also indicated its efforts to explore innovative sharing regimes. Rogers has consistently been open to the theory but expressed significant

<sup>18</sup> Again, while Rogers does not support the displacement of any FS licensee, the Department may wish to consider opportunities to incentivize operators using older microwave systems to upgrade to adaptive links capable of tolerating very low probability interference events. Such modern FS equipment would go a long way to ameliorate many outstanding concerns interference concerns, particularly around low-power and very low-power licence-exempt devices that do not operate under AFC.

reservations in practice owing to the immaturity of the technology, especially in licensed commercial mobile bands.

38. As explained by Naik et al, coexistence between licence-exempt and incumbent users has been assessed by multiple stakeholders in both the U.S. and Europe.<sup>19</sup> The FCC believes that it is possible for licence-exempt (“unlicensed” in the FCC’s parlance) and licensed FS to coexist, as long it is enabled through a database approach which it terms automated frequency coordination (AFC).<sup>20</sup> This same conclusion has been reached by Ofcom<sup>21</sup> and the EU<sup>22</sup>, based on a wide range of studies. We do not seek to repeat or question these studies here and agree with the general approach that limits any degradation to a 1dB increase in the noise experienced at the receivers of our links. However, we do recommend that the Department closely review and consider the details of the studies performed in the UK and Europe, in addition to those completed by the FCC.

39. We note that 90% of our fixed links are outside of urban areas. Accordingly, we suggest the following approach to coordination with Wi-Fi and potential licensed flexible uses.

#### *With Wi-Fi*

40. Wi-Fi usage is predominantly indoors and low-power. Indoor usage is unlikely to interfere with fixed links because the fabric of the building will generally provide good isolation and fixed links are sited to avoid looking at buildings. Low-power Wi-Fi indoors is generally acceptable as high range is not typically needed. This has led the FCC, EU and Ofcom, among others, to conclude that low-power indoor Wi-Fi can coexist with fixed links without any need for coordination. This also confirms that there is no need to migrate fixed links from the band. Further, no decision should be made in this consultation that could create any interference to or constrain the growth of licensed FS – particularly in rural areas.

41. Where Wi-Fi is deployed outdoors, then it will typically be the 2.4 GHz or 5 GHz bands that are used, rather than 6 GHz, so as to benefit from the greater propagation in these bands. In fact, the Department only recently made another 100 MHz of higher power outdoor Wi-Fi spectrum available as part of the HPOD decision. At present, 6 GHz Wi-Fi is expected to be used primarily for mesh-

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<sup>19</sup> Gaurang Naik, Jung-Min Park, Jonathan Ashdown, William Lehr, “Next Generation Wi-Fi and 5G NR-U in the 6 GHz Bands: Opportunities and Challenges,” 31 Aug 2020, *IEEE Access*;  
<https://ieeexplore.ieee.org/document/9165719>.

<sup>20</sup> See FCC 18-147.

<sup>21</sup> Ofcom, *Improving Spectrum Access for Wi-Fi*;  
[https://www.ofcom.org.uk/data/assets/pdf\\_file/0036/198927/6ghz-statement.pdf](https://www.ofcom.org.uk/data/assets/pdf_file/0036/198927/6ghz-statement.pdf).

<sup>22</sup> See CEPT Reports 302 and 316.

backhauling within a house, with direct access from devices occurring in 5 GHz. This suggests the need for outdoor 6 GHz Wi-Fi will be low.

42. As contemplated by the FCC and others, outdoor Wi-Fi deployments in 6 GHz should be coordinated through an AFC system (once proven effective in real-world usage), which should prevent Wi-Fi deployment in locations where interference into fixed links is likely. We anticipate that the number of such locations will be small, at least initially. Interference is likely only where the Wi-Fi device is located within the direct beam of the fixed link and is relatively close to one end of the link. For example, ECC Report 302 provides protection contours for outdoor Wi-Fi devices operating in the vicinity of fixed links. These are approximately 20kmx1km for urban areas and 40kmx2km for rural areas equating to 20km<sup>2</sup> and 80km<sup>2</sup>, respectively. Smaller areas than this may be possible where there is building shielding or similar propagation limiting factors. The top 100 cities and towns in Canada have a combined area of 120,000km<sup>2</sup>. Assuming 1,500 fixed links, of which 10% are in urban areas, then the urban coordination area would be 3,000km<sup>2</sup> – less than 3% of the total urban area. This implies that 97% or more of potential outdoor high-power Wi-Fi deployments could go ahead without affecting our 6 GHz FS links. Of course, other operators will also have fixed links and there are other incumbents that may also need to have exclusion areas. Outside of urban areas, the percentage of landmass and hence Wi-Fi devices in a coordination zone will be much lower.

43. In summary, protection of fixed links will not impact indoor deployment of Wi-Fi and can be expected to have only a modest impact on 6 GHz outdoor deployment, which is not expected to be a high demand use case. As a result, there is absolutely no need to migrate fixed links from this band with resulting expense and loss of economic value in order to introduce Wi-Fi. Furthermore, as highlighted above, it should be made explicitly clear that no part of any decision to permit licence-exempt service can limit the authorization of new 6 GHz links, particularly in rural areas, given the cost advantages of using this band over higher frequency ones or fibre, and the minimal potential impact on Wi-Fi use.

#### *With licensed Flexible Use*

44. We set out below three potential uses of 6 GHz for flexible use, namely capacity expansion in dense areas, provision of mobile services to verticals, and FWA. While there are few studies at this time considering coordination of these services with fixed links, we note the following points:

- **Capacity expansion.** If a site has exceeded the capacity of existing cellular bands, including 3500 MHz, then it is near-certain that it will have a fibre

backhaul connection to deliver the necessary backhaul data rates. Hence, there are unlikely to be fixed links on the site and likely none in the vicinity. There will probably be buildings providing blockage to long-distance propagation paths. As a result, the risk of interference is very low.

- **Verticals.** Most provision will be indoors, where the same principles as for Wi-Fi (above) will apply. For outdoor deployment, the base station height will likely be low and the blockage from the campus buildings significant. As a result, the risk of interference is very low.
- **FWA.** As FWA is outdoors and often transmitted from elevated towers, there is a higher risk of interference with fixed links. Nevertheless, as both FWA and fixed links are static and have directional antennas, mitigating any interference will often be possible. Hence, while coordination will be necessary, on-going use of fixed links is unlikely to result in material reduction in the locations where FWA can be deployed. With a flexible use designation, however, this will be a standard network planning scenario between licensed services.

45. We further note that licensed flexible use services will be deployed by mobile network operators, who are also one of the main users of the licensed fixed links. Well established coordination processes would be used to ensure FS links are not impacted, similar to the FWA case described above. While it may be impractical to restrict flexible use licences based on grandfathered FS link ownership, some operators may have an incentive to change FS links (frequency, modernize equipment) if it improves their mobile service usage of shared spectrum. However, this would be a market-based decision based on sustainable economic business cases. Again, we do not support any forced displacement of licensed 6 GHz FS.

#### *Adaptive approach to maximize utilization*

46. With an AFC solution, parameters can be changed over time. Indeed, as more experience augments the theoretical studies, exclusion zones can be fine tuned over time and coordination zones could be reduced if no interference is noted or increased should unexpected interference occur. In the event of interference suffered by Rogers, especially resulting from aggregated interference, we would provide details in confidence of the SINR at our fixed links in order for the Department to update any rules and optimize the database to ensure protection of licensed services and increase the spectrum efficiency.

47. Given that coordination is not needed with one of the major anticipated uses of the band (Wi-Fi indoors), and that the impact of coordination of standard-power applications will typically be a very small fraction of the area being unavailable, there is no economic case for requiring the migration of fixed links. However, the

Department must remain diligent about the protection of licensed FS owing to the vital role it plays in mobile networks, especially in rural areas or between urban centres. Looking forward, mobile operators can also work with ISED and the database provider to optimize the solution.

48. In the U.S., operators of incumbent FS microwave links, represented by AT&T, CTIA, and utilities, continue to oppose AFC-free operation of low-power and very low-power licence-exempt devices, which they believe will inevitably cause harmful interference to their licensed operations. AT&T explains the potential impact of low-probability interference to its FS links and the estimation that 85% of those links do not employ adaptive modulation (which would enable incumbents to make better use of their licences).<sup>23</sup>
49. In Rogers' view, it is apparent that incumbents with legacy, non-adaptive FS links may oppose even low-power licence-exempt operation. Monte Carlo simulations for evaluating potential interference to FS from licence-exempt include rare combinations of factors that can exceed the -6 dB I/N threshold. If combined with a deep fade, the FS receiver could suffer a reduction in SINR sufficient to cause bit errors and, if not adaptive, be disrupted. These combinations of factors and fading are highly improbable but possible, potentially impacting a legacy link designed for 99.9999% availability.
50. In order to achieve effective and efficient Canadian spectrum management, the Department should consider the opportunity to better facilitate spectrum sharing between incumbent FS and licence-exempt use. A PSD limit of 8 dBm/MHz rather than 5 allowed in 6 GHz is made possible by modernization of FS links or their replacement with modern telecommunications systems. Adaptive modulation technology has been adopted for the last 10 years as the foundation for efficient radio systems of all types, ranging from Wi-Fi to high-throughput satellites. Achieving the high link availability performance of 99.9999% no longer requires the brute-force efforts used prior to adaptive modulation technology advances. Efficient network deployments and spectrum management, which embrace brain over brawn for spectrum sharing takes advantage of these kinds of advances, including potentially AFC.
51. As the above highlights, Rogers fully supports effective and efficient sharing where there will be no interference or impact on modern, licensed FS systems. To understand the potential impacts of maximizing utilization, the Department should

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<sup>23</sup> AT&T ex parte to FCC Docket ET 18-295 Nov 12, 2019, page 9  
<https://ecfsapi.fcc.gov/file/11122856900313/2019-11-12%20ATT%20FS%20RLAN%20IX%20Ex%20Parte%20Pkg--FINAL.pdf>

conduct a survey of deployed FS technology types to better understand the scope of all incumbents' sensitivity to low-probability interference from low-power licence-exempt use in 6 GHz. The results need not be disclosed publicly for each operator but an aggregate share of adaptive vs non-adaptive deployments should be made public. The Department should also look for opportunities and options to incentivize licensed FS operators using legacy equipment to upgrade to modern systems with adaptive modulation capabilities.

#### *Interference monitoring and mitigation*

52. The market realities for RLAN equipment are such that the devices developed and shipped for the U.S. will likely be similar to those made available in Canada to take advantage of economies-of-scale and drive down costs. Hence, the equipment specifications for 6 GHz licence-exempt operation in Canada should align to the greatest extent possible with FCC requirements. Specific operating parameters, such as operating frequency range, can be configured for different geographic regions, however, enabling common equipment to operate in a reduced range of 6 GHz frequencies in Canada compared with the U.S. Even if such rules are not aligned, the Department and Canadian licensed operators will need to be alert for potential interference, as “grey market” devices meant for the U.S. would likely make their way into the hands of at least some Canadian end-users, intentionally or unintentionally.

53. The FCC Report and Order attempts to deal with potential interference to licensed operations from licence-exempt (unlicensed) devices by stating:

Any user causing interference may be required to cease operating the U-NII device, even if the device in use was properly certified and configured, and will not be permitted to resume operation until the condition causing the harmful interference has been corrected.<sup>24</sup>

54. ISED has similar policies for licence-exempt devices documented in *SP-5150 MHz — Spectrum Utilization Policy for Licence-exempt Wireless Local Area Networks in the 5 GHz Range* for operation in Canada.<sup>25</sup> A new RSS for licence-exempt RLAN in the 6 GHz band should include similar provisions regarding interference. In order to enforce any prohibition on harmful interference, it must be possible to identify the source of the interference. Therefore, additional operational measures to facilitate identification and localization of interfering licence-exempt devices may be appropriate. The Department should also ensure that local regional offices are

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<sup>24</sup> FCC R&O para 149.

<sup>25</sup> ISED, *SP-5150 MHz — Spectrum Utilization Policy for Licence-exempt Wireless Local Area Networks in the 5 GHz Range (Issue 2)*, pg 9; [https://www.ic.gc.ca/eic/site/smt-gst.nsf/vwapi/sp5150-i2e.pdf/\\$FILE/sp5150-i2e.pdf](https://www.ic.gc.ca/eic/site/smt-gst.nsf/vwapi/sp5150-i2e.pdf/$FILE/sp5150-i2e.pdf).

properly resourced to support licensed operators and mitigate any potential increase of interference as a result of attempting to have licensed and unlicensed services coexist.

### **Use of AFC**

55. ISED has proposed the use of an AFC database in the 6 GHz band. We generally support adopting this approach once it has been proven in real-world usage. An AFC can potentially enable coordination with existing users, which would maximize the value of the band while ensuring that primary licensed users do not suffer interference. The Department should, however, take a measured and prudent approach due to the potential risk to licensed FS links, especially vital for rural Canadians' connectivity. As such, the Department should initially limit consideration of an AFC system to 5925-6425 MHz and only after at least one (1) year of real-world experience in a peer country. Indeed, as discussed below, the AFC rules have yet to be finalized in the U.S. and are already facing legal actions by incumbent licensed users to ensure protection of their services.

56. At a high-level, the principles of database coordination are well known and include the following:

- Every device that might cause interference, such as high-power (standard-power) Wi-Fi, must communicate with the database before operation and must only operate on channels allowed by the database.
- All such devices must regularly re-register, such that their allocated channels can be changed should there be a change in incumbent usage or should interference be detected.
- All incumbents that are susceptible to interference must be registered in the database. The database must be updated if there are changes to these deployments or new incumbent deployments.
- Suitable rules must be defined and agreed by the incumbents as to the size of exclusion zones around incumbent usage for all possible levels of frequency offset and all relevant characteristics of the interferer (e.g. transmitter height, duty cycle, etc.).
- Suitable protocols must be defined for database communication.
- Databases must be certified and must have exemplary security and availability. They must be operated by independent entities well qualified to do so.

57. Critically, it will be the AFC that provides protection to licensed fixed links, and potentially, depending on decisions made about the upper 6 GHz band that could allow innovative 5G services beyond 2025. If the AFC does not operate correctly,



facilities-based providers could suffer interference that prevents their networks working effectively. This would result in potentially denying reliable network service to our customers in rural areas and for urban customers between urban centres, as well as other service providers using wireless backhaul. Thus, it is critical that rules are set with care and through a consultative process, databases are run by reputable and experienced companies, and that measures exist to rapidly react to problems should they occur. In particular, the Department must establish a rapid escalation path and priority support from regional offices should any licensed user experience interference. Further, processes should be established such that the AFC database rules can be rapidly changed to maintain protection of licensed users, and, if necessary, potential interferers identified, investigated, and mitigated.

58. We also believe that an AFC may enable a range of options for accessing the band, including dividing by geography and tier of access. Further, an AFC allows the rules of the band to change over time, for example adjusting coordination distances, allowed power levels or even modes of access. With much uncertainty about future use of Wi-Fi and 5G, this flexibility appears to be a very valuable insurance against unanticipated developments. However, the Department must continue to take a measured approach and not prematurely take any decisions that could result in unmanageable interference to critical services for Canadians.

### **Treatment of the upper part of the band**

59. A measured and balanced approach to authorizing additional services in the 6 GHz band will be the optimal spectrum policy option for Canada. We recommend that licence-exempt access be allowed in the lower part of the band (5925-6425 MHz) on a secondary basis subject to not claiming protection from nor interfering with licensed incumbents. This is fully in line with developments in many parts of the world and in recognition of the likely need for more spectrum for Wi-Fi as usage grows. We, however, strongly oppose the upper part of the band (6425-7125 MHz) being immediately enabled for licence-exempt use at any power levels.

60. There are strong arguments from across the cellular community as to why this band might be better assigned as 5G spectrum. For example, Coleago states:<sup>26</sup>

Our analysis shows that there are significant benefits in identifying the frequency band 5925-7125 MHz for IMT in support of 5G-NR and its evolution. Using the 6 GHz for 5G would enable mobile operators to deliver the ITU IMT-2020 requirements, notably the user experienced data rate of 100 Mbit/s in urban areas, in an economically feasible

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<sup>26</sup> Coleago Consulting, "The 6 GHz opportunity for IMT", August 2020.

manner. This is relevant in cities with a population density of 6,000 people per km<sup>2</sup> or more. This report provides an analysis for five cities, namely Lagos, Moscow, Paris, Sao Paulo and Tokyo, which clearly shows that 6 GHz spectrum is required to deliver the 5G vision of near guaranteed user experienced data rate of 100 Mbit/s, i.e. citywide “speed coverage”. The selected cities have characteristics that also apply to a broad number of other larger cities.

While the 6 GHz band could allow for 100 Mbit/s user experienced data rate citywide (in both developed and developing markets), in rural areas the 6 GHz band spectrum can be used for FWA thus optimising the spectrum usage of the band and enabling operators to deliver 100 Mbit/s (or more) rural broadband without recourse to subsidies. Furthermore, in sub-urban areas the same spectrum could serve both mobile broadband and FWA.

In developed countries, which in principle have a good urban and suburban broadband infrastructure, there is a lack of broadband in many rural areas. FWA using 6 GHz spectrum in addition to other mid-bands spectrum would make it possible to overcome the urban-rural digital divide in a time-frame consistent with national broadband development plans. Using the 6 GHz for 5G FWA would materially reduce or potentially even eliminate the need for rural broadband subsidies. Importantly, the 6 GHz band would provide sufficient bandwidth to ensure that FWA will also be able to address the needs for fixed connectivity as a long-term solution for rural areas.

61. The GSMA stated, “Our members from all three ITU Regions were surveyed on this band and 90% of MNOs’ responses placed the band 6425-7125 MHz as a high priority for IMT, whether in a new IMT identification at WRC-23 or making use of the existing global mobile allocation.”<sup>27</sup> Other consultancies<sup>28</sup> and mobile network operators make similar points.
62. In Rogers’ view, Canadian facilities-based network operators would use access to licensed 6 GHz mobile spectrum for at least three use cases.
- i. Provide additional capacity on congested macro cells and small cells, beginning in city centres and expanding outwards as data demand grows, off-loading traffic from 3500 / 3800 MHz for those nearer the center of the cell.

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<sup>27</sup> <https://www.gsma.com/spectrum/balanced-approach-to-6-ghz/>

<sup>28</sup> Eg <https://www.analysismason.com/consulting-redirect/reports/6ghz-opportunity-imt-white-paper/>

- ii. Provide deployments and managed services for verticals where 3500 / 3800 MHz provides insufficient capacity.
- iii. Deploy FWA solutions, especially in areas with poor (wireline) broadband availability.

63. We recognize that the Department has initially proposed opening 1200 MHz to licence-exempt and Wi-Fi vendors, in particular, will be pushing to immediately make the entire 6 GHz band available for licence-exempt usage. As discussed earlier, however, there is insufficient evidence at present to be able to definitively draw conclusions. We note that regulators in some countries have already moved to exempt this band, notably the FCC, while others, like the UK, are taking Rogers' wait and see approach. Still others are advocating for immediate licensed mobile use, for example Slovenia's AKOS on behalf of EU countries.<sup>29</sup>

64. Rogers believes that the ideal usage of 6425-7125 MHz will ultimately see that some, if not all, of the upper band should be licensed by auction. However, we recognize that there may currently be insufficient data to conclusively demonstrate this is the optimal decision, and it may be outside the scope of the 6 GHz Consultation as proposed by the Department. We believe that a comprehensive and robust debate is needed on this matter and this is exactly what we expect to happen at WRC-23, where much new data can be anticipated as both sides set out their case. As such, we continue to recommend that ISED defer any decision on 6425-7125 MHz until after WRC-23, and then consult, based on the evidence presented there and Canadian usage of licence-exempt in the lower 6 GHz band.

65. While it is normally good spectrum management practice to enable access to bands as soon as possible, in this case a delay is a better decision for a number of reasons.

- a. Wi-Fi is highly unlikely to need the band before 2025, as it will have been granted access to 500 MHz of spectrum in the lower band, more than enough to accommodate anticipated growth for many years (see Appendix A).
- b. As 5G use cases are still being defined, cellular is unlikely to need the band before 2025, as the new 3500 / 3800 MHz spectrum will hopefully provide sufficient capacity to accommodate anticipated growth until then, depending on the final assignment and competition rules. (see Appendix A)

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<sup>29</sup> AKOS, Latin American Spectrum Management Conference 2020 (10 – 13 November), "Finding the right balance for the future shape of the 6GHz band" <https://www.youtube.com/watch?v=VkQYUy7ppv4&list=PL-w3m3Fi4ZVv8IMVq4vul3raMTtRnKSJi&index=12>

- c. A decision to allow licence-exempt access in the upper band (on a secondary basis and while protecting incumbents) is effectively not reversible, nor can the market correct a poor decision through trading. Hence, unlike a decision to license a band, it is critical to get the release correct and thus worth taking the time to make the optimal decision in those cases where more time is likely to lead to more insight.
- d. In the meantime, the entire band would remain in use for new and existing fixed links, providing essential connectivity to mobile base stations not served by fibre, especially in rural areas, and supporting rural Canadians. Once proven, an AFC system can be set up for 5925-6425 MHz and provide additional licence-exempt services that will still protect licensed users.

66. Rogers is confident that such an approach can be made to work alongside the alternative path taken by the U.S., whether low-power equipment or, eventually, standard-power equipment. This requires that all equipment certified and entering Canada operate in conformance with ISED's regulations.

- **Low-power equipment.** Low-power Wi-Fi equipment should be required to have country-determination, as has been proposed for operation in Europe. The equipment's software will then ensure that it only operates in those frequencies available in that country, i.e. 5925-6425 MHz in this case. After 2023, should it be needed, this software can be updated over-the-air by the equipment manufacturer enabling access to the entire band.
- **Standard-power equipment.** High power Wi-Fi and other licence-exempt equipment will need to request permission from the AFC. This will only provide access to channels in the lower half of the 6 GHz that are available and prevent operation in the upper half. Should a decision be made after 2023 to add licence-exempt to the upper half, the database will then also provide access to those channels without requiring any equipment change.

67. There could also, in principle, be border issues. Prior to a decision on the upper band in 2023, the only issues would be U.S. equipment causing interference across the border to Canadian incumbents such as fixed link providers. Given that the U.S. is using a database approach for their high-power operations, should this problem occur then the U.S. database could have an appropriate border exclusion zone set. After 2023, cross-border interference issues would depend on the choice made in Canada for the upper band. If it were licensed for 5G, then appropriate coordination and exclusion zones on both side of the border might be needed. If it were licence-exempted, then no further coordination would be required.

68. Consequently, there is no imperative for ISED to fully align with the U.S. on the use of this band, although discussion between ISED and the FCC and potential cooperation between database providers might be beneficial. There is also little downside in having different database rules to ensure protection of Canadian licensees. Rules are implemented in software and can quickly be modified, for example, to the upper band limits. A provider of an AFC system in the U.S. could deploy the same solution in Canada with only very minor changes to a few lines of code, subject to Canadian-specific requirements discussed below.
69. Whatever decision is made, either now or after WRC-23 as recommended, it remains critical that incumbent use is protected. Should the upper 6 GHz band be licensed, then it should be in a manner that requires protection of incumbents.

### **Alternatives to deferring a decision**

70. The upper band will be most valuable to mobile network operators in more densely populated areas where it can be used more easily to provide additional capacity. Such areas likely represent less than 1% of the landmass of Canada, though the majority of the population. Hence, the band could be auctioned for these dense areas (e.g., Metro and Urban Tier 5 service areas) and lightly licensed outside of these areas (e.g., Rural and Remote Tier 5 service areas) where it will not cause interference with incumbents, similar to the HPOD regime in 5150-5250 MHz.
71. Other novel approaches to light licensing could allow, for example, a limited number of local licences awarded on a first-come first-served basis such that licence holders have a guarantee of a minimum bandwidth available to increase investment certainty. For example, each of the first two applicants in an area could be awarded 300 MHz, then when the third applicant arrives, they are awarded 200 MHz with the allocations for the first two also reduced to this level. For the fourth and fifth applicants they are awarded 140 MHz and existing applicants have their allocations reduced to 140 MHz. Applicants would need to demonstrate that they were completely separate entities and not sharing networks locally or otherwise pooling resources. Beyond this no further allocations are allowed unless an existing user no longer needs, or is using, their allocation.
72. The advantage of this approach is that it leaves 99%+ of country (geographically) able to use the upper part of the band for Wi-Fi. Light licensing in the areas not auctioned would increase flexibility and may improve Wi-Fi performance through frequency planning and prevention of excessively high deployment densities that result in interference. It would also allow for both flexible use and Wi-Fi QoS, providing choice and the deployment of innovative services.

73. In summary, we prefer that a decision on 6425-7125 MHz be deferred until after WRC-23, but if this is not accepted, then we propose a flexible approach to award that can enable a mix of licensed and licence-exempt models and can evolve over time. There is no downside to deferring a decision, as no value is lost, and the delay will enable better-informed and evidence-based decision making that could create significantly more value than any immediate decision. In contrast, a decision to immediately introduce licence-exempt in the upper band is practically irreversible, making it critical that the Department is certain of the optimal approach before proceeding.

74. The remainder of Rogers' comments respond to the specific issues raised in the Consultation.

Q1: ISED is seeking comments on the timelines for the availability of:

- a. low-power equipment ecosystems, both Wi-Fi 6E and 5G NR-U
- b. standard-power equipment ecosystems, both Wi-Fi 6E and 5G NR-U, under the control of an AFC
- c. AFC

75. The ecosystems for low-power equipment are materially further along in development than standard-power equipment ecosystems that will be under the control of an AFC, as well as AFCs themselves. Initial first generation low-power devices are starting to become available now in the U.S. and in Europe, subject to international and various domestic standards finalization and certification processes. However, as AFC standards are further behind in development, the best-case scenario is that AFC-controlled devices could be expected at the earliest in late 2021 or possibly 2022. A much more realistic timeline suggests that AFC-controlled standard-power devices are unlikely until sometime in 2023, certainly in significant numbers. We also highlight that similar database-controlled device ecosystems, including Television White Space (TVWS) devices, have, to date, tended to not meet standards development timeline targets nor experience much market uptake in any jurisdiction.

76. While Canada does normally align with U.S. ecosystems due to ease of border coordination, other large, international ecosystems can sometimes be superior for Canadian spectrum policy. Of note, EU licence-exempt ecosystems are required to be able to determine which country they are in, in order to obey country-specific

legislation. While consumer grade low-power equipment can be jailbroken by end-users to try and take advantage of potential higher power settings, standard-power devices and operation must be diligently monitored to ensure that critical licensed services do not receive any harmful interference that could negatively impact Canadians, especially rural Canadians.

### *Low-power ecosystems*

77. The equipment standards for licence-exempt operation of familiar Wi-Fi products are based on standards developed by the Institute of Electrical and Electronics Engineers (IEEE). The latest version, 802.11ax, has been updated to include support for 6 GHz operation and is in its final ballot phase.<sup>30</sup> The Wi-Fi Alliance offers equipment certification testing for Wi-Fi 6E.<sup>31</sup> Low-power indoor licence-exempt 6 GHz Wi-Fi 6E devices compliant with the April 2020 FCC R&O are expected to become commercially available in early 2021. Of note, some devices that are ultimately certified by ISED will not be Wi-Fi Alliance (WFA) Certified in Canada.
78. In discussions with vendors, the first Wi-Fi 6E devices are likely to be low-power residential gateways that can be used to deliver broadband Internet over coaxial cable, Passive Optical Network (PON), or Fixed Wireless Access (FWA) networks. The second device class will likely be a Wi-Fi mesh pod, used to improve or extend Wi-Fi coverage. Wi-Fi Access Point (AP) chipset vendors already have Wi-Fi 6E parts in mass production or expect to start in early 2021. Original Equipment Manufacturers (OEMs) should already have samples and reference designs by this point and Wi-Fi 6E is already in a number of vendors' near-term product roadmaps. Rogers expects to deploy low-power customer premise equipment (CPE) with Wi-Fi 6E support as they become commercially available.
79. Rogers fully supports the Department taking steps to make 5925-6425 MHz immediately available for low-power licence-exempt usage. Canadians will be able to immediately take advantage of 500 MHz of new low-power licence-exempt operation. As highlighted above, providing an initial 500 MHz for licence-exempt spectrum fully accommodates three new 160 MHz Wi-Fi 6E channels, which will allow more than sufficient flexibility for devices to coordinate. However, any decision on 6425-7125 MHz should be deferred until after WRC-23.
80. Similar to development work done on Wi-Fi 6E standards, there has been extensive work done within the Third Generation Partnership Project (3GPP);

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<sup>30</sup> The IEEE Standard is in the final stage of standards development known as the 'SA ballot phase' and should complete in February 2021. See generally [https://www.ieee802.org/11/Reports/tgax\\_update.htm](https://www.ieee802.org/11/Reports/tgax_update.htm)

<sup>31</sup> Marketing materials for Wi-Fi 6E can be found at <https://www.wi-fi.org/discover-wi-fi/wi-fi-certified-6>.

however, the 5G NR-U ecosystem for low-power operation specified by 3GPP is expected to take slightly longer to develop. Equipment for low-power (and standard-power) 5G NR-U ecosystems are expected to be developed, with 5G NR-U core requirements for both user equipment (UE) and base stations (BS) having been formally finalized in 3GPP Rel-16, though work continues on issues related to wideband operation and capabilities. 3GPP has already standardized band n96, covering 5925-7125 MHz for the U.S. market.

81. In early 2021, 3GPP will discuss whether to create a new band for 5G NR-U operation in 5925-6425 MHz to support unlicensed operation in this spectrum range for European markets<sup>32</sup> or to update band n96 with appropriate network signaling. This work should be completed in 3GPP Rel-17 timeframe, subject to how the COVID-19 pandemic and associated vaccination programs impact on ability to complete the work. With the rapid work on development, should 3GPP complete the specification work on schedule, it is expected that 5G NR-U equipment will be available by late 2021 or 2022. Its deployment and commissioning may also depend on evidence of associated support in UEs.
82. As such, it is expected that 5G NR-U equipment that can take advantage of low-power licence-exempt use in 5925-6425 MHz will be available along a similar timeline as Wi-Fi 6E equipment, though slightly lagging. The rapid availability of the equipment in both standards ecosystems will allow the market to vigorously compete and provide the Department with greater understanding of how global ecosystems are developing and insight into potential best usage of the 6425-7125 MHz for Canadians.
83. Rogers highlights that a technology neutral licence-exempt RLAN designation for 6 GHz spectrum ensures other types of devices, besides Wi-Fi 6E and 5G NR-U, may also operate on a licence-exempt basis in this band, provided they comply with the applicable rules. Thus, Wi-Fi 6E and 5G NR-U equipment represent just two types of RLAN devices but must not be taken as exclusive users of the proposed licence-exempt 6 GHz spectrum allocation.

#### *Standard-power ecosystems*

84. Product roadmaps for standard-power devices under AFC control are much less certain at this time. As stated above, standard-power equipment will become available some time after the AFC requirements are finalized by the FCC, perhaps in late 2021 or early 2022. In speaking with some Wi-Fi vendors, they indicate that due to the ongoing but currently incomplete work on standards, interfaces,

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<sup>32</sup> 3GPP work item ([RP-202116](#)) placeholder has been approved in the 3GPP TSG RAN Meeting #89e for European lower-6 GHz (5925-6425 MHz) unlicensed operation.



protocols, industry specifications, and eventual certification of AFC systems that it is likely another two years before there is a commercial AFC system in operation. Without the AFC system to coordinate the standard-power devices to ensure protection of licensed services, the availability of standard-power devices for anywhere in the 6 GHz band is, strictly speaking, a moot point. Standard-power 5G NR-U equipment may become commercially available by mid 2022.

85. However, device manufacturers envision that many low-power CPEs should be upgradeable via software, with some chipsets already being designed to be able to transmit at the higher power levels. It is likely that dual use devices, capable of operating in either low-power or standard-power under the control of an AFC system, would likely be commercially available prior to the development of standard-power only devices. In Rogers' view, devices that would only be able to operate under standard-power are only likely to become commercially available once AFC systems have been certified and are in commercial operation. We would also note that dual power systems already in the market would need to be certified for standard-power and AFC operation, in addition to their existing low-power certifications. This, however, may be able to be completed at the same time, assuming the Department issues regulations for both classes of devices at the same time.
86. The very fact Wi-Fi 6E devices will have such hardware flexibility built-in supports the Department taking a measured approach to the introduction of standard-power operations in any part of the 6 GHz band. Should AFC systems eventually be proven to be effective at safeguarding critical licensed operations within urban and rural areas, devices that may benefit from higher power should be easily upgradeable via a firmware update without the need to replace the CPE.

#### *AFC systems*

87. Full AFC operation will take time to design, deploy, and stabilize after the FCC Multi-Stakeholder Industry Working Group<sup>33</sup> completes its work. WinnForum<sup>34</sup> and WFA<sup>35</sup> are also working on appropriate specifications to support the development and deployment of an AFC system. Many different parties must all implement pieces of a working AFC system, coordinate its testing, update their respective piece as required, and ensure a complete database of incumbent FS links with accurate location information has been established. Nothing similar has been successfully deployed in either the U.S. or Canada so far, hence the expectation it

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<sup>33</sup> *6 GHz Band Group Approves Leaders* blog post by National Public Safety Telecommunications Council  
<https://blog.npstc.org/2020/10/13/6-ghz-band-group-approves-leaders/>

<sup>34</sup> <https://www.wirelessinnovation.org/6-ghz-committee>

<sup>35</sup> <https://www.wi-fi.org/who-we-are/current-work-areas>

will take some time to implement a reliable AFC system for licence-exempt 6 GHz operation.

88. Rogers observes that the U.S. administration has changed since the FCC released its April 2020 FCC-20-51 Report and Order and the 6 GHz Docket ET 18-295 remains open.<sup>36</sup> As such, changes in the specific equipment rules made by the new FCC may possibly impact the commercial rollout schedule and AFC implementation timelines. Again, with so much uncertainty around a novel spectrum coordination regime, the AFC system should be proven in real-world usage within a peer country prior to being introduced in Canada.

89. While the Consultation indicates that South Korea is also looking at introducing some form of database-driven spectrum sharing, similar to the FCC's AFC system in the entire 6 GHz band by 2022,<sup>37</sup> this would likely be a poor case study for Canada. There are significant geographic differences (size and density) between Canada and South Korea, and it is not clear if the outdoor licence-exempt usage will be similar to the Department's proposed standard-power levels. However, we still encourage the Department to monitor for any learnings that could enhance potential deployment of AFC systems in Canada and ensure protection of licensed 6 GHz operations.

Q2: ISED is seeking comments on its proposals to allow licence-exempt RLAN use in the 5925-7125 MHz band.

90. The best policy option for the Department is to take a measured and phased approach to the 6 GHz band. The Department should initially introduce low-power licence-exempt RLAN use in 5925-6425 MHz and monitor international developments in order to maximize the benefits to Canadians of 6425-7125 MHz. This balanced approach has the benefit of immediately making available 500 MHz of new licence-exempt spectrum to facilitate the uninterrupted growth of Wi-Fi and 5G NR-U (and other technologies), while ensuring a strong degree of protection for licensed incumbent users. With 500 MHz of 6 GHz spectrum, Wi-Fi 6E devices get immediate access to three complete high-capacity 160 MHz channels to support much higher data transfer speeds. If AFC technology is ultimately proven in real-

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<sup>36</sup> FCC Docket 18-295 *Unlicensed Use of the 6 GHz Band*  
[https://www.fcc.gov/ecfs/search/filings?limit=25&offset=275&proceedings\\_name=18-295&sort=date\\_disseminated,DESC](https://www.fcc.gov/ecfs/search/filings?limit=25&offset=275&proceedings_name=18-295&sort=date_disseminated,DESC)

<sup>37</sup> ISED, *Consultation*, para 20.

world deployments, it should be introduced in the 5925-6425 MHz sub-band. Decisions on potential new services to introduce in the 6425-7125 MHz sub-band should be deferred until after WRC-23. Such an approach will allow the Department to maximize the efficiency of spectrum management and ensure that Canadians get the full economic and social value of the spectrum depending on global technological and regulatory developments.

91. Furthermore, taking a measured and phased approach to the 6 GHz band does not prevent the Department from potentially introducing licence-exempt operation in additional spectrum in the band, nor does it rule out the innovative, new spectrum coordination approaches. However, immediately opening the entire 1200 MHz for licence-exempt services, with a large amount of spectrum being authorized for standard-power using an unproven technology, poses significant risks to incumbent services. A premature allocation of additional spectrum to licence-exempt in 6425-7125 MHz use would also be extremely difficult to undo later, severely constraining the ability for the Department to decide that other services may better utilize the upper portion of the 6 GHz band based on the evidence.
92. It should also be highlighted that licensed FS gear in the 6 GHz band is generally custom built to very narrow specifications. As such, the deployed infrastructure is very frequency unagile. There is no scope for retuning equipment that is used in the lower part of the band into the upper part of the band (i.e., retuning 100s of MHz), nor shifting frequencies significantly even within either the lower or upper parts of the bands (i.e., retuning 10s of MHz). Should licensed FS and licence-exempt services ultimately not be able to coexist and unacceptable interference negatively impact services – especially to rural Canadians – then a phased approach should provide additional protection to licensed FS services in at least the upper 6 GHz sub-band.
93. Finally, we recommend that a mechanism be included to remotely manage the operating frequency range of licence-exempt 6 GHz devices. This could take the form of a downloadable profile table of allowed frequencies, typically used to configure global products to suit specific geographical regional constraints in existing Wi-Fi equipment. Wi-Fi 6E devices would be shipped to Canada configured for operation in the 5925-6425 MHz range. Owners of these licence-exempt 6 GHz devices would then have the ability to later connect with the manufacturer for updating the policy table to expanded licence-exempt band access, should the Department ultimately elect not to allow licensed mobile services in the entire 6425-7125 MHz range and decide a larger allocation of licence-exempt spectrum is appropriate.

Q3: ISED is seeking comments on the proposed footnote Cxx and the changes to the CTFA as shown in table 2.

94. Rogers generally supports the proposed footnote Cxx and the changes to the CTFA as shown in table 2; however, changes to both the CTFA and footnote should be limited to the 5925-6425 MHz range. For certainty, the footnote should be:

ADD Cxx: Licence-exempt RLAN applications in the **5925-6425 MHz** band must operate in accordance with the established spectrum policy and technical framework; and must not cause harmful interference to, or claim protection from, licensed systems operating in the band. [Emphasis added.]

95. As noted above, 500 MHz of 6 GHz spectrum will still provide Wi-Fi 6E devices to three complete high-capacity 160 MHz channels to support much higher data transfer speeds. A premature allocation of additional spectrum to licence-exempt use will be extremely difficult to undo later should other licensed uses be demonstrated to offer Canadians greater benefits. In addition, refraining from allocating the upper 6 GHz band to licence-exempt use ensures critical FS links in the upper band can remain completely free of any potential harmful interference. This is particularly true in rural parts of Canada, where microwave links form the backbone for telecommunication networks to many parts of the country.

96. Allocating more than 500 MHz to licence-exempt use at this time has not been justified based on the evidence in the Consultation. The Department should delay making any changes impacting 6425-7125 MHz until the completion of WRC-23. Once there is greater clarity on global allocation of the entire range or parts of the sub-band, the Department should consult on the best use of the spectrum. Such a decision does not preclude the future introduction of licence-exempt RLAN use in 6425-7125 MHz (or parts of) but will provide greater flexibility to either ensure greater protection for incumbent licensed usage or to introduce new licensed services in parts or all of the remaining 6 GHz.

Q4: ISED is seeking comments on the proposed rules for standard-power RLANs:

- a. indoor and outdoor operation would be permitted
- b. RLAN access points would only be permitted to operate under the control of an AFC system in the 5925-6875 MHz frequency range
- c. maximum permitted e.i.r.p. would be 36 dBm
- d. maximum permitted power spectral density would be limited to 23 dBm/MHz
- e. use of a vertical elevation mask, with a maximum e.i.r.p. of 125 mW at elevation angles above 30 degrees over the horizon, would be required

97. As stated above, the best rules for the Canadian 6 GHz band would result in a phased introduction of licence-exempt services in the 5925-6425 MHz range until the completion of WRC-23. After WRC-23, when there is greater clarity around global ecosystems and demand for licensed and licence-exempt services, the 6425-7125 MHz sub-band can be addressed.

98. Further, we strongly recommend that standard-power RLANs only be permitted in Canada after at least one (1) year of successful operation in another peer country and a fully deployed system in Canada. AFC technology is unproven in real-world scenarios and would have significant impact on urban licensed incumbent services and potentially catastrophic impact on rural licensed incumbent microwave backhaul. Regulatory certainty for all 6 GHz licence holders and potential AFC operators is also strongly recommended, and the Department could still move forward with establishing all future AFC rules but publicly state they will not authorize AFC system operators until a future date.

99. In regard to the proposed future rules for potential standard-power RLAN devices, Rogers supports that indoor and outdoor operation would be permitted, consistent with FCC rules. We also support that RLAN access points would only be permitted to operate at standard-power under the control of an AFC system in the 5925-6425 MHz frequency range, in keeping with our proposed phased approach to changing 6 GHz usage in Canada. We strongly object to any changes being made to the 6425-6875 MHz portion of the 5925-6875 MHz frequency range until the Department has considered the merits of aligning with international activities, including the decisions to be made at WRC-23 regarding AI 1.2.

100. Rogers agrees with Department's proposed maximum permitted e.i.r.p. of 36 dBm, consistent with FCC rules. Client devices should be limited to 30 dBm e.i.r.p.

101. We also support the proposed maximum permitted power spectral density of 23 dBm/MHz, again consistent with FCC rules. Client devices should be limited to a power spectral density of 17 dBm/MHz.
102. Rogers supports standard-power RLANs be required to use a vertical elevation mask with a maximum e.i.r.p. of 125 mW for elevation angles above 30 degrees over the horizon. Most Canadians live near the U.S. border, so a common 30 degree elevation mask, as proscribed by the FCC for standard-power APs, ensures consistent equipment specifications apply in Canada and the U.S. In addition, interference models for satellite uplinks depend on aggregating millions of individual emitters to create sufficient power for concern. The sparsely populated parts at the extreme east, west, and north of Canada hardly constitute a significant aggregation factor. Rather than mandating a Canadian-specific emission mask for licence-exempt equipment to protect satellite station receivers in parts of Canada where satellite uplink earth stations operate with relatively low elevation angles, a better approach would be to apply specific conditions via the AFC control mechanism in extreme east and west and Far North Canadian locations to protect satellite uplinks, if deemed warranted. This would alleviate any need to have licence-exempt 6 GHz product hardware provisions for Canada that differ from those in the U.S. Canadian-specific products should generally be avoided to the maximum extent possible, so Canadian consumers can benefit from the cost savings associated with economies-of-scale.
103. If the Department ultimately decides not to adopt the phased approach proposed by Rogers, which we strongly recommend against, full alignment with the FCC rules for licence-exempt 6 GHz standard-power equipment is recommended.

Q5: ISED is seeking comments on allowing access to the additional 100 MHz of spectrum in the 6425-6525 MHz sub-band for standard-power operation.

104. As stated above, Rogers' preference and strong recommendation is to not make any changes to 6425-7125 MHz, including the 6425-6525 MHz band, until ISED has considered the merits of aligning with the decisions made at WRC-23 regarding AI 1.2.
105. Although 6425-6525 MHz is not used for auxiliary broadcast in Canada, Rogers Media has several terrestrial microwave systems in the 6590-6770 MHz band for Studio-to-Transmitter Links (STL). Given the location of these systems, often tower or rooftop mounted, frequency separation, and highly directional STL antennas,

RLAN use of 6425-6525 MHz should not significantly affect Rogers Media's STL links in the 6 GHz band. However, due to the critical role that these links provide in keeping Canadians informed of newsworthy events, deferring until after WRC-23 will allow for additional monitoring of coexistence in the U.S. and is the best policy option for Canada.

Q6: ISED is seeking comments on the equipment availability of standard-power RLANs in the 6425-6525 MHz band and the impact on the development of AFC systems for Canada due to a potential lack of international harmonization for that sub-band.

106. Again, Rogers' recommendation is to not make any changes to 6425-7125 MHz, including the 6425-6525 MHz band until the Department has considered the merits of aligning with the decisions made at WRC-23 regarding AI 1.2. Adopting this strategy defers the need to evaluate the potential ecosystem availability for this band, which is not aligned with the U.S. or Europe. Canadian-specific products should generally be avoided to the maximum extent possible, so Canadian consumers can benefit from the cost savings associated with economies-of-scale of international ecosystems.

107. If the Department decides to depart from the U.S. and allow standard-power RLANs in the 6425-6525 MHz band, the equipment availability may be limited to devices that are capable of tuning to U-NII-6. Since there will not be a large European or Asian market for this equipment either, devices may likely cost more and be developed at a slower pace to enable recovery of non-recurring expenditure (NRE). There may also be incremental testing and certification costs for equipment vendors due to the unique Canadian requirements. Again, deferring a decision on 6425-7125 MHz may help to determine if there will be a robust international ecosystem that Canadian operators and end-users can access.

Q7: ISED is seeking comments on the proposed rules for low-power indoor-only RLANs:

- a. operation would be permitted indoor only across the 5925-7125 MHz band
- b. the use of a contention-based protocol (e.g. listen-before-talk) would be required
- c. maximum permitted e.i.r.p. would be 30 dBm
- d. maximum permitted power spectral density would be limited to 5 dBm/MHz

108. As discussed above, we support the proposed rules for low-power indoor-only RLANs in the 5925-6425 MHz frequency range at this time. The Department should not permit their use in 6425-7125 MHz until after ISED has had an opportunity to evaluate the merits for Canada from WRC-23 outcomes. We encourage ISED to diligently examine the evidence of what actual need is there to add a full 1200 MHz of spectrum to licence-exempt at this time, prior to making a one-way decision and forgoing the ability to allocate this versatile spectrum to more beneficial applications for Canada. The arguments being put forward to immediately enable the full 1200 MHz do not stand up to scrutiny.

109. Even the surge in Wi-Fi traffic resulting from everyone working and learning from home due to COVID-19 has appeared to have been supported without serious challenges using existing 5 GHz spectrum. In fact, Ofcom, who has only authorized 5925-6425 MHz for low-power licence-exempt (i.e., no upper band, no standard-power) states, “home broadband speeds have generally held up well during the Covid-19 lockdown despite higher demand due to increased working and learning from home” and is proposing changes to help meet future demand<sup>38</sup> Adding 500 MHz of spectrum will be more than sufficient to meet *future* demand of mid-band licence-exempt for years to come.

110. One key objective for Wi-Fi 6E is higher data rates enabled by larger bandwidth channels. However, an allocation of 5925-6425 MHz for licence-exempt operation accomplishes this objective in multiple ways. There are three full 160 MHz channels from which an RLAN can choose, enabling a very high likelihood of success. Alternatively, various contiguous and non-contiguous combinations of 2x80 MHz channels also support the 160 MHz objective within this band. We have

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<sup>38</sup> Ofcom, *Wifi set for boost after more spectrum freed up for wireless services*, 24 July 2020; <https://www.ofcom.org.uk/about-ofcom/latest/features-and-news/wifi-boost-after-more-spectrum-freed-for-wireless-services>



seen no evidence to date that suggests an additional 500 MHz of licence-exempt operation is not more than sufficient for continued growth of Wi-Fi.

111. Within the 5925-6425 MHz range, we support the proposed rules for low-power indoor-only RLANs using a contention-based protocol (e.g. listen-before-talk), consistent with FCC rules. We also support a maximum permitted e.i.r.p. of 33 dBm for low-power indoor-only RLAN Access Points, and maximum permitted e.i.r.p. of 27 dBm for low-power client devices, consistent with the proposals in the FCC's April 2020 Report and Order. These limits are consistent with the proposed 3 dB increase in power spectral density (PSD) for low-power indoor-only RLAN devices, discussed below.
112. Rogers also supports a maximum permitted PSD of 8 dBm/MHz for low-power indoor-only RLAN Access Points and a maximum permitted PSD of 2 dBm/MHz for low-power clients, consistent with the proposals issued by the FCC as part of their April 2020 Report and Order. In our view, a very slight increase of PSD for low-power indoor-only devices should not impact protection of FS links but would still provide a more than worthwhile benefit to licence-exempt operations and Canadian end-users.
113. A submission by the NCTA<sup>39</sup> in response to the FCC FNPRM issued with their FCC-20-51 Report and Order enumerates the significant reduction in spectral efficiency and coverage range imposed by the 5dBm/MHz PSD restriction compared with current licence-exempt 5 GHz equipment and the benefits of increasing maximum PSD by 3 dB to 8 dBm/MHz. This modest 3 dB PSD increase would increase typical home coverage by 45-75% according to the NCTA, providing a superior customer experience.
114. Wi-Fi throughput depends on, among other things, the modulation and coding scheme (MCS) that the device is able to use. Higher MCSs provide higher spectral efficiency (bits/Hz) and greater throughput but can only be used when the desired Wi-Fi signal is strong compared to the background noise (i.e., where the signal-to-noise and interference ratio or SINR is high). Lower transmit power results in reduced Wi-Fi signal strength, reducing SINR and therefore the availability of the most efficient MCSs that deliver the highest throughput.
115. Limiting PSD to 5 dBm/MHz impairs the ability of Wi-Fi 6E networks to achieve the high data throughput rates, driving large channel bandwidths of 160 MHz and 320 MHz. In order to achieve a whole-home Wi-Fi experience, consumers, directly

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<sup>39</sup> National Cable and Telecommunications Association <https://ecfsapi.fcc.gov/file/1062913925028/062920%2018-295%2017-183%20NCTA%206%20GHz%20FNPRM%20Comments%206%2029%2020%20FINAL.pdf>

or through their broadband providers, would be required to purchase 6 GHz coverage extenders or additional access points, increasing both cost and network complexity. This could mean substantial additional cost and installation effort for Canadians, which the Department could effectively reduce by deciding to adopt an 8 dBm/MHz PSD limit for low-power indoor-only Access Points.

116. In addition, ISED should mandate the same equipment-related hardware requirements adopted by the FCC to ensure low-power APs remain indoors, specifically:

- a) Low-power access point devices may not be weather resistant;
- b) Low-power access point devices must have integrated antennas and prohibit the capability of connecting external antennas;
- c) Low-power access point devices cannot operate on battery power; and,
- d) Low-power access point devices must be marketed as “for indoor use only” and include a label attached stating that “ISED regulations restrict to indoor use only”.

117. If the Department decides to forgo the opportunity for enhanced 5G IMT or other innovative mobile services in the upper 6 GHz band (6425-7125 MHz) in Canada and instead immediately adopt licence-exempt usage across the entire band, then our proposed recommendation regarding the 8 dBm/MHz PSD constraints for low-power indoor-only RLANs is appropriate for the entire 6 GHz band.

118. Regarding the band 7025-7125 MHz, we observe this spectrum is under consideration for WRC-23 A1.2 as a potential Global allocation for IMT. Rogers therefore strongly recommends that the Department take a measured approach to consideration of opening this band (and 6425-7125 MHz more generally) to licence-exempt usage. An overly hasty decision in the upper 6 GHz band could have significant long-term implications, constraining the ability to align with potentially superior licensed services and ecosystems.

119. At a minimum, application of policies similar to *RSS-247 – Digital Transmission Systems (DTSSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices* to 7025-7125 MHz licence-exempt operation should specify contention-based channel access protocol operation. Licence-exempt devices would then refrain from using this spectrum if flexible use systems operate in this band, allowing the Department some limited ability to attempt to future-proof at least 100 MHz for licensed services. Indeed, the Department should apply similar policies to the entire 6425-7125 MHz sub-band.

120. Rogers notes the ongoing concerns expressed to the FCC by FS incumbents regarding potential harmful interference to microwave links from low-power indoor licence-exempt devices. As noted above, several entities including the Association of Public-Safety Communications Officials (APCO) International and the Edison Electric Institute (EEI), AT&T Services, the National Association of Broadcasters (NAB), the Utilities Technology Council (UTC), the National Rural Electric Cooperative Association (NRECA), the American Public Power Association (APPA), and CenturyLink, are all seeking to force the FCC to adopt stronger safeguards against interference to licensed services.<sup>40</sup>
121. We strongly encourage the Department to fully evaluate the field test results submitted by CTIA on December 8, 2020, showing material degradation in microwave fade margin from low-power indoor device emissions.<sup>41</sup> The potential impact to FS systems from low-probability licence-exempt emissions depends heavily on the degree to which they impact on fade margin, whether a fade is occurring, and the degree to which the FS system adapts to changes in the ratio of received signal strength to noise and interference. AT&T describe these aspects in their submission to the FCC mentioned above.
122. Further, it would greatly assist all operators of incumbent licensed FS links to evaluate the Consultation proposals for licence-exempt allocation of the 6 GHz spectrum if the Department could share their “detailed technical analysis on the co-existence of RLANs with existing users” mentioned in the Consultation document.<sup>42</sup> While it would be best to publicly release the analysis, the Department could make the report available under strict Non-Disclosure Agreements should ISED be concerned about any confidential information.
123. In light of these licensed incumbent concerns, Rogers wishes to reinforce the need for the Department to include rules for licence-exempt 6 GHz operation in Canada consistent with the CTFA footnote requiring that devices causing harmful interference must cease transmitting. Further, the Department should ensure that regional offices are appropriately resourced to quickly assist operators with any investigations into interference to licensed services.

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<sup>40</sup> Ramey, Danny. *RadioResource Mission Critical Communications*, “Groups Ask Court to Remand New 6 GHz Rules to FCC for More Interference Safeguards”, 6 January 2021;

<https://www.rrmediagroup.com/News/NewsDetails/NewsID/20359>.

<sup>41</sup> 201207 CTIA 6 GHz ex parte attachment 2;

<https://ecfsapi.fcc.gov/file/1207036691668/201207%20CTIA%206%20GHZ%20Ex%20Parte%20Attachment%202.pdf>.

<sup>42</sup> ISED, *Consultation*, para 49.

124. As the Department is well aware, identifying and clearing interference resulting from faulty end-user equipment, or equipment not certified for use in Canada, can involve significant resources to conduct: 1) remote analysis and preparation; 2) field interference search; 3) interference source confirmation including public contact; 4) ISED reporting; and, 5) follow-up and spectrum clearing. On average, a best-case scenario is a minimum of 16-20 person hours and can take 2-3 weeks if the member of the public is cooperative and we need to involve the Department. In cases where the interfering individual is non-cooperative (with Rogers, and potentially ISED), the total time can be significantly longer. This can create significant ongoing impact to licensed spectrum holders and network end-users, especially if dealing with repeat offenders or a large number of cases.
125. Rogers recommends device vendors be required to configure licence-exempt 6 GHz equipment developed and built for the U.S. market and capable of operating over the entire 5925-7125 MHz range to refrain from using spectrum above 6425 MHz when shipped. This profiling of a single product Stock Keeping Unit (SKU) to meet specific operating frequency requirements of each country is a capability of current Wi-Fi products, so is well understood and established. Equipment manufacturers can offer a policy or firmware update in their Wi-Fi 6E equipment to remotely configure the device to expand its operation above 6425 MHz later if ISED decides this is appropriate after WRC-23. Equipment recertification should not be necessary to accommodate expansion of licence-exempt 6 GHz spectrum after WRC-23 if tested with several profiles including the 5925-6425 MHz operating range at time of initial Canadian certification.
126. As such, Rogers again strongly encourages the Department to closely evaluate the need to add a full 1200 MHz of mid-band spectrum to licence-exempt use before “opening the flood gates” and forgoing the ability to allocate this versatile spectrum to potentially more beneficial alternative applications for Canada.

Q8: ISED is seeking comments on the proposed rules to allow very low-power RLAN devices:

a. operation would be permitted indoors and outdoors across the frequency range 5925-7125 MHz band

b. the use of a contention-based protocol (e.g. listen-before-talk) would be required

c. maximum permitted e.i.r.p. would be 14 dBm

d. maximum permitted power spectral density would be limited to -8 dBm/MHz

127. For certainty, Rogers supports the proposed rules for very low-power RLAN devices at this time in the 5925-6425 MHz frequency range only. There should be no licence-exempt operations of any type permitted in 6425-7125 MHz until after the Department has had an opportunity to evaluate the merits for Canada from WRC-23 outcomes and the developments of international ecosystems.

128. Within the 5925-6425 MHz range, Rogers supports the proposed rules for very low-power RLANs using a contention-based protocol (e.g. listen-before-talk), consistent with FCC rules. We also support the maximum permitted e.i.r.p. of 14 dBm and a maximum permitted power spectral density of -8 dBm/MHz for very low-power RLAN devices, also consistent with proposed FCC rules.

129. While the best policy option for Canada is to not allow any licence-exempt operation in the 6425-7125 MHz band until evaluating decisions made at WRC-23 regarding AI 1.2, if the Department ultimately elects to forgo the opportunity to consider enhanced 5G flexible use services in Canada in the upper 6 GHz, then the proposed rules for very low-power RLANs in the 5925-7125 MHz frequency range are appropriate.

130. Again, we highlight the ongoing concerns expressed to the FCC and legal actions by FS incumbents regarding potential harmful interference to microwave links from very low-power licence-exempt devices. ISED is again encouraged to fully evaluate the CTIA field test results mentioned above for Q7 showing measurable degradation in microwave fade margin from very low-power device emissions proposed by the FCC. The potential impact to FS systems from low-probability licence-exempt emissions depends heavily on the degree to which they impact on fade margin, whether a fade is occurring, and the degree to which the FS system adapts to changes in the ratio of received signal strength to noise and interference.

Q9: ISED is seeking comments on potential business models for AFC administrators to operate their AFC systems in Canada.

131. The operation of a reliable AFC system in Canada will require extraordinary discipline in maintaining an accurate database of FS links. The expectation is for daily updates as new FS links come into operation or are modified or decommissioned. The system must respond immediately to requests from licence-exempt RLAN APs and scale to potentially millions of devices. While AFC systems may provide beneficial coordination, it is also critical to again highlight that it is a novel spectrum coordination and interference technology and could have significant impact on rural connectivity, public safety communications, and utilities' infrastructure. AFC systems should theoretically be able to protect licensed services, but they have no practical real-world experience and risks to incumbents and end-users could be potentially devastating.
132. Given the ongoing work on AFC development for similar requirements in the U.S., it stands to reason a virtually identical system will be brought into operation in Canada – likely by the same U.S.-based companies (or Canadian subsidiaries). Cost-recovery should involve fees to access the AFC in order to authorize standard-power operation. Some device manufacturers could also decide to provide AFC-as-a-service as a value-add to their current networking business in order to increase market share or drive new revenues. However, it would not be appropriate for licensed incumbents to bear any additional costs for protecting their licensed spectrum from licence-exempt services and the Department should ensure this is clear in the Consultation decision.

Q10: ISED is seeking comments on its proposal to permit the approval of multiple, third party AFC systems, taking into account the potential for the development of a sustainable market for AFC systems in Canada.

133. Rogers supports the Department's proposal to permit the approval of multiple, third party AFC systems. Unleashing the power of the market can help ensure the competitive and innovative provision of databases, allowing for rapid evolution and optimization of overall spectrum efficiency. However, a single, accurate database should be used by all of them and each AFC system must fully meet all the requirements set by the Department in order to ensure the ongoing protection of licensed 6 GHz services.

Q11: ISED is seeking comments on potential exit strategies if the AFC administrator decides to cease operation in Canada.

134. Under the proposed introduction for standard-power RLAN devices in the 6 GHz band, it is clearly critical that there is at least one AFC administrator. Should an AFC system become operational in Canada and then cease to support standard-power AP requests for spectrum, all standard-power APs must immediately cease operating until they can establish a connection with an alternate AFC system. Rogers has no comment on the actual strategy to ensure that there is always at least one provider or potential exit strategies if an AFC administrator decides to cease operation in Canada but may provide further comments in the Reply Phase.

135. The Department should also provide clear guidance on what actions they will take to mitigate against any interference from standard-power RLAN devices that are operating outside the control of an AFC administrator. Grey market and “jail broken” devices are, perhaps, inevitable and will need to be addressed as standard interference issues, but the Department should have rapid and robust processes in place to deal with devices legally sold in Canada that are operating offside of any standard-power rules.

Q12: ISED is seeking comments on adopting an AFC system model that is harmonized to the maximum extent possible with the AFC system model being implemented in the U.S. and other international markets.

136. Rogers generally supports adopting an AFC system model that is harmonized with the AFC system model being implemented in the U.S. and other international markets and adopting as many aspects as possible to achieve consistent performance most efficiently. However, while alignment where possible should be followed, this should not be at the expense of tailoring solutions to optimally fit the Canadian marketplace. Nor should it prevent innovative ideas emerging in Canada and then perhaps being adopted in the U.S. and other international markets as well. Modifying rules, coordination calculations and similar variables within an existing database product is relatively straight-forward and hence the benefits of maximum harmonization are likely not great.

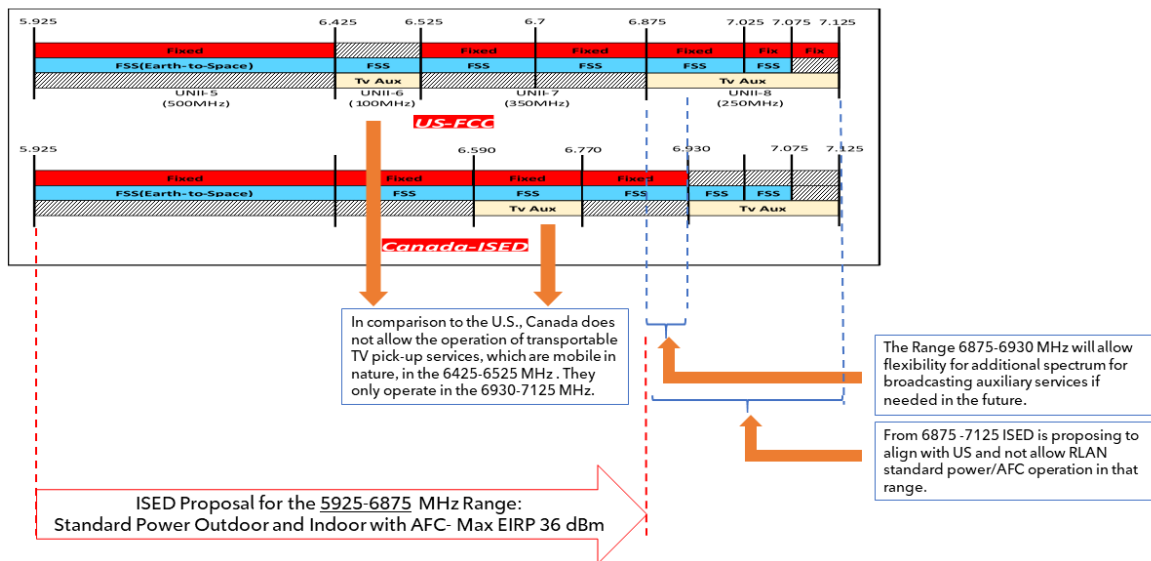
137. For certainty, any AFC system used in Canada must be a separate system from those deployed in the U.S. All Canadian AFC systems must physically reside in Canada and apply Canadian spectrum rules. It would include a database of all

Canadian FS incumbent links, as well as relevant U.S. links within coordination distance of the U.S. border.

138. The U.S. AFCs should similarly follow the same approach and include in their databases the Canadian links within coordination distance to the Canadian border. This should be part of an overall coordination agreement or memorandum of understanding between ISED and the FCC to manage the services at the borders.

139. An example of where coordination at the border would be required is TV auxiliary service using the spectrum 6425-6525MHz (UNII-6), which is different between U.S. and Canada. Unless precautionary measures are taken, Canadian RLAN using standard-power devices in the 6425-6525 MHz range at the border could potentially interfere with U.S. transportable TV pick-up services, which are mobile in nature. In such a scenario, one possible solution would be to program the AFCs to not allow UNII-6 band close to the border. Below is a diagram to further illustrate the issue.

### 6GHz Spectrum Alignment: Canada-ISED proposal Vs. US-FCC



AFC: Automated Frequency Coordination



Q13: ISED is seeking comments on the implementation considerations for the operation of an AFC system, specifically:

- a. information required from licensed users
- b. interference protection criteria for computation of exclusion zones
- c. information required from standard-power APs
- d. frequency of AFC update of licensee information
- e. security and privacy requirements

140. Rogers prefaces our comments on the implementation considerations for the operation of an AFC system by again highlighting the importance of licensed 6 GHz operations for microwave backhaul (in both urban and, especially rural), Canadian broadcasting, public safety, utilities, and satellite services. The onus must be on standard-power device manufacturers and AFC system operators to protect these vital licensed services. The Department must also be diligent in their role of ensuring licensed services are protected from an interfering signal (malicious or accidental) that could cause a link failure or system degradation. The frequency and antenna locations for a terrestrial microwave tend to be single points of failure, and although there may be redundant equipment, there may be significant network and end-user impacts. As such, the Department should not authorize standard-power operation under an AFC system until the technology has proven itself for at least one (1) year in a peer country.

141. The successful implementation of an AFC system in Canada will require accurate location and antenna height and operating frequency for each FS link in the 6 GHz band. The path orientation, i.e. Transmit vs Receive function for each site and frequency, must also be provided for each link to facilitate calculation of a suitable exclusion zone that maximizes access to spectrum by RLANs while minimizing potential interference.

142. Despite the efforts of the Department, of which we are appreciative, the current Spectrum Management System (SMS) database continues to have significant challenges. The data that is supposed to be available in the SMS database is often unreliable for coordination and interference management, with many operator-uploads not working correctly. In our experience, many small-scale operators in licensed and lightly licensed bands and operating non-standard legacy equipment – which can increase the coordination challenges – are not uploading data at all, even though it is a condition of licence. This very concern was echoed by the

Department in the recent 3800 MHz consultation regarding Wireless Broadband Services (WBS) licensees.<sup>43</sup>

143. All these challenges are further compounded by the ongoing instability of the SMS platform, especially when making requests for or uploading larger amounts of data. Going forward, these challenges with using the SMS database to coordinate between operators will only be increased through the exponential increase in potential licensees and spectrum licences through the creation of Tier 5 service areas, massively increasing the amount of data in the SMS database.
144. As such, incumbent FS operators should be enabled to submit their link details to a dedicated online portal established by the AFC system administrator for this specific function. Incumbent licensees should also have the ability (but not be mandated) to download their own information in order to audit and validate its accuracy. Information submitted by incumbents should include the ISED licence number to facilitate an audit of validity and reduce risk for abuse by unscrupulous actors. In our view, timely and accurate data is paramount in order to ensure ongoing protection of licensed incumbents.
145. We recommend that interference protection criteria for computation of exclusion zones include application of a threshold test of -6 dB I/N at the victim receiver.
146. The information required from standard-power APs requesting permission to transmit include their location and antenna height. The AP owner may need to supply a proxy for antenna height, such as which floor of a building they are on. Experience gained from deployment of AFC in the U.S. will inform how location and height for each requesting AP can be provided automatically, showing the value of delaying authorization of AFCs for at least one (1) year of real-world experience in a peer jurisdiction. Location information for the standard-power APs connecting with the AFC system should be retained by the AFC system in order to facilitate identification of standard-power devices found to cause interference to microwave links. ISED should either be able to access this information directly or be able to facilitate quick access on behalf of a licensed incumbent suffering interference.
147. In terms of the frequency of AFC updates of licensee information, the AFC system should have the ability to implement daily updates regarding incumbent FS link protection details to accommodate changes in FS links. Similarly, standard-

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<sup>43</sup> ISED, *Consultation on the Technical and Policy Framework for the 3650-4200 MHz Band and Changes to the Frequency Allocation of the 3500-3650 MHz Band*, para 105-105; <http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf11627.html>.

power APs must update their list of approved frequencies at least daily. This is consistent with the rules for AFC systems specified by the FCC.

148. Regarding the security and privacy requirements, highly secure information protection would be a fundamental property for the AFC system including the FS link data entry portal. Login credentials for each incumbent FS operator should only expose information for the links they themselves submitted or their licensed systems that has been inputted or modified by the AFC system or ISED. Some link data, of course, is highly sensitive. Public Safety and the Department of National Defence (DND) will want protection from interference to their links but may not wish to provide any link details for legitimate cyber and national security reasons. An AFC system should have the capability of protecting confidential incumbent FS links without any need to disclose these details. In addition, the AFC should store data about requests it receives, and the frequencies approved, along with a time stamp for each request, in order to facilitate investigation of any interference suffered by incumbents. This would be aligned with FCC proposals regarding the development of processes to address and resolve potential interference claims.<sup>44</sup>
149. While the above contemplates domestic coordination, there will also be a need to ensure protection of FS links along the border between the U.S. and Canada. Under an AFC system, this requires access to databases that include information about potential FS victim systems located in the other country. These link details must be accurate and secure from unauthorized access. It is unlikely that the U.S. Department of Defense and U.S. law enforcement would want to provide details anymore than would Public Safety Canada and DND, though U.S. regulations of law enforcement communications infrastructure may differ from Canada.
150. The proposed metadata is still being defined for AFC systems, but it is possible that there may be lawful access requirements introduced in either Canadian or U.S. regime, and its not clear if the *Clarifying Lawful Overseas Use of Data Act (CLOUD) Act* is sufficient to allow Canadian access should that be required. Metadata could include the location of the AP, Service Set Identifier (SSID), frequency assignment, and other parameters. The metadata may include information covered under privacy laws for links, and for AP requiring AFC control, which may also impact cross border coordination.
151. A law enforcement agency (LEA) can serve a domestic telecom service provider or any person a warrant for production of information but there could be issues related to serving a warrant to the AFC provider (a telecom licence to operate in U.S. and Canada is assumed), which may be issued to obtain this information in an

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<sup>44</sup> FCC, *NFNRPM 20-51A*, para 176.

investigation of associated targets. This could result in legal challenges, as there may not be a name associated to the warrant but a location. Further, LEAs may want access to the database itself, which could result in future retained data obligations, including related to metadata, which, again, may be different than U.S. requirements.

152. For cyber security reasons, neither Canada nor the U.S. would desire to have a single AFC system to have control over the sovereignty of the other in terms of controlling frequency plans used in the other country's AFC-controlled area. A hacker in the U.S. should not be able to disable or reconfigure an AP in Canada or augment protection profiles, and vice versa. This, of course, would also apply to general cyber security to prevent any domestic or international hacker from accessing the AFC systems.
153. Reliability of communication between APs and AFC Systems should also include defence against distributed denial-of-service (DDoS) attacks. This can include restricting how often an AP can request frequency updates. The protocol used by APs to request permissible frequencies should include encryption and resist robot inquiries to explore the details of the database. Further, the AFC database entries in the AP itself should be not be end-user accessible.
154. There may be different indemnity provisions for AFC administrators between operators in different countries. In the U.S., an operator is typically indemnified if they meet specific cyber security requirements and other requirements against lawsuits from loss of services and privacy breaches. Canada, however, does not have any of these "safe harbour" rules and there could be some resulting impacts in the result of border area interference.
155. Each country must be able to validate the accuracy of any licensed FS data in the AFC of the other country, since one country cannot dictate operation in the other. Having a secure portal on each country's database for FS licensees to input and validate the data for their links for both countries would address many of these concerns. Further, an outage or maintenance activity conducted in one country cannot be allowed to affect the other. Having separate AFC systems in each country would help address this concern.
156. In summary, any AFC system operating in Canada must itself be required to be physically located in Canada, operate according to Canadian spectrum regulations and subject to Canadian laws, including telecommunications, privacy, and cyber security. The Department should work closely with Public Safety Canada and all relevant law enforcement agencies to conduct appropriate screening of any AFC administrator application.

Q14: ISED is seeking comments on any additional considerations, limits or general concerns that should be taken into account in setting detailed standards and procedures for AFC operation.

157. Rogers wishes to reiterate the novelty of dynamically controlling wireless device transmission via an external coordination system that must not only perform database searches for potential victim FS links but then, in addition, calculate a conservative exclusion zone for each within a reasonable range in order to determine operating frequencies unlikely to cause any harmful interference to incumbent microwave links. This is clearly a complex exercise which must operate without failure or error – a significant development project that will take time to build, deploy, and test before licence-exempt devices depending on AFC can be allowed to operate in Canada. Further, as discussed above, there remains significant uncertainty surrounding final AFC rules and implementation in the U.S. due to the impact of the upcoming change of administration on the FCC and related legal actions being pursued by licensed incumbents.
158. Even as the AFC regime eventually comes into operation reliably, it will need to accommodate significant growth over time in the number of Access Points seeking permission to transmit.
159. We again repeat our call that AFC systems should not be authorized in any part of the 6 GHz band until they have a minimum of one (1) year proven real-world experience in a peer country. They should also continue to be limited to 5925-6425 MHz until after WRC-23 and the Department can determine the optimal use for 6425-7125 MHz based on licence-exempt and other services demand for mid-band spectrum and the various international equipment ecosystems.
160. We would also support the Department facilitating a multi-stakeholder working group to work out Canadian-specific AFC development and implementation issues, whether through the RABC or a stand-alone roundtable. Such a body may be an appropriate means to determine many of the details for an effective Canadian deployment, building on learnings of the U.S. process.

Q15: ISED is seeking comments on its proposal to require AFC systems to protect the following types of licensed stations from standard-power APs:

- a. fixed microwave stations
- b. fixed point-to-point television auxiliary stations
- c. radio astronomy stations

161. Rogers again highlights that any licensed use of the 6 GHz band must always be protected from harmful interference caused by licence-exempt devices. Therefore, if an AFC system is deemed appropriate for informing licence-exempt devices of suitable operating frequencies within the 6 GHz band, its use should accommodate all licensed users (i.e., potential victims) with appropriate interference prediction calculations. The list of potential victims includes fixed microwave stations, Canadian broadcasting services, U.S. fixed point-to-point television auxiliary stations near the border, and radio astronomy stations.

162. We agree with the Department's proposal to protect all licensed services, including fixed links. As demonstrated above, these fixed links provide significant value to cellular customers – particularly those outside of urban centres, and urban Canadians connecting with friends, families, and customers in rural or distant urban areas. However, with a measured approach with sufficient technical protection, licensed services should not prevent some licence-exempt usage in over 97% of the country. We suggest robust coordination parameters in line with those adopted by the FCC, including any protection enhancements resulting from ongoing and future efforts in the U.S. Further, we recommend that the Department maintain enough flexibility that protection can respond quickly to concerns and potentially evolve over time based on feedback from Canadian licensed operators as to whether interference has occurred. However, we also again reiterate our view that any expansion of licence-exempt, whether more spectrum, greater power, or other looser regulations, must always be undertaken with a prudent and measured approach, as reversing course on licence-exempt permissiveness would be extremely challenging.

163. The FCC has established a target interference threshold of -6 dB I/N. Many stakeholders participating in the FCC 6 GHz proceeding, including incumbent FS license holders and RLAN proponents, used this interference criteria in their modeling and generally agree it provides a reasonable limit for assessing the impact of interference from licence-exempt device operation. The importance of the Department including sufficient rules in the appropriate radio standards to ensure

enforceable prohibition on interference to incumbent licensed 6 GHz systems caused by licence-exempt devices cannot be overly stressed.

164. While AFC systems are hoped to provide effective protection to fixed point-to-point links and electronic news-gathering (ENG) point-to-point systems in outer city or rural areas, the novel technology remains a significant concern due to the critical nature of these services. Allowing licence-exempt service, including standard-power operations, across most or all of the 1200 MHz in the 6 GHz band in the near-term could jeopardize Canadians ability to stay informed. Rogers Media has concerns regarding potential interference to ENG urban links and wireless mics deployed at newsworthy events from 6 GHz AP unlicensed users in urban areas. In their view, AFC systems must be employed before unlicensed standard-power end-user equipment is deployed in Canada. A prudent and measured approach would be that AFC systems should not be authorized in any part of the 6 GHz band until they have a minimum of one (1) year proven real-world experience in a peer country and that they are limited to 5925-6425 MHz until after WRC-23
165. Rogers also notes the increased interest and deployment of drones, which are typically controlled using licence-exempt radio signals. These devices could easily fly into the bore sight of FS links and cause considerable interference or even a total outage. The protection criteria should assume a longer free-space propagation model to account for this possibility. However, we propose that drones be prohibited from using licence-exempt 6 GHz radios as a more complete safeguard against harmful interference. Drones should instead be restricted to licence-exempt bands that are not attempting in-band coexistence with licensed services.
166. The potential use of low-power licence-exempt 6 GHz radio for drone control represents a risk to incumbent links without an obvious solution. In fact, the FCC specifically excluded the installation of “unlicensed access points” in moving vehicles (under 10,000 ft) and explicitly prohibits “unlicensed devices in the 6 GHz band to be installed on unmanned aircraft systems.”<sup>45</sup> ISED should consider similar rules applicable to drones, which restrict or prohibit use of low-power APs managing drones via licence-exempt 6 GHz systems in Canada.

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<sup>45</sup> FCC Report and Order, para 126 “General prohibition on mobile operations.”.

Q16: ISED is seeking comments on the sample agreement related to the designation and operation of an AFC system in Canada.

167. Rogers is generally supportive of the sample agreement in Annex A related to the designation and operation of an AFC system in Canada. It largely aligns with the comments and recommendations that we have proposed above for AFC administrators. However, we believe that the following changes would be beneficial.
168. All incumbent licensed system operators (“ISO”, like Rogers) should have direct audit and investigation rights of an AFC vendor where such has access to ISO’s Personal Information or competitively sensitive information (“ISO Data”). If no direct audit rights are provided, then an acknowledgment that such audit rights are afforded to ISED will be also on behalf of ISO with ISED having the right to full disclosure of audit findings relevant to ISO.
169. ISOs should be able to access operations information (whether or not ISO Data), including that the appropriate licence grants are reflected in the AFC vendor operations. If no direct access rights are provided, then an explicit acknowledgment that such information will be passed along to ISO by ISED.
170. ISO should be able to piggy-back on ISED enforcement rights (e.g. court order) where ISO Data is compromised, i.e. ISO could seek court injunction against AFC vendor for certain actions related to ISO Data. ISO should also be a third-party beneficiary to the ISED-AFC vendor agreement and/or have a private right of action to enforce under the agreement for breach of ISO Data obligations.
171. An AFC vendor must make any ISO Data provided to its customer in an anonymized and aggregated form, i.e. customer should not be able to have access to personal information nor trace back source of data to Rogers. Further, the agreements should ensure AFC vendor privacy obligations evolve with evolution of privacy legislation/practices in Canada (i.e. whatever comes out of Bill C-11).

Q17: ISED is seeking comments on the proposed approach to incremental implementation of an AFC system in Canada.

172. Rogers does not support the proposed approach to incremental implementation of an AFC system as being the best option for Canada. Standard-power RLAN



devices can be deployed anywhere in Canada at any time, so there is no clear advantage to enabling operation in select regions ahead of others. In addition, achieving an effective and reliable AFC system is a significant undertaking without precedent so the focus should be on getting it right for every Canadian.

173. However, we do continue to strongly support a measured and balanced three-phase approach to introducing licence-exempt services into the 6 GHz band. In the first phase, the Department should introduce low-power licence-exempt usage in 5925-6425 MHz. For the second phase, the introduction of standard-power devices in 5925-6425 MHz under the control of AFC systems should be introduced after AFC-supported usage has proven in real-world operation to protect licensed incumbent services for at least one (1) year in a peer country (e.g., the U.S.). The third phase, which would determine how to best introduce new services in 6425-7125 MHz, should be deferred until after WRC-23 and AFC-supported usage in 5925-6425 MHz has been active in Canada for one (1) year.

Q18: ISED is seeking comments on the objective to maximize the potential for synergies, where possible, in defining the technical and administrative requirements for the respective databases addressing different bands under different technical regimes.

174. Rogers generally supports the objective to maximize the potential for synergies, where possible, in defining the technical and administrative requirements for the respective databases addressing different bands under different technical regimes. Exploiting synergies where there is no penalty in doing so is sensible. There is, however, little difficulty in developing different database approaches. The onus should be on designing the optimal system to achieve Canadian spectrum management objectives and priorities for the 6 GHz band, rather than trying to unduly set Canadian 6 GHz policy in order to exploit synergies with prior systems, whether international or other bands.

175. Indeed, the Department should learn what it can from the Canadian TV white space (TVWS) experience to date and other international regimes. However, while on the surface it appears an AFC system defined for TVWS is similar to the requirements for the 6 GHz band, the differences are quite significant. The number of FS entities requiring protection in Canada is vastly greater than the number of television broadcast facilities. The number of APs requesting coordination are expected to be significantly higher, based on the spectrum potentially available in 6

GHz (500-1200 MHz) supporting much greater interest than a mere 6 MHz channel of TVWS. Further, while relatively infrequent, changes in FS entities will be occurring much more frequently than TV broadcast facilities.

176. We also have the benefit of the 6 GHz multi-stakeholder working group established in the U.S. to work through the specific requirements for a robust and effective AFC ecosystem. This group is accompanied by high quality standards development organizations WinnForum and Wi-Fi Alliance to specify and certify the equipment requirements to use this ecosystem. Finally, we have a large number of equipment manufacturers developing products to implement these standards. The work completed for enabling TVWS pales in comparison and to date there has been very limited actual deployments in any international jurisdiction of TVWS database regimes.

177. It may be possible, as experience is gained with the AFC deployed for 6 GHz, for white space database requirements to be incorporated as well. Only time will tell.

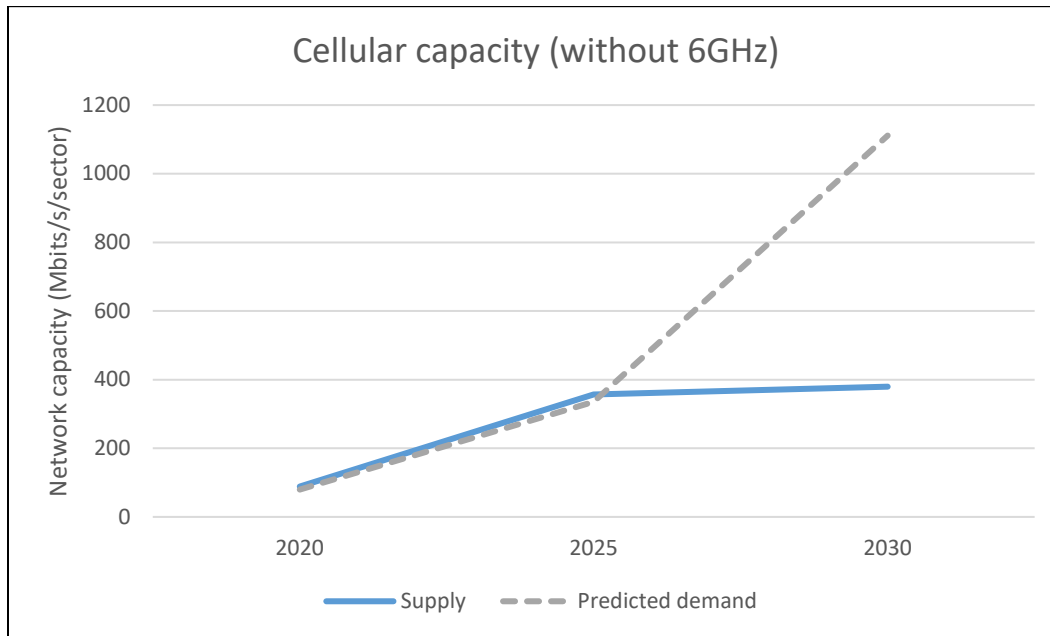
178. Rogers thanks the Department for the opportunity to share its views and participate in this consultation process.

## Appendix A

### Cellular demand prediction

179. The figure below assumes current cellular spectrum is 90% utilised in the most congested cells and that C-band spectrum becomes available and is put to use between 2020 and 2025. It assumes growth of demand in line with Ericsson forecasts.

**Figure 2. Cellular spectrum demand and capacity, 2020-2030**



Source: Rogers' estimates

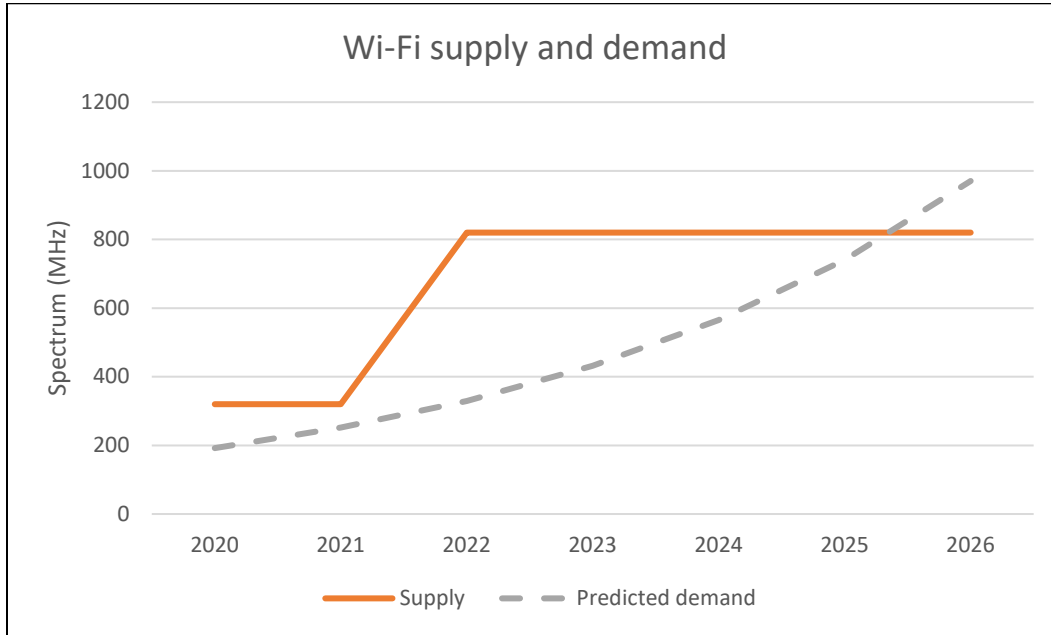
180. The chart shows sufficient spectrum until around 2025, but then more is needed at that point. This additional spectrum could be provided in the upper 6 GHz band.

### Wi-Fi demand prediction

181. The figure below assumes 320 MHz of 5 GHz spectrum is currently available and 60% utilised,<sup>46</sup> and that 500 MHz of 6 GHz spectrum becomes available in 2021. Growth rates are those predicted for home broadband data usage by Ofcom for the UK (we assume Canada will have similar growth rates).

<sup>46</sup> With relatively low city centre population densities compared to European and American countries, our estimation is that Wi-Fi usage will be somewhat lower, and we note that in these other countries, congestion is rarely experienced at present except in the most dense of situations.

**Figure 3. Wi-Fi spectrum demand and capacity, 2020-2030**



Source: Rogers' estimates

182. This shows sufficient capacity to around 2025. After that either more spectrum could be found or 5G at 6 GHz could be used within the home and other locations to provide additional data capacity. Note, the above does not include new licence-exempt mmWave spectrum, as it is not considered substitutable for 6 GHz. However, it may offer a Wi-Fi “offload” in the case of certain specialized in-room use cases (e.g., lossless wireless audiovisual connections).