



TELUS COMMUNICATIONS INC.

Comments for

**CONSULTATION on the
TECHNICAL and POLICY FRAMEWORK for
LICENCE-EXEMPT USE in the 6 GHz BAND**

SMSE-014-20

November 2020

Spectrum Management and Telecommunications

January 19, 2021

Table of Contents

Executive summary	3
6 GHz is valuable mid-band spectrum	3
International activities	5
Incumbent users need to be protected	5
Looking beyond licence-exempt	6
TELUS' key recommendations	9
TELUS' Comments on Specific Questions Posed by ISED	10
Q1: 6 GHz equipment ecosystem	10
Q2: Allowing licence-exempt RLAN in the 6 GHz band	12
Q3: Changes to the CTFA	15
Q4: Technical rules for standard-power RLANs	16
Q5/Q6: Standard-power operation and equipment availability in the 6425-6525 MHz sub-band	18
Q7: Technical rules for low-power indoor-only RLANs	19
Q8: Technical rules for very low-power RLAN devices	21
Q9: Business models for automatic frequency coordination (AFC) systems	22
Q10: Allowing multiple AFC systems in Canada	23
Q11: AFC systems and contingency planning / exit strategies	23
Q12: Harmonisation of AFC systems with the U.S. and other markets	23
Q13: Implementation of AFC systems	24
Q14: Additional considerations for AFC operation	26
Q15: Coexistence with other services in the band	27
Q16: Designation of AFC system administrators	28
Q17: Incremental implementation of AFC systems	28
Q18: AFC synergies with white space databases	28

Executive summary

1. TELUS appreciates the opportunity to submit comments on the *Consultation on the Technical and Policy Framework for Licence-Exempt Use in the 6 GHz Band* (“the Consultation”)¹. TELUS firmly believes that meaningful industry consultation is an important component to developing smart, evidence-based public policy to the betterment of Canadians and Canadian society.
2. TELUS generally agrees with ISED’s view of the 6 GHz band. Given the potential of a broad-based international equipment ecosystem and new sharing approaches, ISED is of the view that the time is right for considering the adoption of new licence-exempt technologies operating in the 6 GHz band in Canada, while maintaining current uses of the band. These new technologies will support a variety of existing and innovative use cases while supporting the continued operation and growth of existing users in the band. TELUS’ comments throughout this response are from the perspective of a service provider with both wireline and wireless networks (TELUS makes use of both licence-exempt and licensed spectrum, both for indoor and outdoor applications, and leverages both IEEE and 3GPP radio standards) as well as that of an incumbent user of fixed services in the band for rural backhaul.

6 GHz is valuable mid-band spectrum

3. Consumers are using many more connected devices, both in and out of the home. This includes many previously unconnected devices being connected, and also new products

¹ *Consultation on the Technical and Policy Framework for Licence-Exempt Use in the 6 GHz Band*, Canada Gazette SMSE-014-20, published November 2020. Link: <http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf11643.html>

and services which are being used for communications, home security, and also reliable and secure services for health care and utilities sectors.

4. There is a core set of wireless services and technologies that nearly everyone uses and depends on in their everyday lives and for the smooth running of businesses and public services. These currently include voice and broadband over both mobile and fixed access networks, Wi-Fi for broadband in our homes and offices, and short-range wireless connections between our growing range of gadgets, broadcast radio and television services.
5. New and emerging use cases such as smart cities, industrial Internet of Things (IoT) and smart agriculture require wireless connectivity that may require a combination of low latency, ultra-high reliability and high download and upload speeds. Innovative technology can develop in unpredictable ways; thus, having the right spectrum available for these use cases will enable innovation in Canada.
6. Canadians rely on Wi-Fi mostly using 5 GHz spectrum to enable access to the Internet and other applications on their ever growing number of connected devices in both domestic and commercial applications. More and more Wi-Fi devices are demanding higher data rates each competing for channel availability. TELUS is of the view that Wi-Fi and similar access technologies such as LAA and NR-U currently in the 5 GHz band could benefit from an expansion of channel availability and the introduction of additional wide band channels (up to 160 MHz today and 320 MHz in the future). These wide band channels are being standardised in IEEE 802.11 for Wi-Fi and in 3GPP's 5G NR-U (planned for Release 17) which will significantly improve data-intensive activities such as video streaming and multi-player gaming in areas where wideband channels are available.

7. TELUS is of the view that licence-exempt expansion into the 6 GHz band will provide significant economic opportunities and improved user experiences for all Canadians. However, these benefits can be realised in the near term with an expansion up to 6425 MHz. Further licence-exempt use of the upper part of the band from 6425-7125 MHz should not take place until after WRC-23 once a better view on global ecosystems is understood.

International activities

8. There are ecosystems developing for Wi-Fi, 5G-NR-U and possibly licensed 5G-NR depending on international decisions. It seems clear that the lower portion from 5925-6425 MHz will be made available in most countries for licence-exempt use. What remains unclear is how the upper portion from 6425-7125 MHz will develop globally beyond the US and South Korea. Allowing licence-exempt operation in Canada prematurely could encumber the band and limit future options for licensed use.

Incumbent users need to be protected

9. Many smaller rural communities in Canada do not have a wired transport network coming in and are currently served by wireless microwave radio transport systems using the 6 GHz band. These systems are cost-effective where road access or terrain would restrict a physical wired transport system; however, low-band microwave radio transport systems have limited bandwidth capacity, and are still susceptible to weather and environmental conditions. Installing fibre backhaul could greatly increase speed and enhance services but is costly and often uneconomical given the distance from existing facilities. Enabling

greater spectrum use of the 6 GHz band holds great potential and promise for new services but ISED must ensure that existing services are adequately protected from interference, especially in rural and remote areas.

10. TELUS commends ISED for moving quickly in taking this first step towards promoting innovative uses of the 6 GHz band. TELUS views the ISED proposal to enable licence-exempt use in the band whilst protecting incumbent users as a good start and a quick way to make better use of this valuable mid-band spectrum. However, ISED should endeavour to consult on policy regarding incumbent users in the band. Given high demand and contention for low-band fixed backhaul spectrum in rural and remote areas contrasted with limited use and alternative options in urban areas, there could be different protection criteria implemented in certain geographic areas versus areas to promote new innovative uses while still offering protection to incumbents where there is a need.

Looking beyond licence-exempt

11. Wireless solutions for both transport and access are needed to connect many rural and remote communities. ISED should take an outcome-focused approach to both enable innovation and align usage of the 6 GHz band with its rural connectivity policies. ISED should not restrict the future use of 1200 MHz of the 6 GHz band entirely if there are good business cases that may be enabled through other licensing mechanisms.
12. For the past 20 years, there has been rapid growth in the global demand for connectivity. Significant strides have been made by the telecom industry to accelerate the deployment of advanced communications infrastructure across Canada. In fact, the Canadian telecommunications sector exceeds its peers globally, compared to both jurisdictions with

similar population densities like Australia and those more densely populated like Europe or Asia, in the deployment of vast, reliable networks through facilities-based competition. Despite our accomplishments, there is still work to be done. Based on the CRTC 2019 Communication Monitoring Report, just 41 per cent of households in rural Canada have access to broadband speeds at or above 50/10 Mbps. Releasing more licence-exempt spectrum will not help connect these underserved homes and premises.

13. Today, the prime band for 5G mobile services is expected to be the 3 GHz band due to its potential for enabling 100 MHz channels. Progress in radio technologies (such as beamforming techniques using massive MIMO) has enabled the use of higher mid-band frequencies for both capacity and coverage. Looking ahead, the 6 GHz band may prove to be the next (and possibly the last) large tranche of prime contiguous mid-band spectrum to satisfy Canadian's ever-increasing demand for data. This spectrum could help address the future need for expanded fixed wireless access capabilities in rural and remote areas. It also would address future urban network capacity exhaust, once 3.x GHz spectrum has been fully deployed, and with no other significant influx of mid-band spectrum in sight.
14. As more countries consult on 6 GHz allocations in 2021, identifying the "best" use from among a wide range of possible outcomes is not a trivial task. Wi-Fi is a major success story and remains the de-facto local connectivity technology for enterprises and consumers and the demand for licence-exempt spectrum to support Wi-Fi is ever increasing. However, in order to control the quality of mobile and fixed wireless access service (e.g. last-mile connectivity), wireless operators such as TELUS require exclusive use of the licensed bands. To scale network operation and maintain quality of service,

having exclusive use spectrum is of utmost importance. In unlicensed operation, there is no guarantee of predictable service quality.

15. TELUS has consistently pushed for more licensed spectrum to be made available sooner. Yet the possibility of taking a speedy decision for the whole 6 GHz band that does not maximise the long-term use of key spectrum cannot be justified by the early to market benefits that would still apply to licence-exempt use for a portion of the band. Many from the mobile industry advocate for ISED to take a balanced approach to changes to the 6 GHz spectrum. Moving ahead today by making the 5925-6425 MHz portion available for licence-exempt use will benefit Canadians through access to greater shared spectrum. However, ISED should wait until after WRC-23 so as to not miss an opportunity for efficient use of the prime mid-band spectrum from 6425-7125 MHz thereby ensuring that Canadians get the best use of it.
16. This year we've seen exactly how detrimental the digital divide is to our country. The COVID-19 global health crisis has shown us that wireless connectivity is critical for education, work and entertainment. For those living in rural or underserved communities, the lack of broadband services has put them at a significant disadvantage. Wireless operators like TELUS are taking steps to resolve this by quickly expanding offerings of fixed wireless broadband services. However, the lack of mid-band licensed spectrum is what creates a bottleneck in rural broadband access, not the Wi-Fi congestion in 2.4 and 5 GHz that is far more impactful to urban markets. ISED must consider how releasing more mid-band spectrum can facilitate the connection of hundreds of thousands of Canadian homes and premises as government and industry work together to address the Universal Service Objective.

17. The detail behind TELUS' recommendations and TELUS' comments in response to the various questions raised by ISED follows in the main body of this document.

TELUS' key recommendations

- A. ISED should move forward with licence-exempt use only within the lower portion of the 6 GHz band from 5925-6425 MHz.
- B. ISED should temporarily delay the introduction of licence-exempt use in the upper portion of the 6 GHz band from 6425-7125 MHz.
- C. Subject to WRC-23 outcomes, ISED should consider deviating from the FCC path by adding IMT for licensed mobile use in the upper portion of the band from 6425-7125 MHz to help serve the future need for more mid-band spectrum to address both urban capacity exhaust and rural and remote connectivity.
- D. ISED should issue a public consultation on possible policy changes for incumbent services to make the most efficient use of the 6 GHz spectrum band in all areas.

TELUS' Comments on Specific Questions Posed by ISED

Q1: 6 GHz equipment ecosystem

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

Low-power equipment ecosystems, both Wi-Fi 6E and 5G NR-U

18. There is significant global interest for terrestrial use of the 6 GHz band and equipment is quickly becoming available. The first tranche of RLAN equipment is being made available in the US today for the Wi-Fi ecosystem based on IEEE 802.11ax standard (also known as “Wi-Fi 6”) that includes the 6 GHz band (this equipment is referred to as “Wi-Fi 6E”). A significant number of these devices are expected to become available in 2021. Similarly, ETSI standards are maturing for the European market and it is expected that equipment will be available in 2021.
19. 3GPP-based licence-exempt technologies are also in standards development with NR-U equipment based on Rel-16 expected to be available by late 2021 or 2022. The 5G NR-U equipment ecosystem for low-power and standard-power is expected to be part of the band n96 class of devices for the 5925-7125 MHz spectrum range.
20. 3GPP will also consider in early 2021 whether a new band class for NR-U operation or updates to network signaling requirements is the best approach for 5925-6425 GHz to align with European regulations. This work is expected to be completed in 3GPP Rel-17 time frame (2022).

21. Further, 3GPP will study 5G NR licensed operation in the upper portion of the 6 GHz band (6425-7125 MHz) for Europe and Russia, and the whole 6 GHz band (5925-7125 MHz) for China. TELUS recommends that ISED follow the international developments for the upper portion of the band and consider implementing licensed flexible use if a robust equipment ecosystem develops.

Standard-power equipment ecosystems, both Wi-Fi 6E and 5G NR-U, under the control of an AFC

22. US standards are in development and AFC-enabled devices are anticipated starting in 2022. Given the strong interest for the 6 GHz band, TELUS expects a robust AFC-enabled standard-power ecosystem will develop for both Wi-Fi 6E and 5G NR-U.

AFC

23. The US rules for an Automatic Frequency Coordination (AFC) system have been developed but test procedures are not yet available. TELUS expects an AFC system to be available along the same timeline as standard-power devices (end of 2021 or 2022). If ISED adopts a standardised AFC protocol similar to that under development in the US, Canada could take advantage of the same AFC solution and AFC-enabled devices along similar timelines as the US.
24. As described further in its response to Question 2, TELUS does not agree with the implementation of an AFC solution in the upper portion of the band (6425-6875 MHz) since the US is the only jurisdiction looking at this type of incumbent protection mechanism at this time. Waiting to see how the upper portion of the band develops

internationally and / or waiting for a better understanding of the effectiveness of the AFC in the US would be prudent before allowing licence-exempt devices with unproven technology to flood the market.

25. TELUS notes that for any implementation of an AFC system, ISED must ensure that all standard-power RLAN access points refrain from transmitting in all parts of the 5925-6425 MHz frequency range unless receiving express authorisation for a specific frequency range such that the AFC system has determined operation will not cause interference to incumbent systems.

Q2: Allowing licence-exempt RLAN in the 6 GHz band

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

26. Many jurisdictions are consulting and moving ahead on allocating 5925-6425 MHz for licence-exempt use to enable low-power and very low-power devices but the same is not true for 6425-7125 MHz outside the US and Korea. TELUS notes that to date only the US has implemented standard-power rules with a novel AFC solution that will enable greater RLAN power level whilst protecting incumbent services.
27. TELUS recommends ISED take a prudent and measured approach to changes in the 6 GHz band and allow expanded licence-exempt RLAN use now but only in the 5925-6425 MHz sub-band. This additional 500 MHz of licence-exempt spectrum will help alleviate congestion from the 5 GHz band.
28. Through the timely release of this one sub-band, ISED will enable novel ecosystems while allowing an opportunity to monitor technical coexistence and database infrastructure

deployment growing pains without unnecessarily risking the entire band and its incumbent services. Allowing licence-exempt operations in this one sub-band will enable 23x20 MHz, 11x40 MHz, 5x80 MHz and 2x120 MHz channels. This significant increase in available bandwidth will provide significant economic opportunities and greatly improve user experiences for Canadians. Further, since legacy Wi-Fi devices do not currently operate in the 6 GHz band, releasing this spectrum will enable the newest multiple access technology improvements (i.e., Wi-Fi 6 using OFDMA) to be used to their maximum benefit.

29. Should ISSED allow licence-exempt operation in the 6425-7125 MHz portion of the band, it would be extremely difficult to change course in the future as licence-exempt devices will be everywhere and there would be no way to work around them.
30. Many countries consulted on 6 GHz allocations in 2020, and identified 5925-6425 MHz for licence-exempt use. Few countries have opted to make the same allocation for the upper portion of the band as a potential IMT identification (after studying the potential for IMT co-existence with incumbent services) is being addressed as part of the WRC-23.
31. Wi-Fi remains the de-facto local connectivity technology for enterprises and consumers, and is important for extending broadband connectivity to a plethora of devices. However, for those living in rural or underserved communities, the lack of broadband services has put them at a significant disadvantage that additional licence-exempt spectrum does nothing to solve. It is the lack of mid-band licensed spectrum that is the limiting factor in rural broadband access, not Wi-Fi congestion.

32. Wireless operators require exclusive use spectrum to control the quality of mobile and fixed wireless access service (e.g., last-mile connectivity). To scale network operation and maintain quality of service, having exclusive use is of utmost importance.
33. Given the potential to further close the digital divide that an additional 600 MHz of mid-band spectrum could facilitate, TELUS recommends holding off until after WRC-23 when there will be a better understanding as to how international equipment ecosystems and policy have developed before moving ahead with the remainder of the band (i.e., 6425-7125 MHz).
34. TELUS would like to commend ISED for taking this first step towards enabling terrestrial flexible use in the 6 GHz band. TELUS views the ISED proposal to enable licence-exempt use in the band whilst protecting incumbent users as a good start and a quick way to make better use of this valuable mid-band spectrum. However, in an effort to strive towards the most efficient use of the band, further consideration should be given to incumbent uses in the band. ISED should endeavour to consult on policy regarding incumbent users in the band. The most efficient use of this mid-band spectrum cannot be achieved with blanket national protection for incumbent services indefinitely. Given high demand and contention for low band backhaul spectrum in rural and remote areas contrasted with limited use and alternative options in urban areas, there should be different protection criteria implemented in certain geographic areas versus others to promote new innovative urban uses while still offering protection to rural incumbents where there is a need.
35. TELUS recommends that ISED issue a public consultation on incumbent uses in the band to establish policy for the 6 GHz band that would guide usage of this important mid-band spectrum toward a more efficient outcome. Following this public consultation, TELUS

expects ISED would revisit protection rules generally for relevant stakeholders in the band and also adjust AFC rules accordingly.

Q3: Changes to the CTFA

<p>Q3. ISED is seeking comments on the proposed footnote Cxx and the changes to the CTFA as shown in table 2.</p>
--

36. Considering ISED's present intention for the 6 GHz band is to begin use an AFC system that allows licence-exempt use in the band while protecting existing services, TELUS is not opposed to the wording of the proposed footnote Cxx but recommends that it apply only to the 5925-6425 MHz frequency range.
37. TELUS notes that there is a mobile allocation in the 2.4 GHz and 5 GHz licence-exempt bands and questions why ISED chose not follow the same precedent for the 6 GHz band. Maintaining the current allocation as fixed and FSS primary while allowing licence-exempt use on a no interference no protection basis limits future potential to maximise the use of the spectrum. TELUS is of the view that ISED should add mobile use to the CTFA for the entire 5925-7125 MHz range at this point and consult on policy that will enable the most efficient use of the spectrum for a given geographic deployment scenario.

Q4: Technical rules for standard-power RLANs

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

Indoor and outdoor operation would be permitted, but only under the control of an AFC

38. TELUS agrees that indoor and outdoor operation should be allowed in the 5925-6425 MHz portion of the band. The intent of an AFC solution is to interact with RLAN and NR-U devices for the protection of incumbent services from interference. If this protection can be guaranteed for both indoor and outdoor operations, standard-power is very desirable. The coverage of potential service offerings at standard-power are much greater than what would be possible with low-power and very low-power specifications. The standard-power of 36 or 42 dBm EIRP will allow for better indoor coverage of both residential and enterprise access points which in turn results in a better end user experience of broadband services. The distances between outdoor access points and end users are typically greater than those of indoor installations and would benefit from higher power. Although standard-power greatly enhances potential service offerings versus low-power, TELUS notes that licence-exempt does not replace exclusive licensing.

Maximum permitted EIRP would be 36 dBm

39. TELUS notes that the FCC is considering increasing the maximum EIRP from 36 dBm to 42 dBm, while keeping the maximum PSD at 23 dBm/MHz (but always under control of an AFC considering the points highlighted in Q13 b). TELUS urges ISED to consider allowing the maximum EIRP possible for standard-power access points.

Maximum permitted power spectral density would be limited to 23 dBm/MHz

40. TELUS agrees with ISED's proposal to limit the maximum PSD to 23 dBm/MHz.

Use of a vertical elevation mask, with a maximum EIRP of 125 mW at elevation angles above 30 degrees over the horizon, would be required

41. TELUS agrees with ISED's proposed implementation of a vertical elevation mask for standard-power APs, but that this restriction should only apply to APs deployed in outdoor scenarios. The same elevation mask (equal in both angle and maximum EIRP to that proposed by ISED for this band) was imposed on high power outdoor use of the 5150-5250 MHz range after intensive study of the protection requirements of FSS space stations. This band is currently in extensive use and, to TELUS' knowledge, no harmful interference impacts have been observed at the FSS satellite receivers.

Q5/Q6: Standard-power operation and equipment availability in the 6425-6525 MHz sub-band

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.

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.

42. TELUS does not support the release of 6425-6525 MHz for licence-exempt use at this time, albeit for different reasons than those that apply in the US context. TELUS notes that the initial standard-power access point equipment will have the hardware capabilities to operate across the sub-band and many products could be updated through software to enable operation into the 6425-6525 MHz sub-band at a future time. However as mentioned in response to Question 2, TELUS recommends a delay to any decision on the upper portion of the band (6425-7125 MHz) until after WRC-23.

Q7: Technical rules for low-power indoor-only RLANs

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

Operation would be permitted indoor only across the 5925-7125 MHz band

43. As mentioned in its response to Question 2, TELUS recommends a delay to any decision on the upper portion of the band (6425 - 7125 MHz) until after WRC-23. TELUS' internal study as well as records from the FCC² have demonstrated potential interference to fixed backhaul links from low-power RLANs even when operating indoors. It follows that low-power RLANs operating outdoors (and not under the control of an AFC system) would pose an even greater risk of interference. As such, TELUS supports that low-power RLANs (not under AFC control) be limited to indoor-only operations.

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

44. Although it is well understood that contention-based protocols installed in RLAN devices today perform well at facilitating co-existence amongst licence-exempt devices, TELUS' internal study as well as industry comment³ shows that these same protocols would be

² *Technical Appendix: Low Power Indoor (LPI) and Very Low Power (VLP) operation of Unlicensed National Information Infrastructure (U-NII) Devices and coexistence with Fixed Links at 6 GHz*, Nokia Bell Labs & CTO, June 2020. Link: https://ecfsapi.fcc.gov/file/1062933399140/Technical%20Appendix%20-%206GHz%20LPI_VLP_FINAL%206-29-2020.pdf

³ Section II.D, *Ex Parte Presentation, Unlicensed Use of the 6 GHz Band, ET Docket No. 18-295; Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz, GN Docket No. 17-183*, CTIA, April 2020. Link: <https://ecfsapi.fcc.gov/file/10414098829953/200414%20CTIA%206%20GHz%20Ex%20Parte.pdf>

ineffective to protect licensed incumbents. There is concern that incumbent backhaul services may experience harmful interference from low-power indoor-only RLANs

Maximum permitted EIRP of 30 dBm and maximum power spectral density of 5 dBm/MHz

45. Allowing the use of 30 dBm maximum EIRP and/or 5 dBm/MHz maximum power spectral density by low-power indoor systems not operating under the control of an AFC system will present a high probability of interference in certain deployment scenarios. In such cases, it would be very difficult to find the source of interference. Particularly problematic would be situations where an RLAN access point co-channel transmission appears within the main beam of a backhaul receive link. The main factor is the geometry of the access point (height) versus the receive antenna pattern of a backhaul system, which could likely occur in high-rise access point deployments (such as in urban locations). Lowering the access point output power or PSD limit, within a usable amount, will not remove the interference potential.
46. One solution could be to require low-power indoor devices to interface with an AFC restricting their operation to non overlapping channels. However, since no other jurisdictions are currently mandating the use of an AFC for low-power devices, such a Canada-specific requirement would likely limit the ecosystem available to the Canadian market.
47. TELUS recognises the aforementioned potential interference issues but considers the proposed power levels important to enable innovative operations within this licence-exempt band. As such, TELUS does not suggest lowering the maximum permitted

power nor does it suggest mandatory AFC control; rather, TELUS recommends that ISED issue a public consultation on usage policy for the band by incumbent services as indicated in TELUS' response to Question 2.

Q8: Technical rules for very low-power RLAN devices

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

Operation would be permitted indoors and outdoors across the frequency range 5925-7125 MHz band

48. As mentioned in its response to Question 2, TELUS recommends a delay to any decision on the upper portion of the band (6425-7125 MHz) until after WRC-23.
49. Very low-power operations operating outdoors at the proposed power levels would also be problematic in coexistence with fixed backhaul operations in certain deployment scenarios.⁴ However, consistent with its recommendation in the preceding question, TELUS recommends that rather than limiting the potential applications for very low-power devices, ISED should issue a public consultation on usage policy for the band by incumbent services as indicated in TELUS' response to Question 2.

⁴ A low-power RLAN device operating indoors at 30 dBm EIRP with 16 dB of penetration / building exit loss is equivalent to a very low-power RLAN device operating outdoors at 14 dBm EIRP.

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

50. As described in its answer to Question 7 above, TELUS believes that the use of contention based protocols would be useful for facilitating co-existence amongst licence-exempt devices, but ineffective in protecting the licensed incumbents from interference.

Maximum permitted EIRP would be 14 dBm and maximum power spectral density of -8 dBm/MHz

51. As described in answer to Question 7 above, TELUS believes that there is a high likelihood of interference to fixed backhaul links in certain operational scenarios. TELUS' recommendations are the same as for the low-power indoor scenario, but additionally TELUS recommends that ISED also monitor the proceedings of the FCC FNRPM on this matter before concluding on a maximum permitted output power.

Q9: Business models for automatic frequency coordination (AFC) systems

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

52. TELUS has no comment at this time on potential business models for AFC systems operating in Canada.

Q10: Allowing multiple AFC systems in Canada

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.

53. TELUS has no comment at this time on ISED's proposal to permit the approval of multiple AFC systems in Canada.

Q11: AFC systems and contingency planning / exit strategies

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

54. TELUS has no comment at this time on potential exit strategies if the AFC administrator decides to cease operation in Canada.

Q12: Harmonisation of AFC systems with the U.S. and other markets

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.

55. ISED must develop a framework in consultation with stakeholders to operationalise the policy objectives and protection criteria for the AFC to implement. TELUS notes that the FCC has advanced work in this regard and ISED should use FCC rules to guide its implementation of an AFC, but one that is designed with the Canadian spectrum environment in mind. A key consideration is to have an industry-wide standardised protocol for communication between an AFC and standard-power RLAN APs to ensure

Canada can take advantage of a broad ecosystem of devices made for the US market. Additionally, along the Canada-US border, a common protocol could provide greater coordination possibilities that may facilitate future interference resolutions.

Q13: Implementation of AFC systems

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

Information required from licensed users

56. TELUS urges ISED to undertake a review of current licence data within the SMS system to ensure data accuracy before allowing any standard-power device to operate. Without accurate licensed station parameters it will not be possible for an AFC system to protect incumbent systems.

Interference protection criteria for computation of exclusion zones

57. Based on TELUS' internal study and also documented in ECC Report 316⁵, the level of interference to fixed backhaul receivers depends not only on the distance between RLAN access points and fixed backhaul receivers, but is also sensitive to the height differential between the RLAN access point transmitters and fixed backhaul receivers. A high level of

⁵ CEPT ECC Report 316: *Sharing studies assessing short-term interference from Wireless Access Systems including Radio Local Area Networks (WAS/RLAN) into Fixed Service in the frequency band 5925-6425 MHz*, published May 2020. Link: <https://docdb.cept.org/download/8951af9e-1932/ECC%20Report%20316.pdf>

interference can be expected when the RLAN access point transmitter is at a height that appears within the main beam of the fixed backhaul receive antenna.

58. As such, TELUS proposes the use of a -10 dB I/N protection criteria to protect fixed backhaul systems from harmful interference where policy dictates that protection is required.

Information required from standard-power APs

59. TELUS proposes that access points must provide all required information before standard-power operation would be possible. Standard-power access points must provide accurate and up to date geolocation data, antenna height, antenna pattern and orientation if applicable.

Frequency of AFC update of licensee information

60. TELUS proposes that an AFC be required to update licensee information daily and that a regular interval be set up for RLAN access points to reconfirm allowable operating parameters.

Security and privacy requirements

61. TELUS would like to highlight the importance of adequate security measures to protect data and ensure reliable operation and urges ISED to develop appropriate measures relating to security and privacy in consultation with stakeholders. Information regarding incumbent licensed operations to be protected will be required to be made publicly available by an AFC but the same is not true for information regarding standard-power

access devices or their locations. The security, reliability and privacy issues will need to be addressed, especially as individual devices and their locations are registered.

62. Given the need for reliable security measures, including authentication procedures between devices and an AFC to minimise harmful or unauthorised intrusion or manipulation, TELUS would support stringent security regarding the contents and communications between an AFC and access devices. Consideration should be given such that all communications between an AFC and AFC-enabled access points be conducted through a means of mutual authentication and encryption to avoid spoofing or denial of service attacks.

Q14: Additional considerations for AFC operation

<p>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.</p>
--

63. TELUS has no comments at this time on additional considerations needed in setting detailed standards and procedures for AFC operation.

Q15: Coexistence with other services in the band

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

Fixed microwave stations

64. TELUS supports ISED's proposal to use AFC systems to protect existing and new incumbent fixed backhaul stations. TELUS provides detailed recommendations in response to Question 13 above related to database accuracy and the design of exclusion zones with an appropriate I/N value.
65. While the intent of the AFC system is to design exclusion zones for the protection of fixed backhaul receive stations, consideration is also needed regarding interference resolution. If, in certain situations, fixed backhaul receive stations experience interference despite standard-power access points being under control of an AFC system, ISED must be involved in the resolution.

Fixed point-to-point Television Auxiliary stations

66. TELUS has no comments at this time on the use of AFC systems to protect Television Auxiliary stations.

Radio astronomy stations

67. TELUS has no comments at this time on the use of AFC systems to protect radio astronomy stations.

Q16: Designation of AFC system administrators

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

68. TELUS has no comments at this time on the sample agreement related to the designation and operation of an AFC system in Canada.

Q17: Incremental implementation of AFC systems

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

69. TELUS has no comments at this time on the proposed approach to incremental implementation of an AFC system in Canada.

Q18: AFC synergies with white space databases

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.

70. TELUS has no comments at this time on any potential synergies between AFC and white space databases.

* * * * *

End of document