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16 February 2018

Innovation, Science and Economic Development Canada (ISED)
c/o Director, Spectrum Regulatory Best Practices
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Re: Gazette Notices SLPB-006-17 and SLPB-010-17 – ISED Consultation on the Spectrum Outlook 2018 to 2022 – Cogeco Comments

In accordance with the procedures set out in the above-noted consultation, please find attached the comments of Cogeco Communications Inc. ("Cogeco").

Cogeco thanks ISED for the opportunity to submit comments in this proceeding.

Yours very truly,

Michel Messier
Senior Director, Regulatory Affairs, Telecommunications

c.c.: Nathalie Dorval, VP Regulatory Affairs and Copyright, Cogeco Inc.
Luc Noiseux, Chief Technology and Strategy Officer, Cogeco Inc.

Innovation, Science and Economic Development Canada
Spectrum Management and telecommunication

Consultation on the Spectrum Outlook 2018 to 2022

Gazette Notices SLPB-006-17 and SLPB-010-17
respectively published in Canada Gazette on
October 21, 2017 and December 30, 2017

Comments of Cogeco Communications Inc.

16 February 2018

Introduction

1. Cogeco Communications Inc. ("Cogeco") is pleased to submit these comments in accordance with the procedures set out by Innovation, Science and Economic Development Canada (ISED) in *Consultation on the Spectrum Outlook 2018 to 2022, Canada Gazette*, Part I, SLPB-006-17, dated 6 October 2017, modified in Gazette Notice SLPB-010-17, dated 20 December 2017 (the "Consultation Document")

2. Cogeco is a diversified communications company headquartered in Montreal, Quebec that provides video, Internet and telephony services through its affiliate Cogeco Connexion Inc. to residential and business customers as well as offering third party Internet access and transport services to Internet service providers on a wholesale basis in Ontario and Quebec.

3. Cogeco also provides an entire suite of information technology services to its business customers through Cogeco Peer 1 (Canada) Inc. Included among the services provided by this entity are collocation, network connectivity services, hosting and cloud services. All of these are supported by 16 data centres, an extensive fibre network in Montreal and Toronto, as well as points-of-presence in North America and Europe.

4. Cogeco commends ISED for adopting this forward-looking and principled approach to determining the spectrum requirements of Canadian stakeholders. In Cogeco's view, ISED policies need to take into account both the evolving needs of Canadian carriers, enterprises and individuals, which can differ significantly, and the evolving international ecosystem of standards bodies and equipment suppliers.

5. As a competitive communications service provider that has invested heavily in infrastructure in Canada over many years, Cogeco has always supported the development of a regulatory framework whose objectives are both to encourage investment in facilities and to promote competition among facilities-based carriers. Cogeco also supports policies which maximise the use of scarce spectrum resources in all regions of Canada. Such a regulatory framework and corresponding policies enable ISED to achieve the over-arching policy objective of the *Spectrum Policy Framework for Canada*:

> *To maximise the economic and social benefits that Canadians derive from the use of the radio frequency spectrum resource.*

6. It would also be consistent with the *Canadian Telecommunications Policy* set out in section 7 of the Telecommunications Act, in particular sub-sections (b), (c), (f) and (h):

> ***7*** *It is hereby affirmed that telecommunications performs an essential role in the maintenance of Canada's identity and sovereignty and that the Canadian telecommunications policy has as its objectives […]*
>
> ***(b)*** *to render reliable and affordable telecommunications services of high quality accessible to Canadians in both urban and rural areas in all regions of Canada;*
>
> ***(c)*** *to enhance the efficiency and competitiveness, at the national and international levels, of Canadian telecommunications; […]*
>
> ***(f)*** *to foster increased reliance on market forces for the provision of telecommunications services and to ensure that regulation, where required, is efficient and effective; […]*
>
> ***(h)*** *to respond to the economic and social requirements of users of telecommunications services; […]*

7. An important step in achieving these objectives is to make sufficient spectrum available to meet the needs of carriers, enterprises and individuals over the next five years. However, while this is important, it is not sufficient for ISED simply to release or reallocate additional spectrum bands. Cogeco recommends ISED also adopt policies which are specifically designed to ensure spectrum is assigned in all regions of Canada to entities or persons who will use it, and to reclaim spectrum from those who do not use it. These policies should also take into account the very different market and spectrum use conditions in urban centres versus rural and remote areas, thereby ensuring all Canadians are able to enjoy the benefits of the spectrum released by ISED.

8. Going forward, Cogeco respectfully submits that ISED's policies should, therefore, focus on two key objectives:

- First, assign spectrum to persons willing and able to use it;

- Second, once the spectrum has been assigned, ensure those persons use it. Failing that, reclaim it and reassign it to others willing and able to use it.[1]

9. The remainder of this submission addresses selected questions posed by ISED in the Consultation Document. Cogeco will be interested in reviewing the submissions of other interested parties and may provide additional comments in the reply phase.

A PRINCIPLED APPROACH TO RELEASING SPECTRUM

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

10. As noted above, Cogeco recommends ISED adopt policies which are specifically designed to ensure spectrum is assigned in all regions of Canada to entities or persons who will use it, and to reclaim or to reassign spectrum from those who do not use it. This two-pronged approach will make ISED's spectrum assignment regime flexible and better able to accommodate new entrants and to increase the number of participants using spectrum in Canada in all regions for the purposes of fostering competition and innovation and improving spectrum efficiency.

More Effective Assignment

11. The first of ISED's objectives should be to take proactive steps to improve the efficacy of ISED's spectrum assignment mechanisms.

12. For example, Cogeco encourages ISED to make more spectrum available to users on a licence-exempt basis. Licence-exempt spectrum is useful in particular for enterprise and individual users who are likely to experiment and develop new uses for

[1] See, for example, similar policies established by ISED in *Decisions Concerning the Renewal of 2300 MHz and 3500 MHz Licences*, Gazette Notice No. DGSO-004-13, 23 November 2013 (at par. 14 and 36), as well as in *Decisions Regarding Policy Changes in the 3500 MHz Band (3475-3650 MHz) and a New Licensing Process*, Gazette Notice No. DGSO-007-14, December 2014 (in particular decisions 8 and 9 at par. 56).

the spectrum. Access by licensed mobile network operators ("MNOs") to licence-exempt spectrum should therefore be subject to reasonable rules to ensure their use of the spectrum is not to the detriment of other users who may not own or otherwise have access to other spectrum; while licence-exempt spectrum can be useful to MNOs, their control of it could also limit experimentation and development by new entrants.

13. Cogeco also encourages ISED to consider licensing more spectrum on a first-come, first-served ("FCFS") basis as this approach is adaptable and will help ISED assign spectrum to entities or persons who will actually put it to use.

14. Where ISED decides to license spectrum using competitive auctions, ISED should continue to use the pro-competitive measures that it has applied in the past, such as set-asides and caps, to limit the overwhelming control position of incumbent MNOs.

15. ISED's spectrum assignment regime should also take into account the fact that spectrum requirements in dense urban areas can differ materially from spectrum requirements in sub-urban or rural areas. For example, while there may be insufficient spectrum available to users in urban areas, this is generally not the case in rural areas. In those areas, the issue is often that spectrum licensees are not deploying the spectrum, while local providers and entrepreneurs who are willing and ready to develop services in their region cannot access the spectrum.

16. Cogeco points out that in many cases the coverage requirements of a Tier 2 service area licence can be satisfied by serving urban areas alone. This can leave rural and remote areas in the Tier 2 service area waiting an unacceptably long period of time to receive services using the spectrum in question, if indeed service is ever deployed.

17. Cogeco considers that this hinders ISED in achieving the policy objective of the *Spectrum Policy Framework for Canada* and the objectives of the *Telecommunications Act*. ISED therefore needs to develop an approach to spectrum assignment for the next five years and beyond which specifically addresses the needs of Canadians in rural and remote areas. Stronger subordination and re-assignment rules may help mitigate this problem to some degree, but a more effective approach to ensuring the timely deployment of spectrum and roll-out of services to all

Canadians may well be to license spectrum using licence areas other than those established under the framework in *Service Areas for Competitive Licensing*.

18. Cogeco welcomes ISED's intent to review the overall spectrum assets being assigned and used (par. 6 of the Consultation Document) and recommends that ISED also review spectrum assets being underused or neglected entirely by wireless operators. ISED should track and focus on overall spectrum assignment by entity as opposed to focusing on a "per-band" view, which has been the historical way of looking at spectrum allocation.

19. Cogeco also believes that ISED must ensure spectrum assets for all product categories studied in this consultation, particularly those pertaining to mobile service (LTE and 5G) technologies, are more widely distributed in order to increase participation in the market. Low-band, mid-band and high-band all present different physical attributes that are relevant in different contexts for mobile service (e.g., dense urban, suburban, or wide rural) and accordingly all of the spectrum composing one of these large spectrum categories should be considered together in a common assignment policy as a means to increase competition with new entrants in the mobile business.

Preventing Warehousing

20. The second part of the recommended approach is to develop more effective mechanisms to prevent spectrum warehousing. Although critically important, it is not sufficient to ensure spectrum is assigned in an equitable and pro-competitive manner – ISED must also ensure that spectrum is subsequently used in a timely manner for the benefit of Canadians. Incumbent licensees must not be permitted to warehouse spectrum.

21. The stark fact is that many licensees, notably the incumbent MNOs, have been warehousing much spectrum in many regions for many years,[2] which creates artificial spectrum scarcity and makes it more difficult for new operators to enter the mobile market. This must be addressed in ISED's plans to assign spectrum over the next five years to accommodate wireless technology growth.

[2] For example, in its 2 October 2017 Comments in *Consultation on a Technical, Policy and Licensing Framework for Spectrum in the 600 MHz Band*, Gazette Notice No. SLPB-005-17, Cogeco listed 28 Tier-4 service areas in Ontario and Quebec where PCS Block A spectrum had not been deployed, 11 Tier-4 service areas in Tier 2-006 Eastern Ontario and Outaouais where AWS-1 licensed to Videotron had not been deployed, and 2 Tier-4 service areas in Ontario and Quebec where 850 MHz Block A spectrum licensed to Rogers had not been deployed.

22. Cogeco therefore urges ISED to develop more effective policies to facilitate re-assignment of spectrum which has been licensed but not used. ISED's conditions of licence should include more detailed terms which allow a third party to secure rights to spectrum, for example through subordination at pre-determined tariffs or through simple re-assignment, if it has been unused for a number of years in a region. In essence, the rights auctioned by ISED should be rights to first use of spectrum, not rights to warehouse it for the initial deployment period or worse, for the entire term of the licence.

23. Cogeco also urges ISED to reconsider decisions which remove deployment obligations from licences where these were deemed to have been met.[3] The public interest in effective use of spectrum resources continues to be of paramount importance even after a deployment obligation was met at a given point in time. Cogeco considers that the obligation to use licensed spectrum should be considered to be a continuing one to ensure use of the spectrum continues to be maximized.

24. Furthermore, Cogeco submits that, if a licensee has failed to use spectrum in a given band "range" (i.e. low band, mid-band or high-band) or failed to subordinate that spectrum to another entity who is in turn using it, ISED could consider disqualifying that licensee from acquiring more spectrum in that range. For example, for every Tier 3 or Tier 4 service area where a licensee has unused 700MHz spectrum, that company might not be eligible to bid in those same service areas on the 600MHz band spectrum (i.e., in the same "low" band range).[4] Strong measures like this would encourage licensees to make commercial use of the resources they have, either directly or through subordinated licensing, before they seek additional resources.

<u>New Spectrum Bands</u>

25. With respect to the question of which new spectrum bands to make available in Canada, Cogeco commends ISED for considering wider international developments beyond those in the United States. The wireless arena is, of course, becoming more and more a worldwide ecosystem. Cogeco encourages ISED to continue to remain focused to ensure Canada benefits from advances happening in highly populated

[3] For example, *Renewal Process for Cellular and Personal Communications Services (PCS) Spectrum Licences*, March 2011, at section 3.3.4.
[4] The specific band "ranges" and other details of this measure would be defined following a public consultation process.

parts of the world such as Europe and Asia, as ISED suggests in paragraphs 17 and 112 of the Consultation Document. Cogeco notes as well ISED's statement at paragraph 30 that:

> *Specific regions are driving this growth, with the Asia-Pacific region accounting for nearly two-thirds of the 800 million new subscribers expected in the period. Developing markets account for nine out of ten new subscribers expected by 2020.*

26. Carefully following developments overseas may allow Canadian operators and consumers to benefit from innovation and economies of scale from equipment suppliers serving those areas. For example, Cogeco considers that there is an increasing trend internationally towards releasing the 3.4 – 3.6 GHz band and beyond for 5G uses. ISED describes several of these initiatives at paragraphs 137-142 of the Consultation Document, but Cogeco understands that other major countries, such as China, Korea and India, have allowed or are also considering allowing 5G in that band (these initiatives are summarized in Figure 1 below).

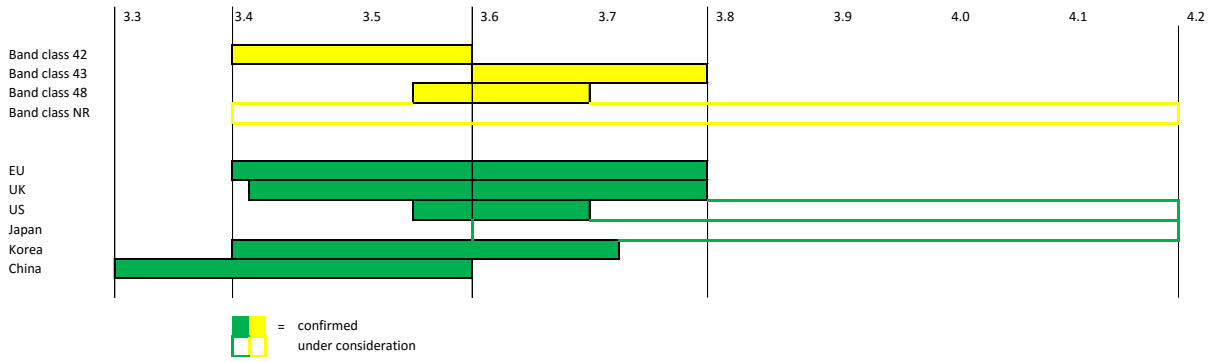

Figure 1 – 5G Plans in the 3 – 4 GHz Band[5]

[5] See 3GPP TS 36.101; 3GPP Press Release, "*Industry Support for 3GPP NR Announcement*," 21 December 2017 (http://www.3gpp.org/news-events/3gpp-news/1931-industry_pr_5g); European Commission Decision 2008/411/EC, 21 May 2008, on the harmonization of the 3 400-3 800 MHz frequency band (http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014D0276&from=EN); Ofcom, Statement and Consultation, "*Improving consumer access to mobile services at 3.6 GHz to 3.8 GHz*," 28 July 2017 (https://www.ofcom.org.uk/__data/assets/pdf_file/0019/107371/Consumer-access-3.6-3.8-GHz.pdf); FCC, *Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, GN Docket No. 12-354, Report and Order and Second Further Notice of Proposed Rulemaking, FCC 15-47 (17 April 2015) (https://apps.fcc.gov/edocs_public/attachmatch/FCC-15-47A1.pdf); FCC, *Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, GN Docket No. 17-183, Notice of Inquiry, FCC 17-104 (3 August 2017) (https://apps.fcc.gov/edocs_public/attachmatch/FCC-17-104A1_Rcd.pdf): GSM Association, Comments in FCC Notice of Inquiry, GN Docket No. 17-183, 8 August 2017

27. The existence of defined 3GPP[6] band classes[7] between 3.4 GHz and 3.8 GHz, and consideration of a band class covering 3.4 GHz to 4.2 GHz, will facilitate the manufacturing of equipment for this band. Since the 3.4 – 3.6 GHz band appears on track to be one of the first worldwide 5G bands,[8] Cogeco recommends that ISED give careful consideration to early release of that spectrum in order to leverage the economies of scale available in those other jurisdictions.

28. Cogeco notes that much of the spectrum in the 3.4 – 3.5 GHz band in Canada has already been assigned for Fixed Wireless Access ("FWA") services, much of it to the national MNOs and to Inukshuk Wireless Partnership. While some of the existing licensees in the 3.5 GHz band are actively providing commercial services using that spectrum, others might only have transmitters in place without actually using them to provide services to the public.

29. Because of the importance of this spectrum band to competition and the future development of 5G services in Canada, Cogeco submits that those licensees who underutilize spectrum in this manner should not gain any advantage from being an existing licensee when ISED develops a new flexible use band plan and licensing framework for the 3.5 GHz band after future consultations.[9] Cogeco recommends that licensees in the 3.5 GHz band should be required to return to ISED for reassignment any spectrum licences in areas where they do not have customers for FWA services

(https://ecfsapi.fcc.gov/file/10808712205095/AS%20FILED%20GSMA%20Mid-Band%20Spectrum%20Comments.pdf); TeleGeography, "*MIIT invites comments on 5G spectrum plans*," 7 June 2017 (https://www.telegeography.com/products/commsupdate/articles/2017/06/07/miit-invites-comments-on-5g-spectrum-plans/); Qualcomm, Spectrum for 4G and 5G, December 2017, slide 15 (https://www.qualcomm.com/media/documents/files/spectrum-for-4g-and-5g.pdf).

[6] The 3rd Generation Partnership Project unites several telecommunications standard development organizations for cellular telecommunications network technologies, including UMTS (Universal Mobile Telecommunications System - the 3G upgrade for GSM), LTE (3GPP Long Term Evolution) and 5G.

[7] A "band class" is a standardized frequency band defined by 3GPP within which LTE network and user equipment operates. See 3GPP TS 36.101. 5G bands are expected to be defined at the World Radiocommunication Conference (WRC-19) that will take place from 28 October to 22 November 2019.

[8] The Radio Spectrum Policy Group of the European Commission recently recommended that Member States make the 3.4 – 3.8 GHz band available by 2020. See page 3 of "RSPG 2nd Opinion on 5G Networks," European Commission, RSPG18-005 FINAL, 30 January 2018: https://circabc.europa.eu/sd/a/fe1a3338-b751-43e3-9ed8-a5632f051d1f/RSPG18-005final-2nd_opinion_on_5G.pdf.

[9] *Decisions Regarding Policy Changes in the 3500 MHz Band (3475-3650 MHz) and a New Licensing Process*, Gazette Notice No. DGSO-007-14, 3 January 2015, at page 6.

and are not actively soliciting customers, notwithstanding any transmitters that might be in place to nominally satisfy coverage obligations.[10]

30. Cogeco is aware that new methodologies for allowing access to spectrum are being developed. As noted by ISED at paragraph 20 of the Consultation Document: *"… new technologies and techniques (e.g. cognitive radio, dynamic spectrum access, smart antennas, and radio resource management techniques) are being developed that will change the way spectrum is accessed through intelligent decision-making solutions and geographic/operational awareness of the radio environment.*" Cogeco considers that these new technologies and techniques may assist in ensuring spectrum is more effectively assigned to entities or persons in all regions of Canada who will actually use it. However, these techniques and technologies are neither mature nor widely available. ISED must make sure the legacy way of accessing spectrum in Canada is optimized and becomes more efficient to allow the spectrum ecosystem to grow in concert with the availability of innovative new technological developments.

COMMERCIAL MOBILE SERVICES

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

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

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

[10] This approach would be similar to that set out in Decision 9 of DGSO-007-14, 9. where existing FWA licensees are eligible to apply for licences *for their existing coverage area* defined on a grid-cell basis to allow them to continue to offer services, where the deployment condition of licence has been *partially met* and services are being provided, and all other conditions of licence for the current FWA auctioned spectrum licences have been met upon expiry of their licence,

31. Cogeco concurs with ISED's assessment in section 5.2 of the Consultation Document regarding the demand for commercial mobile services and traffic anticipated in the next few years. While the Cisco Visual Networking Index[11] describes global trends, Cogeco believes that Canada will experience similar trends. Cogeco notes, however, that the above assessment describes for the most part the impact of the demand for commercial mobile services on existing MNOs. As noted above, Cogeco urges ISED to apply spectrum assignment mechanisms which facilitate new smaller and regional MNO entrants in order to foster competition and innovation.

32. Cogeco also agrees with ISED's assessment regarding technology developments and usage trends as described in the Analysys Mason, Ericsson, Cisco and GSMA reports.

33. Cogeco has observed that MNOs deploy a number of strategies, such as network densification and traffic off-load, to address the trend towards increased commercial mobile traffic. Cogeco is concerned, however, that network densification may be more successful in more densely populated urban areas. It may be a less successful strategy in rural areas, where population densities and therefore customer bases are lower, even though those areas may also be experiencing increased traffic growth. ISED may, therefore, need to consider different approaches in urban versus rural and remote areas, to account for the very different conditions and spectrum requirements of each area.

34. Off-loading traffic onto licence-exempt spectrum, for example through "Licensed Assisted Access" ("LAA") standards, is also increasingly being used by MNOs. As a general position, Cogeco encourages ISED to make more spectrum available on a licence-exempt basis, particularly as such spectrum can be more equitably and swiftly distributed to those entities or persons willing and prepared to use it.

35. However, as noted in paragraph 7 above, commercial mobile operators are not the only users of spectrum in Canada. Licence-exempt spectrum is also an important resource for enterprise and individual users. Cogeco therefore urges ISED when releasing additional spectrum to ensure an appropriate balance between licensed and licence-exempt uses, and to ensure MNOs cannot unfairly control licence-exempt spectrum through LAA, to the detriment of other spectrum users.

[11] Cisco Systems Inc., *Cisco Visual Networking Index: Global Mobile Data Traffic Forecast* Update, 2016–2021, 7 February 2017.

36. Licensing spectrum on an FCFS basis or using dynamic allocation technologies may also be ways of distributing spectrum to those who are keen and prepared to use it. In maximizing the use of spectrum, Cogeco considers dynamic allocation to be an interesting approach that ISED should follow closely. However, as noted in paragraph 30 above, Cogeco does not consider that dynamic spectrum allocation technologies are currently ready for deployment in Canada. Ultimately, ISED may need to consider a wide range of measures to ensure maximum use of spectrum in all regions of Canada, including effective spectrum and network sharing requirements.

LICENCE-EXEMPT

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

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

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

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

37. Cogeco agrees with ISED's assessment in section 5.3 of the Consultation Document regarding the demand for licence-exempt spectrum in the next few years.

38. Cogeco notes that it is very important for ISED to consider the global ecosystem for the release of a new spectrum band to be useful. The Canadian market is simply too small to justify development specifically for it. As noted above, though, ISED

should look to markets in addition to the U.S., such as Europe and Asia, when considering whether viable equipment suppliers are in place for a given spectrum band.

39. In this respect Cogeco welcomes the recent effort to expand the usage of the 5GHz spectrum band in order to provide more bandwidth for Wi-Fi technologies. This includes ISED's May 2017 decision to allow higher power and outdoor RLAN devices ("HPODs") in the 5150-5250 MHz band.[12] Cogeco considers this a good example of leveraging the broader equipment ecosystem, since devices capable of using the spectrum are already available in US.

40. Cogeco notes that MNOs are increasingly looking to use LTE-LAA technologies to relieve traffic pressures by off-loading traffic to licence-exempt spectrum bands. Telus, for example, has deployed the technology,[13] and Rogers' comments in SMSE-002-17 indicate a keen interest in LAA[14], and Bell recently announced reaching Gigabit LTE speed using LAA technology.

41. Cogeco also notes that LAA has been standardised by 3GPP[15] and includes the listen-before-talk protocol. In effect, 3GPP specifications now support the use of "non-3GPP access" (the most common example being Wi-Fi) to access the LTE Evolved Packet Core ("EPC") and enable for non-3GPP accesses all of the features traditionally associated with mobile services, including true mobility of Wi-Fi end-user devices and hand-off of devices from one Wi-Fi access point to another. The LTE-unlicensed technology referenced by ISED in paragraph 44 of the Consultation Document does not include that protocol and would therefore be problematic to implement on a wider scale due to interference potential.

42. Other work is being done on Wi-Fi standards to facilitate traffic off-load as well as mobility of end-points and handoff between network radios, for example certain standards of the Institute of Electrical and Electronics Engineers ("IEEE"), specifically

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[12] *Decision on the Technical and Policy Framework for Radio Local Area Network Devices Operating in the 5150-5250 MHz Frequency Band*, Gazette Notice SMSE-013-17, 29 May 2017.
[13] Telus Release, *Leading-edge technology achieves wireless speeds of nearly 1Gbps in TELUS' downtown Vancouver "5G Living Lab"*, 27 September 2017.
https://www.telus.com/en/about/news-and-events/media-releases/leading-edge-technology-achieves-wireless-speeds
[14] Rogers Communications Canada Inc., Comments, *Consultation on the Technical and Policy Framework for Radio Local Area Network Devices Operating in the Band 5150-5250 MHz*, Canada Gazette, Part I, SMSE-002-17, 29 March 2017.
[15] See for example 3GPP TS 23.402.
https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=850

IEEE 802.11v, 802.11k, 802.11r and 802.11u. Cogeco is also aware of work being done by the Wireless Broadband Alliance in this area.[16]

43. Cogeco notes, however, that this work is being done to benefit MNOs. As pointed out above, these are not the only users of licence-exempt spectrum and ISED should be careful to ensure these technologies do not simply become the means for the existing MNOs to further consolidate their power in the market by controlling both licensed and licence-exempt spectrum. Licensed spectrum and licence-exempt spectrum cannot be considered in isolation. Cogeco encourages ISED to consider measures to ensure equitable access to spectrum by all players -- existing MNOs, new MNO entrants, alternative wireless carriers, enterprise users and individuals.[17]

44. Cogeco anticipates that additional spectrum will be required for Wi-Fi networks in the 5 GHz band as Wi-Fi standards evolve. Spectrum in the 60 GHz band may also be required for IEEE 802.11ad networks and spectrum in the 64-71 GHz band would be used for massive 5G MIMO ("multiple-input multiple-output") networks.

45. Cogeco believes that the trend for offering carrier-grade or managed Wi-Fi services will continue to increase over the next five years. As noted at paragraph 42 above, standards bodies continue to work in this area and Cogeco expects new networks will be rolled out using the standards they develop.

46. At this time, Cogeco anticipates that the 2.4 GHz and 5 GHz bands will be the most affected by this trend. It will therefore be important for ISED to release additional 5 GHz spectrum as soon as devices capable of using it become widely available on the market. Cogeco notes that the FCC extended the upper edge of the U-NII-3 band from 5.825 GHz to 5.850 GHz in 2014[18] and is continuing to examine whether to release the U-NII-2B and U-NII-4 bands (see Figure 2 below).[19] Cogeco therefore urges ISED to continue to follow closely developments in this proceeding.

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[16] See also Wireless Broadband Alliance whitepaper, *Quality of Service on Carrier Grade Wi-Fi*, April 2017: http://www.wballiance.com/wp-content/uploads/2017/04/Quality-of-Service-on-Carrier-Grade-Wi-Fi_v1.00-1.pdf

[17] See also paragraphs 41-45 of Cogeco's Comments, *Consultation on Releasing Millimetre Wave Spectrum to Support 5G*, *Canada Gazette,* Notice No. SLPB-001-17, 15 September 2017.

[18] *Revision of Part 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz band*, ET Docket No. 13-49, First Report and Order, 29 FCC Rcd 4127 (20 February 2013), reconsideration denied in Memorandum Opinion and Order, FCC 16-24 (2 March 2013) .

[19] See Public Notice, FCC 16-68A1 (1 June 2016) in *Revision of Part 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz band*, ET Docket No. 13-49, Notice of Proposed Rulemaking, 28 FCC Rcd 1769 (20 February 2013).

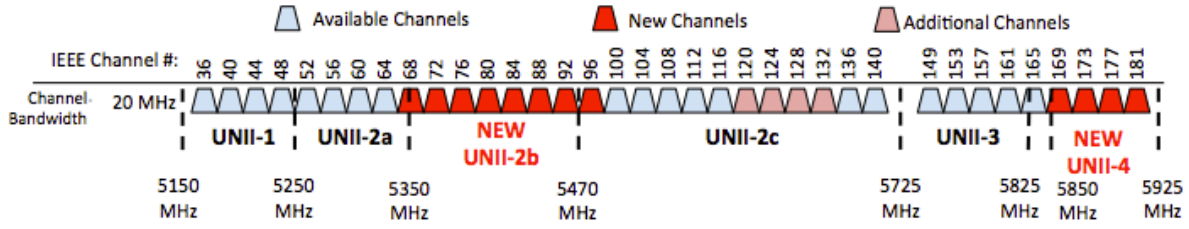

Figure 2 – Wi-Fi Band Plan at 5 GHz (US)[20]

SATELLITE

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

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

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

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

47. Cogeco agrees with ISED's assessment at paragraph 69 of the Consultation Document regarding demand for MSS. Cogeco expects broadband internet to be the focus for growth for satellite applications during the 2018-2022 period. Although video broadcasting will still be a sizable portion of the satellite-based traffic, Cogeco does

[20] CableLabs, *Sophisticated Wireless Interference Analysis: a Case Study for Spectrum Sharing Policy*, at page 18. Submitted on 28 March 2017 in *Consultation on the Technical and Policy Framework for Radio Local Area Network Devices Operating in the 5150-5250 MHz Frequency Band*, Canada Gazette, Part I, January 28, 2017, Notice No. SMSE-002-17.

not anticipate major growth in the need for capacity as improved compression technologies will largely compensate for new 4K-UHD services.

48. Cogeco does not have a specific view at this time on demand for earth observation applications and reserves the right to comment on the views which may be expressed by other respondents to the Consultation Document.

49. Cogeco considers that the cost per bit of data transmitted will always be higher when using satellite technology than using wireline technology or fixed wireless access ("FWA") technology, even after applying HTS technology[21] and other compression technologies. As noted by ISED, most commercial satellite services (data, voice, video) and their areas of growth (broadband, HD voice and 4K video) are typically provided where provisioning by wireline networks would be cost-prohibitive.

50. Cogeco considers that the improved use of LTE technology for FWA and the advent of 5G will help to connect more areas that were traditionally difficult to connect with wireline technology by enabling the use of wireless technology in "the last mile" of an access service (wireless-wireline convergence). While satellite services will continue to be important in providing services to rural and remote areas where population density, geography and other factors make it unfeasible for other technologies, those areas are expected to shrink in the next few years as areas reached by wireline expand. For this reason, Cogeco considers that growth in spectrum demand for satellite uses may be important but should be considered secondary to the growth in demand for spectrum for mobile applications.

51. Cogeco notes that there is a worldwide trend to reallocate the C-band to be used for 5G and FWA services. Due to dramatically increasing demand for mobile spectrum, Cogeco encourages ISED to do the same by allocating the C-band for 5G.

52. Cogeco does not have a specific view at this time on the Ku-band and Ka-band. Cogeco agrees with ISED's assessment at paragraphs 76 – 82 of the Consultation Document and considers that these bands should remain allocated to satellite services.

53. As ISED has identified at paragraph 85 of the Consultation Document, low-Earth-orbit ("LEO") represents a major breakthrough in satellite technology. Cogeco expects deployments to focus on high-speed broadband services. The technology is

[21] See paragraph 83 of the Consultation Document.

expected to enable a high reusability of available spectrum in the C-, Ku- and Ka-bands, as well as much smaller beams due to shorter distances to Earth. The proximity to Earth of LEO satellites will also drastically reduce latency and allow smaller, more convenient ground antennas.

54. Nonetheless, mobile and FWA technologies will continue to mature and to cover more geographic areas in Canada. Satellite technologies, therefore, remain important but should not be prioritized over the other wireless categories defined by ISED in this Consultation Document.

BACKHAUL

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

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

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

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

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

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

55. Cogeco notes that the use of wireless technology for network backhaul is increasingly more common and Cogeco agrees with ISED's assessment of the

situation in general. Cogeco anticipates that increased demand for commercial mobile, licence-exempt, satellite, or fixed wireless services or applications will impact demand for backhaul spectrum.

56. Cogeco expects that demand for commercial mobile spectrum will have the biggest impact because of service growth and penetration as well as the advent of 5G services. Cogeco notes in particular that densification of mobile networks as a result of the introduction of 5G technologies will result in increasing demand for backhaul, as there will simply be more sites to connect to the network. There will also be more situations where it may be difficult to run a wire to an access point or a small cell. In these circumstances, wireless backhaul may be the only feasible solution.

57. As stated by ISED at paragraph 100 of the Consultation Document, wireless backhaul technology is expected to provide higher-capacity links in order to meet the increasing data demands of a typical site (by 2025 the anticipated data requirements are expected to be between 600 Mbps and 10-20 Gbps). The spectrum used to support backhaul services will therefore be required to support higher capacity links, for which high-band spectrum is better suited. Cogeco notes that mid-band spectrum offers a reasonable compromise between high capacity and range requirements.

58. Cogeco notes that allowing flexible fixed and mobile services within the same frequency band appears to be a global trend, and should be taken into account by ISED when considering spectrum optimization and usage in Canada.

59. However, Cogeco also notes that an operator's decision to use one particular type of backhaul solution instead of another is influenced by cost considerations as well as availability of spectrum and other technical considerations. Cogeco considers that demand for wireless backhaul using licensed spectrum is currently being suppressed by the price structure being used by ISED. This means that there is a greater demand for wireless backhaul service than might currently be visible to ISED, and that if ISED were to adjust its pricing structure, this demand might become more apparent. Because of this unsustainable pricing for licensed spectrum for backhaul services, a parallel backhaul ecosystem has been developing using unlicensed 5 GHz spectrum. Cogeco also notes that further developments in 5G technology are expected to be leveraged for wireless backhaul services.

60. ISED's price structure for wireless backhaul spectrum is based on the obsolete 64kbps unit ("Telephone Channel Equivalencies");[22] it is almost financially unsustainable to use licensed spectrum for wireless backhaul solutions if one requires speeds of 500 Mbps or higher based on this old pricing methodology. Cogeco notes that, in particular, consumer demand for mobile data is driving demand for greater capacities on backhaul links. As ISED noted in 2014:

> *Consumers' demands for faster broadband services, higher bandwidth applications, and connectivity anytime and everywhere have resulted in increased capacity demands on backhaul networks. As a result, backhaul capacities have steadily increased from tens to hundreds of Mbps; and capacities of up to 1 Gbps are anticipated by a few wireless service providers*.[23]

61. This trend is also being facilitated by a general decrease over time of the cost per bit/second of equipment. However over the same period, ISED's rates for the use of licensed backhaul spectrum has remained constant. Further, as capacity requirements on backhaul links have increased, so has the cost to operators of the licensed spectrum. As noted, this increased cost has served to encourage operators to acquire equipment using unlicensed spectrum instead.

62. Cogeco recommends that ISED adopt a 10Mbps unit instead as well as more reasonable rates. Cogeco also recommends that ISED review these rates every two to three years to ensure they remain appropriate. Cogeco notes in this regard ISED's comments in 2014 and encourages ISED to complete its review:

> *The Department recognizes stakeholders' concerns and the difficulties highlighted with respect to the current capacity-based fee structure as it relates to point-to-point and backhaul systems. Industry Canada appreciates that since radio licence fees were first introduced, technologies and system requirements have changed dramatically. The Department is conducting a comprehensive review of licence fees and will consult on any proposed revisions to how they are established and assessed.*[24]

[22] Radiocommunication Regulations, Regulation 58(c).
[23] *Decisions on Spectrum Utilization Policies and Technical Requirements Related to Backhaul*, Gazette Notice No. SMSE-022-14, 3 January 2014, at page 5.
[24] *Ibid*, at page 33.

POTENTIAL FREQUENCY BANDS FOR FUTURE RELEASE

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

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

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

Provide supporting rationale for your responses.

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

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

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

63. Cogeco welcomes new initiatives from ISED to release more spectrum for wireless services. Even if, as ISED notes, the latest wireless technology advancements like massive MIMO, full-duplexing and carrier aggregation will make every MHz of spectrum more optimized and efficient (par. 38 of the Consultation Document), Cogeco fully expects wireless usage growth to outstrip the current supply of spectrum.

64. Cogeco supports ISED's intent to monitor closely the international context of each spectrum band in order to leverage the benefits accruing from the provision of mobile service in other countries. Cogeco recommends that ISED remain aligned with WRC-19[25] and the FCC to the greatest extent possible. In those cases where the FCC does not follow WRC guidance, or vice versa, ISED should issue a consultation to examine the issue and its impact in the Canadian context.

[25] The ITU World Radiocommunication Conference 2019, to be held between October 28 and November 22, 2019.

65. Cogeco agrees with ISED's assessments on the bands being considered internationally for commercial mobile, fixed, satellite, or licence-exempt uses.

66. Cogeco notes that the 26 GHz range is considered a Pioneer Band for 5G in Europe.[26] Among other things, the 26 GHz range provides a potentially common tuning range with the US for equipment which would create commonality of scale for a broad frequency range from 24 GHz to 30 GHz.[27] In addition, the 24 GHz band is being considered as part of the FCC Spectrum Frontiers proceeding as it is "*an attractive option for mobile use*."[28] Cogeco recommends that ISED also consider the release of these two bands.

67. Cogeco considers the two low-band frequency bands identified by ISED, the 800 MHz and 900 MHz bands, to be particularly important for early release. Low-band spectrum is necessary for any new operator to cover a wide area with a single tower, particularly in an underserved rural area. It is also a necessary complement to any mid- or high-band spectrum which may also be used by that operator.[29]

68. Since low-band spectrum has, for the most part, been assigned to the three incumbent national MNOs, these two low-band frequency bands represent a rare opportunity, after a well-designed auction of 600 MHz spectrum, for new entrants to acquire spectrum which would further the objective of increased competition in the wireless sector. The 800 MHz and 900 MHz band spectrum identified by ISED in Table 7 of the Consultation Document should therefore be prioritized for release for commercial mobile broadband use within the 2018-2022 timeframe of the Consultation Document. Cogeco encourages ISED to follow closely related developments in the US.

69. In addition, Cogeco recommends that, when releasing that spectrum, ISED establish a regulatory framework designed to facilitate the emergence of new regional or local operators. This could include setting aside up to the entire band for new entrants.

*** End of document ***

[26] "Strategic Roadmap Towards 5G for Europe", European Commission, RSPG16-032 FINAL, November 9, 2016, page 3. See also "RSPG 2nd Opinion on 5G Networks," European Commission, RSPG18-005 FINAL, 30 January 2018, page 3.
[27] *Ibid*, page 5.
[28] Report and Order and Further Notice of Proposed Rulemaking, GN Docket 14-177, FCC 16-89, paragraph 383.
[29] Millimetre wave networks, for example, require low-band networks for umbrella coverage.