redline communications

October 26, 2020

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Subject: Canada Gazette Notice No. SLPB-002-20-2020: 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, August 2020

Dear Madam,

Redline Communications Group Inc is pleased to submit its comments on the above noted Gazette Notice. Our submission is structured in two sections: Section 1 provides our overall positioning while Section 2 provides answers to a select number of questions posed by ISED in the consultation paper.

We commend ISED for the timely release of this paper. The burgeoning demand for unfettered access to spectrum for Industrial 5G by a plurality of entities involved in its development requires swift action on the part of ISED to ensure that the potential for Canadian innovation is realized to the benefit of all Canadians.

We look forward to continued participation in this process.

Sincerely,

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SECTION 1: OVERALL POSITIONING

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Introduction

1. Redline Communications Group Inc. (Redline) hereby submits its comments on **Canada Gazette Notice No. SLPB-002-20-2020: 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** ("**the Consultation**").

2. Redline is the worldwide leader in private wireless networks for industrial and mission-critical applications. We serve the electric utility, oil and gas, mining, government and enterprise sectors by providing private, secure, reliable wireless networks.

3. There is significant demand in Canada for private LTE solutions, whether for smart grid/utility applications, mining installations, oil and gas development sites or remote towns without wireless or broadband service that incumbents are unable to serve economically. Redline and companies like us have the technology and the wherewithal to build and deploy high quality, ruggedized private networks customized to the precise needs of our customer base.

4. The biggest challenge faced by Redline and its industrial and commercial clients, however, is the lack of available spectrum to serve the demand for private networks. There are no bands available (such as the CBRS band in the U.S.) that are easily accessible by industrial users with the kind of robust technological and device ecosystem that will allow private networks to flourish in Canada. This process provides a marquis opportunity for ISED and the Canadian communications industry to work together to facilitate the development of a world-class industrial 5G environment that supports Canadian industry, home-grown Canadian innovation and most importantly the Canadian economy.

Global Trends in Industrial 5G

5. Section 5 of the Consultation provides examples of jurisdictions where spectrum has been allocated or is being considered for private network use. Countries listed include the U.S., the UK, Germany, Sweden, Australia, South Korea and China, among others. Redline is aware of at least another 11 countries where private network spectrum allocations are being discussed or have already been implemented, including France, the Netherlands, Chile and

Brazil among others.[1] Ten of these allocations are in the n78 band, which with its robust LTE device ecosystem gives these initiatives the greatest chances for success.

6. A recently announced initiative in Europe is bringing together Siemens, Ericsson, data storage specialist Seagate and robotics specialist Tharsus in an industrial 5G accelerator program. The companies involved said that "local private networks are the only way to deliver on the promise of 5G-powered industrial IoT."[2]

7. Based on experience thus far, Redline believes that industrial 5G will spawn a huge variety of use cases and applications. It begs the question of whether the MNOs can possibly cover them all on their own. There needs to be a way for other entities, including software firms, hardware vendors and end user corporations to access spectrum directly so that the MNOs do not become an unwitting bottleneck in the development of a robust industrial 5G ecosystem in Canada. The jurisdictions noted above recognize this reality and are taking steps towards this goal.

8. The global thrust towards spectrum licensing for private networks buttresses the claim of a surge in demand in Canada as well. ISED's consideration of using the 3800 MHz band for flexible use should follow the lead of others and designate spectrum in band n78 in a way that is accessible by private industrial users so that the innovation occurring elsewhere, particularly the U.S., can come to Canada as well.

9. Canada, with its vast land area and abundant natural resources, is the envy of the world for its resource economy and the opportunities brought in its wake. The resource industry, including mining, oil and gas as well as Canada's electrical utilities, can be a source of tremendous innovation in communications due to their constantly evolving need for leading-edge wireless solutions. To actualize this potential, ISED is encouraged to make the right decisions now to bring Canada in line with other countries by making industrial 5G a major priority in spectrum planning.

[1] Source: Qualcomm Infographic https://www.linkedin.com/posts/sebastianbarros_5g-activity-6723415378749472768-jaXw

[2] Source: https://enterpriseiotinsights.com/20200924/channels/news/siemens-joins-ericsson-led-uk-industrial-5g-accelerator

Lack of Spectrum Availability for non-MNO Carriers and Industrial Users

10. The strangle hold that MNOs have on the most valuable spectrum in Canada has frustrated Private LTE innovation opportunities for at least the last decade. Spectrum lies fallow and unused in huge swaths of the country where the economies of a consumer driven focus are non-existent.[3]

11. The needs of industrial and major utility users are significant and ever-growing. The major incumbents, however, have generally been reluctant to subordinate spectrum for these use cases. Redline has experience globally and, ironically, we have found that Canada is one of the most difficult places to do business mainly due to the spectrum regime which allows licensees to hold on to spectrum in areas where they will never use it. Aside from RP-19, which has shown itself to be an arduous, time consuming and, frankly, outdated process, negotiating with the licensee is the only other avenue in which to gain access to spectrum that an incumbent will never use. And this rarely works.

12. This state of affairs has led to those in need of spectrum to rely mainly on unlicensed frequency bands, leading in turn to degraded service levels and a stifling of innovation. Some of the MNOs have recently begun to recognize the market demand for Private LTE networks and have attempted to develop their own solutions. However, the needs of this sector are varied and highly complex whereas the MNOs prefer offering cookie-cutter, repeatable solutions. As noted above, it is highly unlikely that the MNOs can fulfill all needs and, thus, there needs to be real choice in providers of private network solutions. This can only be achieved through providing end users and their suppliers direct access to spectrum.

13. In areas where the MNOs have deployed networks, utilities and others are relegated to the status of renters of spectrum wholly reliant on the MNO network's capabilities - mainly geared to consumer and general business use cases - to solve highly specialized and complex security and communications use cases, again leading to the stifling of innovation.

14. As recognized by jurisdictions on every continent, direct affordable access by industrial players and utilities to spectrum with an existing vibrant ecosystem is the key to unleashing the innovation of industrial 5G in Canada.

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[3] See CRTC-commissioned report from 2018 entitled "*Analysis of Canadian Wireless Spectrum Auctions: Licence Ownership and Deployment in the 700 MHz, 2500 MHz and 3500 MHz Frequency Ranges*", https://crtc.gc.ca/eng/acrtc/prx/2018joseph.htm

Our Proposal: Alignment with the U.S. Model

15. As indicated in the Consultation, in 2015 the FCC established a flexible shared licensing regime in the 3550 MHz - 3700 MHZ spectrum range, known as the CBRS band. The CBRS band has been a great success for both carriers and private LTE users alike, where priority access to spectrum was auctioned while others are able to gain access affordably for local requirements. Private LTE has flourished within this regime, with easy access to spectrum spawning highly innovative solutions to a plethora of industrial 5G use cases. In addition, the WISP incumbents were treated fairly, having been afforded the time and resources to allow for a smooth transition to the new technology ***without incurring the expense of displacement***.

16. There were two main factors that led to the success south of the border:

    a. A truly innovative and creative licensing regime, as described in Section 5 of the Consultation, that provides a win-win-win for MNOs, small carriers/private users and the FCC. Through carrier aggregation, PAL licensees (**MNOs** as well as some private users) are able to operate with sufficient capacity no matter where in the band they purchased their PAL licenses; **smaller carriers and industrial users** are allowed affordable access using the GAA spectrum; and CBRS solves all the border coordination issues that were inherent to WBS thus significantly reducing the work required by **the regulator** to manage licensing; and

    b. the mature ecosystem in band n78 for both 4G and 5G devices means carriers and industrial users alike have access to a rich diversity of choice in both devices and technology vendors for affordable off-the-shelf equipment that can readily serve the vast majority of use cases.

17. For these reasons, we are proposing the following:

    a. The spectrum band between 3650 to 3980 MHz should be designated flexible use spectrum in 10 MHz Channels and a CBRS-like shared licensing regime should be established to regulate the entire block. The first 50 MHz should be designated as General Authorized Access (GAA) spectrum and incumbents in that band given time to transition to the new band plan and technology. The balance of the spectrum (280 MHz) should be designated as Priority Access License (PAL) frequencies to be allocated by auction on a Tier 5 area basis;

b. PAL licenses should be available to carriers as well as industrial entities and utilities, with at least 30 MHz below 3800 set aside for industrial users in rural and remote areas of the country to facilitate industrial 5G use cases; and

c. GAA operators should be able to operate in the entire band on a no-interference basis either to PAL licensees or other GAA operators, provided they participate in the Spectrum Access System (SAS). Significantly, this solves the issue of unused spectrum, whereby GAA providers can operate in the entire band as long as a PAL operator has not set up their system, relieving the current spectrum shortage.

18. These measures will create the same win-win-win in Canada that CBRS has proven to be in the U.S. and it will bring us in line with the rest of the world in facilitating the promise of innovation of Industrial 5G.

Relegating Shared Spectrum to 3900-3980

19. Section 9 of the Consultation, ISED presents two options to address current WBS licensees in the 3650-3700 MHz band. In Option 2, ISED proposes displacing WSB incumbents and moving them up to a newly opened block of spectrum in the 3900-3980 MHz range. ISED also suggests that this band may be a good candidate for shared licensing. We disagree on both points.

20. The main concern we have with the proposal is that there is a limited device ecosystem available for anything above 3800 MHz. Most devices available in that spectrum are from Huawei, which is not an option for utilities and most industrial use cases. ISED seems optimistic that an ecosystem will develop over time, but that is far from certain at this point. In the meantime real harm will have been done to incumbents, who will be forced to vacate the spectrum at high cost, while Industrial 5G will continue to stagnate and remain in low gear for a significant period of time.

21. Our proposal, on the other hand, which echoes many others that are participating in this proceeding, is a fairer approach that provides incumbents the time they need to transition to the new technology affordably and facilitates Industrial 5G in a much shorter time frame.

22. Thus, our recommendation for a CBRS-like model will benefit all stakeholders including MNOs, who will have access to significant amounts of spectrum on a priority basis if they buy it at auction; resource, utility and other industrial users will be able to access

spectrum directly either on a PAL or GAA basis without having to rely on a third party for spectrum; and incumbent WISPs can continue to operate in their bands. Most importantly, Canadians will win as Industrial 5G innovation will be unleashed in Canada to the benefit of all Canadians.

SECTION 2: RESPONSES

In this section we address answers to the questions where we could add the most value:

Q1

ISED is seeking comments on the timelines for the development of an equipment ecosystem using 5G technologies in the 3800 MHz band. In particular:

a) the ecosystem maturity level and readiness of equipment under band classes n77 or n78 for the Canadian market

b) the ability of existing or future base station radios to handle multiple technologies and band classes at the same time (i.e. whether all four band classes (B42, B43, n77 and n78) or a subset of these band classes are able to operate on the same base station radio) and how it may affect the adoption of 5G technologies in the 3800 MHz band

Answer

a) The 5G ecosystem for band n78 is more mature for Canadian market. This band has been available for several years in many countries, in particular in Europe, where many countries have already auctioned band n78 as early as 2017. There will be a mature ecosystem of base station and UE equipment in n78 by the time the Canadian market starts deploying in this band. Band n77, on the other hand, will have a less mature ecosystem for the Canadian market as fewer countries have adopted this band. U.S. is one of the main countries adopting this band, with auction planned for December 2020. European countries have not made this band available. Consequently, the availability of equipment in band n77 is mainly driven by U.S. market traction. Given that this band is not auctioned yet in the U.S., the 5G ecosystem in n77 won't be mature in near-term future and it not yet known to what extent it will develop.

Another 5G band that overlaps with n77 and n78 is the NR band n48 (3550-3700 MHz). This band and its LTE counterpart (B48) are gaining tremendous traction in the U.S. market as CBRS bands. A rich LTE ecosystem is already available for B48, with 5G equipment in n48 expected to become widely available soon. Bands B48 and n48 could be used by existing WBS licensees if they are allowed flexible use operation in their existing band (3650-3700 MHz).

b) Since bands B42, B43, n77 and n78 are either adjacent or have some overlap, future base station radios should be able to support a subset of these band classes simultaneously. However, it must be noted that one base station radio will not likely be able to support the

full range of all of these bands (i.e. the entire 900 MHz between 3300-4200 MHz), requiring multiple radios needed to cover the entire range.

Q2

ISED is seeking comments on the potential linkages between the equipment ecosystems using 5G technologies in the 3500 MHz and 3800 MHz bands. In particular:

a) whether contiguity between the 3500 MHz band and 3800 MHz band is preferred given that 3GPP specifications allows for non-contiguous carrier aggregation

b) whether there are any technical or operational impediments (e.g. equipment limitations/challenges to support aggregated use of spectrum, or requirements for additional base station radios) that would be incurred if operators have a large frequency separation between frequency blocks in one or both bands, and at what point (i.e. how wide the frequency separation) such impediments would become significant

c) whether the equipment ecosystem deployed for the 3500 MHz band will be able to operate in the 3800 MHz band, and whether this equipment could easily be extended to 3800 MHz after being deployed

Answer

a) Contiguity between 3500 MHz and 3800 MHz band is not necessary as 3GPP technologies support carrier aggregation over non-contiguous bands. Such contiguity could only be utilized by radio equipment that cover both 3500 MHz and 3800 MHz bands or at least have overlap with both bands. For example, radio equipment supporting band B42 (3400-3600 MHz) or B43 (3600-3800 MHz) do not benefit from the contiguity between 3500 MHz and 3800 MHz bands, as their operating bands have little or no overlap with both bands. In addition, such contiguity would only be beneficial to operators that have licenses for both channels right below and right above the border of 3500 MHz and 3800 MHz bands (i.e. 3650 MHz). Given that these bands have different auction timing and likely different set of interested parties, there is no guarantee that an operator can gain access to channels at 3650 MHz border in both bands.

Another relevant issue for this contiguity is that ISED emission requirements for the 3500 MHz and 3800 MHz bands may be somewhat different. In addition, emission requirements

for each band is specified for operation within that band, with limits for out-of-band emission (OOBE) outside of the band. Operation across a channel that overlaps both 3500 MHz and 3800 MHz band will not be capable of adhering to the OOBE requirements of each of these bands, as transmission extends beyond the upper or lower border of these bands. To enable transmission across such overlapping channels special emission requirements are needed for channels that overlap with both bands.

b) Current base station radios can support carrier aggregation across non-contiguous frequency blocks in one band as well as across blocks in different bands. The same technology could be used for operation across 3500 MHz and 3800 MHz bands. If the frequency blocks are too far apart, the base station radio can be designed with multiple RF chains, each one tuned to one of the frequency blocks. It should be noted that multiple RF chains may be inevitable in any event if the base station needs to operate across two bands, as each band has its own OOBE requirements.

c) The equipment ecosystem deployed for 3500 MHz band will most likely be unable to operate in the 3800 MHz band. The base station radios deployed for 3500 MHz band typically include RF filters that limit the transmit emission and/or received signal to the target 3500 MHz frequency range. Such filters will not cover the 3800 MHz range and as such, 3500 MHz base station radios will not operate in the 3800 MHz band without modification. In addition, many front-end components covering the 3500 MHz band do not extend to 4000 MHz. Some RF components are limited to 3800 MHz, while others exhibit 3-4 dB performance degradation in 3800-4000 MHz range. Accordingly, the 3500 MHz base station radios cannot be easily extended to operate in the 3800 MHz band.

Q3

ISED is seeking comments on how the difference in technical rules between the U.S. and EU could impact Canada's ability to leverage the economies of scale from the global 3800 MHz ecosystem. In particular:

a) would the difference in technical rules (such as out-of-band-emission (OOBE) power limits) result in two distinct region-specific equipment ecosystems

b) which equipment ecosystem would be more suitable in the Canadian environment (noting that Canada has, for the most part, aligned with the U.S. on low- and high-band spectrum for 5G but in the mid-band, Canada is more aligned with the EU in the 3500

MHz band (3450-3650 MHz)) and specifically, whether Canada should generally align its technical rules with the U.S. or the EU in the 3800 MHz band

Answer

a) With different technical rules for bands 3700-4000 MHz in the U.S. and 3400-3800 MHz in the EU and given that these bands only have 100 MHz overlap, it is likely that we see two distinct region-specific ecosystems for radio equipment supporting these bands. Given that these bands in aggregate cover a wide 600 MHz range (3400-4000 MHz), it is not expected that many base station radios will be capable of supporting both bands. As a result, it is expected that radio equipment vendors will target to support one of these bands in a radio but not both.

b) The new 3800 MHz band in Canada (3650-4000 MHz) covers the entire 3700-4000 MHz band in the U.S., while it only covers half of the 3400-3800 MHz band in EU. Therefore, aligning with U.S. technical rules for band 3700-4000 MHz provides greater benefit for the Canadian market in terms of ecosystem and harmonization across the border. In addition, EU countries have limited their released spectrum in this band to 3800 MHz, which aligns with 3GPP band class n78. This does not align with Canadian spectrum that goes up to 4000 MHz which is part of the n77 band. The 3700-4000 MHz band in the U.S., on the other hand, is also covered with band class n77. This means that if Canada aligns its technical rules with those of the U.S. for band 3700-4000 MHz, Canada can benefit from the ecosystem of band n77 equipment that will be available for U.S. market with no concern about the capability of these radios in meeting Canadian technical rules.

Q5

ISED is seeking comments on developing a flexible use licensing model for fixed and mobile services in the 3650-4000 MHz band.

Answer

Redline supports ISED decision in adopting a flexible use licensing model for the 3650-4000 MHz band. This enables this band to be used in variety of use cases to meet the needs of different market segments. On the one hand it allows the WISPs to continue using this band

to provide fixed high-speed internet to remote locations. On the other hand, this band can be used in public and private mobile networks to provide 5G mobile access for public use as well as for vertical industry applications. This flexible use model is similar to that of the CBRS band in U.S. The recent U.S. auction of PAL channels in CBRS band is evidence of the success of this model in supporting various use cases. The competition in this U.S. auction was among a large number of different players, some as big as national mobile operators competing for nation-wide coverage, and some as small as regional utility or industrial operators looking for a channel in a small coverage area. These operators have a wide range of use cases, including 5G public access, broadband residential internet, private networks for utilities and vertical industries, e-learning for virtual classes, etc. The CBRS flexible use model allows each operator to use the band to meet the service requirements of its customers. Adopting a similar flexible use model for 3650-4000 MHz band in Canada would ensure similar success in Canada.

Q14

Subsequent to changes to the spectrum utilization described in section 7 and recognizing the need to change the current WBS licensing model, ISED is seeking comments on its proposal to displace the existing WBS licensees and designate 80 MHz of spectrum available for the development of a new shared licensing process in the 3900-3980 MHz band as described in Option 2. Specifically, ISED is seeking comments on:

a) the amount of spectrum proposed (80 MHz) under a shared spectrum licensing process

b) whether there should be a provision that allows certain users (e.g. existing WBS licensees) priority licensing (e.g. an initial application window before accepting applications from others)

Answer

Moving WBS licensees to the new 3900-3980 MHz channel poses several challenges. First is the availability of an ecosystem of radio devices operating in the new proposed band. Currently there is limited ecosystem of n77 devices with no devices meeting the requirements of industrial or fixed wireless access use cases.

Building new radio devices for this band is quite challenging since radio components supporting this band are currently unavailable. Front-end components covering 3.3-3.8 GHz

do not extend to 4GHz. Some RF components are limited to 3.8 GHz, while others exhibit 3-4 dB performance degradation in 3.8-4.0 GHz range. Thus the main risk for potential operators in 3.9-3.98 GHz is that components that operate in this band will be slow to become available. Similarly, there is currently a very limited ecosystem for UE devices supporting the 3.8-4 GHz range (NR band n77).

Forcing WSB licensees into the 3900-3980 MHz band will require them to upgrade their networks to new 5G technology. Given that current WBS radios used in 3650-3700 MHz do not work in the new band, WSB licensees will need to upgrade their equipment to radios supporting the new band. Most WBS licensees currently using non-standard radio technologies would prefer to transition to 3GPP standard technologies. However, for many of such WBS licensees, the existing LTE technology can meet their service requirements, and they do not need to adopt the more advanced 5G technology. In addition, the LTE ecosystem is much more mature than that of 5G, and therefore the deployment cost of LTE network is much more affordable for WBS licensees than the new 5G network. However, there is no LTE band that covers t3900-3980 MHz. LTE band 43 only goes up to 3800 MHz. The only 3GPP band that cover the 3900-3980 MHz range is the NR band n77, but using this band would require and upgrade to 5G NR technology. Thus with Option 2, WBS licensees will be unable to deploy LTE networks and be forced to upgrade to more expensive 5G networks if they want standard-based devices.

As set out in our proposal above, a more viable solution for WBS licensees is to have access to a frequency band below 3800 MHz such that they can take advantage of the existing band n78 LTE ecosystem.

Q19

ISED is seeking preliminary comments on the future spectrum licensing process for 3900- 3980 MHz, including the following:

a) what type of applications are envisioned for this spectrum

b) what type of shared licensing process ISED should consider (e.g. database approach, licensee to licensee coordination)

c) what additional measures ISED should consider employing to manage access to the band in high demand areas, such as major metropolitan centres

d) what technical restrictions should be considered (e.g. technical rules similar to adjacent 3500 MHz flexible use band with reduced power levels, a guard band between new flexible use systems below 3900 MHz, shared use above 3900 MHz, etc.)

e) what type of eligibility criteria, if any, should be established

Answer

The case put forward by Redline in Section 1 of this submission strongly discourages ISED from relegating industrial use cases and WISPs to the top part of the 3800 MHz band. Our answer here therefore relates to the licensing regime in relation to our proposal for shared licensing similar to CBRS in the U.S. for the entirety of the band.

a) Redline agrees with the list of use cases outlined in paragraph 109. In particular, we believe that one of the main use cases of any shared licensing band would be private and industrial networks. Vertical industries such as mining, utilities and manufacturing need access to spectrum in order to build their own private networks. Such industries require private mission-critical networks that are much more reliable and secure than public mobile networks. However, vertical industries have no or limited access to spectrum designated for their use cases. Having 30 MHz or more of spectrum set aside outside the main urn=ban core areas of the country for such use cases – either in the 3900-3980 MHz range or, per our proposal, below 3800 MHz – would allow vertical industries to deploy their own private networks that are tailored to their specific service requirements and are self-managed.

b) Redline believes that a database approach for spectrum sharing is more favorable than licensee to licensee coordination. The database approach can follow the CBRS model developed in the U.S., with a central entity (i.e. a SAS in CBRS) tasked with spectrum allocation. Like CBRS SAS, the central entity can dynamically allocate the frequency and the transmit power of each base station to facilitate shared access to spectrum without excessive interference between licensees.

c) ISED can employ a priority access mechanism – similar to PAL in CBRS – for spectrum access in high demand areas. In our proposal, we suggest all but the bottom 50 MHz of the 3800 band be auctioned as PAL licenses, with the rest set aside for General Access Authorization GAA. Network operators that require reliable uninterrupted access to a channel can procure priority access licenses at auction and use carrier aggregation to pull together disparate 10 MHz blocks. This type of access would be of great importance as well in more outlying areas for use cases such as vertical industries where the private network is mission-critical and

guaranteed network reliability and availability is required for uninterrupted operation and safety of personnel.

Also like CBRS, the priority access channel is only reserved for its licensee when there is active operation in that channel. Otherwise, the priority access channel is available for license-exempt spectrum sharing, which will likely be sufficient for many use cases in large parts of the country where MNOs are unlikely to deploy.

d) Should ISED decide to proceed with Option 2, we suggest a guard band would be unnecessary and thus wasteful of valuable spectrum. Considering this band will be designated as flexible use like the lower adjacent bands, and the fact that most new deployments will likely use 3GPP LTE or 5G technologies, similar emission restrictions can be considered for this band. For channels adjacent to 3900 MHz, lower powers can be considered – but power reduction measures should be applied to channels just below 3900 MHz border as well so that interference reduction afforded operators both below and above 3900 MHz band edge.

e) As ISED noted in Section 5 of the Consultation and expanded upon in our comments above, other countries are allocating spectrum to industrial users and use cases. The spectrum under discussion here should similarly be opened to these types of entities as well as WISPs.

Q43

ISED is seeking comments on the proposal to rely on technical limits and coordination procedures rather than mandate specific technology solutions (e.g. TDD synchronization between systems) to address interference issues between TDD flexible use systems in the 3650-3980 MHz band.

Answer

When it comes to coordination among neighboring networks Mobile Network Operators (MNOs) have gone through this process numerous times and have the resources and experience for conducting such coordination. As such, coordination procedures would be suited for the segments of the 3650-3980 MHz that are targeted for public 5G networks.

On the other hand, for the segment of spectrum primarily targeted for WBS and vertical industries (either the 3900-3980 MHz band proposed by ISED or the 3650-3980 MHz band proposed by Redline) coordination procedures may not be the best solution.

Small operators such as WISPs or vertical industries have little or no experience in interference coordination – as many of them would start to operate their own private network for the first time. Such small operators do not have the experience, the know-how and the resources required for doing interference coordination – in particular if they want to do such coordination with MNOs that are experienced in this process. As such, small operators will be in disadvantaged position for interference coordination.

Therefore, we propose a CBRS-like shared licensing approach for the entire band that leaves coordination in the hands of a third party (see our answer to Q44). This has proven to be very successful in the U.S. and there is no reason it cannot be as successful in Canada.

Q44

ISED is seeking comments on whether any additional measures should be taken to limit potential interference issues between flexible use systems in the 3650-3980 MHz band.

Answer

We recommend adopting a strategy similar to CBRS in U.S. for managing coordination in the frequency band primarily targeted for WBS and vertical industries. The central entity that manages spectrum allocation (similar to SAS in CBRS) would also be in charge of interference coordination. This can be done for example by TDD synchronization based on the TDD split requested by the majority of deployed radios in each area. A TDD coordination framework like the coexistence framework developed in the CBRS Alliance can be adopted here as well. By moving the coordination task to a central entity, the small players do not require to interact directly. The central entity can dynamically determine the required TDD synchronization in each region, for instance based on the requested TDD split of each deployed radio and by selecting the most requested one.

Q45:

ISED is seeking comments on whether specific technical measures should be adopted to address potential interference issues between flexible use systems and WBS systems until the displacement deadline.

a) For co-channel flexible use and WBS operations in the 3650-3700 MHz band, what specific measures may be needed to protect WBS? For example, should new flexible use stations be required to coordinate with WBS stations within a specified distance prior to deployment? Alternatively, should a technical parameter such as a power flux density (pfd) trigger for coordination measured at the WBS receive antenna be adopted? Are there other more appropriate measures that ISED should consider? Should multiple measures, such as a combination of distance and pfd trigger for coordination, be adopted? How would these requirements impact the deployment of new flexible use stations?

b) For adjacent band flexible use systems, is there a need to adopt any additional measures, beyond what is currently specified in RSS-192 and SRSP-520, to further address coexistence between these flexible use and WBS systems? If so, what should they be? How many flexible use frequency blocks (or MHz) immediately adjacent to the 3650-3700MHz band could potentially affect WBS systems? How would these requirements impact the deployment of flexible use stations?

Answer

a) If flexible use operation is adopted in 3650-3700 MHz band and WBS operators are asked to transition out of that band, then specific measures need to be put in place to protect WBS operation before their displacement deadline. One such measure could be the protection area around any WBS receiver. A transmit power can be set for any flexible use operation within the WBS protection area. This power limit can be set in tiers, with lower power limits in tiers closer to the WBS receiver. This can be combined with the proposed power flux density (pfd) limit. If the pfd at the WBS receiver is above a limit even after imposing the protection area limits, then flexible use operator needs to reduce the transmit power of it nearby transmitters to meet the pfd limit at WBS receiver.

b) With the new band proposal, WBS operation in band 3650-3700 MHz could be impacted with interference from flexible use operation in both 3450-3650 MHz and 3700-3980 MHz. While RSS-192 considered co-existence with flexible operation in 3450-3650 MHz band, the new band proposal would add new co-existence issue with flexible operation in the 3700-

3980 MHz. Any existing measures that WBS operators have adopted to protect themselves from adjacent band operation below 3650 MHz may not give them protection for new adjacent band operation above 3700 MHz. This requires additional measures to protect WBS operators from adjacent band operation in both upper and lower bands. One such measure is to adopt more strict OOBE measures for flexible use operation below 3650 MHz and above 3700 MHz (or at least for the new 3700-3980 MHz) with maximum OOBE limits lower than what is adopted in RSS-192.

Another temporary measure that can be adopted is to lower the maximum allowed transmit power of flexible use operation in channels adjacent to 3650-3700 MHz band in areas near the existing WBS operators (e.g. the WBS protection area mentioned in response to Q44). We believe that at least the first adjacent 10 MHz channel (i.e. channels 3640-3650 MHz and 3700-3710 MHz) should be targeted for this temporary lower transmit power limit. The reduced power limits will only be in effect until the nearby WBS operation is moved out of the 3650-3700 MHz (or alternatively until the WBS displacement deadline). This measure can be adopted in combination with the lower OOBE limits mentioned above to give enough protection to current WBS operation.