

Review of the Canadian Communications Legislative Framework

Submission of RABC
January 11, 2019

Executive Summary

1. The Radio Advisory Board of Canada (“RABC” or “the Board”) provides the Government of Canada with broadly based, unbiased and technically expert advice regarding the management and use of the radio frequency spectrum in Canada. RABC members represent most stakeholders of radiocommunication in Canada – including: manufacturers, satellite and terrestrial wireless carriers and service providers, network operators, broadcasters, public safety and national security radio network operators, and users.
2. RABC plays a very important role in a well-functioning Canadian radiocommunications environment. The Board acts as an advisor to Innovation, Science and Economic Development Canada (“ISED”). Standards, guidelines, regulations and policies play a key role in ensuring that radiocommunications equipment and systems work as intended and that interference to services is minimized or non-existent. The risks involved with standards that are not well thought out include the risk of harmful interference as defined in the *Radiocommunication Act*.
3. In response to Question 1.2, although RABC members are in agreement, at a high-level, in respect of the need for access to passive infrastructure pursuant to streamlined, predictable, cost-effective and non discriminatory regulations, the RABC has two specific recommendations.
4. Most members of the RABC recommend that the panel:
 - expand the wording of subsection 43(5) of the *Telecommunications Act* to ensure that the CRTC has a clear power to set and/or mediate just and reasonable rates and order access to utility infrastructure of municipal and energy utilities constructed on, over, along or under public property of all descriptions. These access rights should be defined to include the right to install, maintain, repair and operate transmission facilities as defined in the *Act*. This would effectively empower the CRTC to determine the terms of access to infrastructure of municipal and energy utilities and other companies and would have a significant impact on cost predictability, timing predictability, and also to provide regulatory consistency; and
 - extend the statutory right to construct wireline network on municipal property to wireless networks. The *Telecommunications Act* should include a definition of “transmission lines” to specifically refer to wireless equipment/infrastructure.
5. One member of the RABC believes the current legislative regime, which leaves the regulation of utility pole access and rates under the authority of provincial/territorial utility regulators, is balanced, effective and reasonable. In the view of this member, these regulators are the best-suited and constitutionally authorized to recognize and govern for jurisdictional differences, which is especially important as it relates to rural and remote indigenous communities, as it ensures that needs “on the ground” are addressed.

6. This member's core disagreement with the above recommendation is that it represents a further regulatory burden on Canadian Electrical Utilities ("CEUs") without a commensurate increase in service, decrease in other regulations, or ability to better serve their rate payers. In this member's view, if the CRTC has regulatory authority over passive infrastructure, most notably telecom attachments on poles, CEUs would still have their full suite of rate hearings with their provincial regulators, of which pole attachments would remain a component, while also adding an additional regulatory level to their rate process. Furthermore, the CRTC is unlikely to improve the ability of the electricity sector to deliver reliable, affordable, and sustainable electricity, because that is not their mandate and so this member believes there is a serious question about regulator appropriateness.
7. In response to Question 2.1, RABC is of the view that the *Radiocommunication Act* should be amended to provide additional guidance to the Governor-in-Council with respect to prescribing fees. In particular, the RABC recommends that Section 6(1)(l) of the *Radiocommunication Act* clearly indicate that fees should only recover the cost of managing the spectrum. This will ensure that spectrum licence fees do not distort the efficient use of the spectrum and that Canadian spectrum users remain competitive relative to their counterparts in the United States.
8. In response to Question 3.1, the RABC supports a net neutrality framework that allows and incentivizes innovation, customization, and investment in networks while at the same time creating networks without unjust discrimination or undue preference. This means a framework that provides:
 - Consumers with access to the lawful content, applications, and services they want;
 - Operators with the freedom to manage their networks to assure that their users receive the quality and access that they have demanded; and,
 - Content and Application Providers with an environment that allows for customized experiences based on the demand of their customers.
9. In response to Question 6.1, the RABC explains that the fundamental role of the spectrum manager remains essentially the same and believes that the current legislative framework is sufficiently flexible to meet these challenges without requiring additional change. Moreover, the RABC is of the view that the current Canadian legislation provides the tools and methods necessary to manage the spectrum and mitigate interference and the current legislative framework is sufficiently flexible to meet emerging challenges without requiring additional change.
10. In response to Question 7.1, the RABC does not have a consensus position regarding the allocation of responsibilities among the CRTC and other government departments. However, should the government decide that changes are necessary, RABC respectfully suggests that careful attention should be taken to make sure that the function RABC has

served for 75 years, as well as its collaborative relationship with the spectrum manager, are taken into account and preserved.

Introduction

11. The Radio Advisory Board of Canada (“RABC” or “the Board”) provides the Government of Canada with broadly based, unbiased and technically expert advice regarding the management and use of the radio frequency spectrum in Canada. RABC members represent most stakeholders of radiocommunication in Canada – including: manufacturers, satellite and terrestrial wireless carriers and service providers, network operators, broadcasters, public safety and national security radio network operators, and users.

12. The Board has served, evolved and adapted over the years, but the function it serves remains valid today and is an important element of spectrum management in Canada.

13. In the late summer of 1944 the Radio Manufacturers Association of Canada (now the Canadian Electronics and Communications Association) wrote to C.D. Howe, the Minister of Industry, to propose that the government should sponsor, with the industry, a Canadian Radio Technical Planning Board because, in the words of Mr. R.A. Rush, Controller of Radio in the Department of Transport:

“as a result of the war, the technical knowledge of Canadian radio experts and manufacturing facilities have expanded tremendously, and that there seemed no question but that in the post-war period, Canada will play a greater part than it has in the past in the production and design of electronic equipment and broadcasting.”

and

“the establishment of the Board “would provide a central fact-finding and recommending body which would be of great assistance to the Government.”

14. C.D. Howe recognized the merit in this proposal and directed Mr. Rush to convene a meeting to help organize the Board. Rush met with representatives of several associations in Ottawa on 11 September 1944 and the Canadian Radio Technical Planning Board (“CRTPB”) was born as an “association of associations” While, given its statutory responsibilities, the Government could not participate, directly, in the proposed work plan of the Board, Rush decreed that the government wished to avail itself of advice from the industry and would be “only too pleased to do so as regards the CRTPB”. CRTPB is now RABC.

15. The original sponsor members were:

- American Radio Relay League (Canadian Section)

- Canadian Association of Broadcasters
- Canadian Broadcasting Corporation
- Canadian Electrical Manufacturers Association
- Institute of Radio Engineers
- Radio Manufacturers Association of Canada
- The Railway Association of Canada
- The Telephone Association of Canada

By late 1945 membership had doubled to 16 associations.

16. RABC currently has 21 sponsor members. They are:

- Association of Public-Safety Communications Officials (APCO) Canada
- Bell Telecom Group
- Canadian Association of Broadcast Consultants
- Canadian Association of Broadcasters
- Canadian Association of Chiefs of Police
- Canadian Broadcasting Corporation/Radio-Canada
- Canadian Communications Systems Alliance¹
- Canadian Electricity Association
- Canadian Electronics and Communications Association
- Canadian Satellite and Space Industry Forum
- Canadian Wireless Internet Service Providers
- Canadian Wireless Telecommunications Association
- Department of National Defence
- Government of Ontario (Solicitor General, OPP)
- Model Aeronautics Association of Canada
- NAV CANADA
- Radio Amateurs of Canada
- Railway Association of Canada
- Rogers Wireless
- Royal Canadian Mounted Police
- TELUS

17. Some private companies are members of RABC; they were allowed to join when the Canadian telecommunications industry was deregulated and they were “grandfathered” in the organization. The Board prefers that only associations or large public agencies join. With its “association of associations” model, the Board draws on the expertise of its Sponsor Members’ own members (e.g. Motorola participates directly in RABC through Motorola’s membership in the Canadian Electronics and Communications Association).

¹ The Canadian Communication Systems Alliance joined RABC in December 2018.

18. RABC plays a very important role in a well-functioning Canadian radiocommunications environment. The Board acts as an advisor to Innovation, Science and Economic Development Canada (“ISED”). Standards, guidelines, regulations and policies play a key role in ensuring that radiocommunications equipment and systems work as intended and that interference to services is minimized or non-existent. The risks involved with standards that are not well thought out include the risk of harmful interference as defined in the *Radiocommunication Act*.
19. Spectrum is a finite and shared resource with technical limitations. Radiocommunication regulations are necessary to avoid two critical situations: 1) overloaded frequencies and severe interference; and 2) harm to people (i.e. radio frequency radiation exposure by electronic devices). In addition, regulations and standards are needed to have a well-functioning environment.
20. Efficient regulations are necessary to take advantage of innovation such as new technologies and new devices; and to optimize the use of spectrum.
21. The radio spectrum serves a diverse range of needs, including emergency and public safety telecommunication services, broadcasting, satellite, commercial wireless² communications and non-commercial wireless communications including government, scientific and radio amateurs. Technical standards, guidelines, procedures and policies are required to ensure fair and equitable access to spectrum between these various uses and between users. Updates to the standards, guidelines, etc. are frequently required given the rapid changes in radio spectrum use and technologies.
22. The digital economy, Wi-Fi and the rapid proliferation of smartphones, tablets and other wireless connected devices and “things” (the Internet of Things or “IoT”), as well as other technological developments, all contribute to a huge demand for spectrum. As technology continues to evolve rapidly, user capabilities and services are changing. Notable current examples include IoT, 5G wireless communications and new Low Earth Orbit (“LEO”) satellite constellations, digital broadcasting, vehicular radar, wireless power chargers, etc. Such rapid technological development and the growing global digital economy require significant changes in spectrum use.
23. With the onslaught of smart appliances, connected cars, wearable medical devices and more, many new stakeholders are emerging who lack an understanding of spectrum management and radiocommunications standards. These new stakeholders think in terms of building their “things”, rather than thinking they are building a radio. Spectrum management continues to be vitally important to avoid overcrowding frequencies and interference, and to prevent harm from exposure to radio frequency energy.

² Wireless refers to both terrestrial and satellite services.

24. The diverse range of needs often results in stakeholders having differing and/or conflicting opinions with regards to spectrum management and usage. The RABC process enables technical experts from various competitors and different stakeholder groups to understand each other's position and clarify where there is agreement and where opinions differ and enables the spectrum stakeholders to come to a consensus on spectrum issues. The debate leading to consensus advice is closely monitored by ISED officials, who then become educated and knowledgeable about the varying opinions as well as changes to technology. This helps the Department make better, quicker and more informed decisions.
25. ISED relies on RABC to provide a forum for the reviewing and commenting on the more technical documents, using a process other than the Canada Gazette process. Typically the RABC responds to requests for comments from ISED on the following types of documents:
 - Radio Standards Specifications (RSS);
 - Standard Radio Systems Plans (SRSP);
 - Interference Causing Equipment Standards (ICES);
 - Broadcasting Procedures and Rules (BPR);
 - Broadcasting Equipment Technical Standards (BETS);
 - Technical Bulletins (TB);
 - Database Specifications (DBS); and
 - Guidelines (GL).
26. The Board has established its own process which takes less time than the Canada Gazette process and which can result in stakeholders coming to consensus on various issues. A 2014-15 government evaluation of RABC noted that the Board's process can be measured in months, not years. In contrast, the average Canada Gazette consultation takes 15 months.
27. The Board is proud of its track record. When consensus advice is achieved, it is almost always included in the final published standard. Where consensus cannot be achieved, the Board frequently describes the issues, various opinions and presents options for the Department to consider.
28. RABC will also respond to consultations undertaken in the Canada Gazette process. In some instances, the Board will also develop and submit advice to the Department as a result of the Board's own initiative.
29. Recently, ISED asked the Board to modify its process to allow Canada to fulfill its obligations under the World Trade Organization's notification process. RABC now accepts comments on proposed changes to certain standards from organizations operating within Canada's trading partners.

30. The Board will also invite non-members to participate in discussions when appropriate in order to ensure the Board's advice represents the radiocommunications stakeholder community as fully as possible.

Response to Questions

Question 1.2 *Given the importance of passive infrastructure for network deployment and the expected growth of 5G wireless, are the right provisions in place for governance of these assets?*

31. As ISED documented in the *Spectrum Outlook 2018-2022*, small cell antennas are being incorporated into commercial mobile networks to provide the increased capacity and coverage required to meet the significant increase in demand for data. The deployment of small cell antennas is expected to accelerate to support new 5G features and the further associated increase in demand for data. Deployment will be significant, with estimates that the number of small cells will be ten to one hundred times greater than existing commercial mobile antennas or macro cells. Access to passive infrastructure is also important for public safety.
32. Access to passive infrastructure on commercially reasonable terms to support the rollout of 5G must include not only towers and roof tops, but also support structures, rights of way, utility poles and street furniture, etc. As noted in the terms of reference document:

This importance is expected to grow with developments in 5G wireless, small cells that have equipment distributed in a much greater variety of locations and on non-traditional structures, and increasing demand for fibre optics.³
33. Arrangements between carriers and municipalities and other entities regarding antenna siting must balance the need for carriers to consider local impacts while ensuring that all carriers are able to deploy the antenna systems required in a timely and efficient manner in order to provide 5G services to Canadians. This is not a one-time concern, this is a new paradigm; the need to access passive infrastructure will only increase over time. The RABC is concerned that negotiating and managing access to many tens of thousands of sites, owned by municipal government, utility companies or other owners could impede the rapid large-scale deployment of small cell antennas. RABC members have been urging ISED and the CRTC to revise current regulations and devise strategies to facilitate small cell deployment. The RABC is concerned about the administrative burden on carriers needing to access municipal and other infrastructure. The Board encourages ISED and the Canadian Radio-television and Telecommunications Commission ("CRTC") to develop policies to streamline this process.
34. In the *Spectrum Outlook 2018-2022*, ISED formally recognized these concerns raised by numerous stakeholders regarding the procedural and administrative requirements of its

³ Broadcasting and Telecommunications Legislative Review, Terms of Reference, page 4.

current antenna structure and siting framework as applied to small cells. ISED and the CRTC must now consult on the needed changes to ensure the regulatory regime remains effective in the context of the wide deployment of small cell antennas for 5G.

35. Specifically, the RABC believes Canadian Regulators should: develop a national framework based on best practices to facilitate small cell deployment. At a high level, the framework should be streamlined, predictable, cost effective and non-discriminatory. Specifically, the framework should:
 - institute streamlined processes to its tower-siting procedures for small cells in cases where the full process is not applicable such as where small cells are mounted on existing infrastructure. In order to lessen administrative overhead, the municipal notification, consultation and approval processes for small cells should be streamlined;
 - engage municipalities to develop best practices for use of public rights of way or other public property, and identify and eliminate practices that appear to be unreasonable due to high costs, unpredictable timing, discriminatory treatment of appliances or other concerns;
 - ensure that care is taken to protect legacy radiocommunication services as dense 5G networks are deployed; and
 - take measures to ensure antenna owners log their site data immediately after launch in order to facilitate efficient interference management and network planning given the expected growth of stakeholders/sites.
36. These are examples of practical issues that are top of mind for infrastructure deployments with a specific focus on 5G. Legislative modifications can help empower policymakers to strike the right policy balance.
37. Furthermore, most members of the RABC recommend that the panel:
 - expand the wording of subsection 43(5) of the *Telecommunications Act* to ensure that the CRTC has a clear power to set and/or mediate just and reasonable rates and order access to utility infrastructure of municipal and energy utilities constructed on, over, along or under public property of all descriptions. These access rights should be defined to include the right to install, maintain, repair and operate transmission facilities as defined in the *Act*. This would effectively empower the CRTC to determine the terms of access to infrastructure of municipal and energy utilities and other companies and would have a significant impact on cost predictability, timing predictability, and also to provide regulatory consistency; and
 - extend the statutory right to construct wireline network on municipal property to wireless networks. The *Telecommunications Act* should include a definition of “transmission lines” to specifically refer to wireless equipment/infrastructure.
38. However, one member of the RABC believes the current legislative regime, which leaves the regulation of utility pole access and rates under the authority of provincial/territorial

utility regulators, is balanced, effective and reasonable. In the view of this member, these regulators are the best-suited and constitutionally authorized to recognize and govern for jurisdictional differences, which is especially important as it relates to rural and remote indigenous communities, as it ensures that needs “on the ground” are addressed.

39. This member’s core disagreement with the above recommendation is that it represents a further regulatory burden on Canadian Electrical Utilities (“CEUs”) without a commensurate increase in service, decrease in other regulations, or ability to better serve their rate payers. In this member’s view, if the CRTC has regulatory authority over passive infrastructure, most notably telecom attachments on poles, CEUs would still have their full suite of rate hearings with their provincial regulators, of which pole attachments would remain a component, while also adding an additional regulatory level to their rate process. Furthermore, the CRTC is unlikely to improve the ability of the electricity sector to deliver reliable, affordable, and sustainable electricity, because that is not their mandate and so this member believes there is a serious question about regulator appropriateness.

Question 2.1 *Are legislative changes warranted to better promote competition, innovation, and affordability?*

40. The deployment of spectrum resources requires significant ongoing investments as new technologies and services are developed. For example, research, development and investment did not stop at 1G analog voice service, nor will they stop after 5G networks and services have been deployed. Similarly, research and development in, and the deployment of, new satellite infrastructure and other types of radiocommunications systems is a continuing process. New services and technologies are expected to emerge which will require new spectrum to support higher capacity and lower latency networks.
41. However, annual licence fees for spectrum use in Canada are too high, especially in relation to the United States. For example, wireless service providers in Canada pay over \$185 million each year in annual spectrum licence fees and since 1987, the total amount paid is close to \$3.3 billion.⁴ On an annual basis, this is more than 30 times the amount that commercial mobile operators pay in the United States on a per subscriber basis.⁵
42. Canadian satellite and earth station licensing fees are also high, including in relation to the U.S. In Canada, space station operators pay an annual spectrum licence fee based on the spectrum covered by each licence. In contrast, the Federal Communications Commission (FCC) sets an annual fixed fee per GSO satellite and NSGO satellite constellation to recover the FCC’s costs in administering the licences. In the result, Canadian annual satellite licence fees are often many times the U.S. fee. Similarly, the FCC

⁴ See: <https://www.cwta.ca/facts-figures/>

⁵ Ibid.

levies a single fixed annual licence fee for satellite earth stations to recover its regulatory costs. In Canada, annual earth station licence fees are based on telephone channel equivalencies and in some cases are more than 100 times the U.S. fee.

43. In some cases, Canada's approach to spectrum licence fees also distorts efficient spectrum use. For example, as operators plan to meet the growing demand for wireless services, they will continue to rely on microwave backhaul to densify their networks in major urban centers and to reach underserved communities in rural areas where the deployment of wireline infrastructure is not economically or technically feasible. This means that microwave backhaul requirements will need to achieve gigabit or multi-gigabit capacity to provide the high quality and low latency demands of 5G systems and emerging technologies.
44. In November of 2018, ISED issued DGSO-001-18, *Consultation on Licence Fees for Fixed Point-to-Point Radio System*. The RABC is pleased to see the release of this consultation and intends to submit comments.
45. Unlike Canada, the United States focuses on only recovering the cost of spectrum management when setting fees for the use of commercial mobile spectrum. Similarly, in the U.S. licence fees for satellite space and earth stations are set to recover the FCC's costs of regulating these activities. By not having to spend significant amounts on annual spectrum licence fees, U.S. providers are able to invest that money on innovative activities such as network deployment with capabilities and offering new services attractive to both consumers and productive for businesses. In the case of satellite providers, this would permit Canadian-licensed operators to compete on a more level playing field with foreign operators. Thus, in order to support timely and efficient investment in wireless networks and services, similar to the United States, licence fees for the use of spectrum should be limited to recovering the costs of managing the system.
46. Moreover, users of spectrum in Canada already contribute significantly to the wellbeing of Canadians, whether it is through advancements in research, supporting public health and safety, or through economic development and increases in productivity. The Canadian Government should not use fees for revenue generation. This is money that can be better spent on providing innovative new services to Canadians.
47. Objective 7(b) of the *Telecommunications Act* states that Canadian telecommunications policy must aim "to render reliable and affordable telecommunications services of high quality accessible to Canadians in both urban and rural areas in all regions of Canada." Canada's wireless networks offer world-leading speeds and exceptional coverage across the country; in 2016, 98.5% of Canadians had access to Long Term Evolution ("LTE") speeds.⁶ However, the RABC acknowledges that there is still a lot of work to do to ensure that Canadians in rural areas have access to high quality services that keep pace with the

⁶ CRTC Communications Monitoring Report, 2017, Table 5.5.16

rapidly evolving mobile economy. Smart, innovative, balanced spectrum management policies will accelerate investment in rural broadband and other innovative local services. As such, it is the RABC's view that policy objective 7(b) should be retained as a guiding policy objective for our telecommunications regulators.

48. RABC is of the view that the *Radiocommunication Act* should be amended to provide additional guidance to the Governor-in-Council with respect to prescribing fees. In particular, the RABC recommends that Section 6(1)(l) of the *Radiocommunication Act* clearly indicate that fees should only recover the cost of managing the spectrum. This will ensure that spectrum licence fees do not distort the efficient use of the spectrum and that Canadian spectrum users remain competitive relative to their counterparts in the United States.

Question 3.1 *Are current legislative provisions well-positioned to protect net neutrality principles in the future?*

49. The RABC believes Canada already has the effective legislative tools it needs to protect net neutrality principles in the future, and no additional legislative changes are required. As recently highlighted by the CRTC's Chris Seidl, Executive Director, Telecommunications:

This concept [of net neutrality] is enshrined in the *Telecommunications Act* through section 27(2), which prohibits unjust discrimination or undue preference, as well as section 36, which prohibits telecommunications companies from influencing the content they transmit unless they have received express authorization to do so from the CRTC.

These sections of the *Act* provide the CRTC with the tools and the flexibility to establish and enforce a net neutrality framework that is entirely appropriate and reasonable for Canada.⁷

50. The existing legislative tools provided through the Act have allowed the CRTC to create a number of specific decisions and frameworks, including the internet traffic management practices (ITMP) and differential pricing practices (DPP) of internet service providers frameworks, that comprise the Commission's policy framework for net neutrality. These tools have given the Commission the ability to both protect net neutrality principles and equip network operators with the ability to provide Canadians with the benefits of advanced connectivity services.

⁷ CRTC, *Chris Seidl to the Standing Committee on Access to Information, Privacy and Ethics*, 2018 February 06; Available from: <https://www.canada.ca/en/radio-television-telecommunications/news/2018/02/chris-seidl-to-the-standing-committee-on-access-to-information-privacy.html>.

51. Net neutrality should remain a set of guiding principles for Canada but should not become absolute or rigid rules. It is important for network operators to retain the ability to manage networks in ways that differentiate traffic while still meeting the spirit of the guiding principles, including for security and protection of networks or to address unpredictable traffic events. The CRTC itself has recognized this, explicitly stating that ITMPs that have been employed to protect users from network threats such as malicious software, spam, and distribution of illicit materials are a necessary part of network operations, as well as those employed temporarily to address unpredictable traffic events in order to protect network integrity.⁸ In the Commission’s DPP framework, they noted that their decision does not apply to the various practices, offerings, and wholesale business arrangements that support certain applications, such as some Internet of Things applications, which make use of managed internet-protocol networks rather than the public internet.⁹
52. Maintaining this balance between protecting from unjust discrimination or undue preference with the flexibility of network operators to continue managing and enhancing the performance of their networks will become increasingly important in the future as new advanced connectivity services become available, such as 5G wireless networks.
53. 5G standards have been developed to support three distinct application categories: enhanced Mobile Broadband (eMBB); Ultra-Reliable & Low Latency Communications (URLLC); and, massive Machine Type Communications (mMTC). While initial 5G deployments will focus on the eMBB use case, the ultimate 5G vision includes the development of a network that can allow the provision of all three categories over a single physical infrastructure by way of a new technology called “network slicing”. Carriers will be able to deliver distinct types of services over the virtual slices of their network, providing different levels of security, speeds, latency, etc., based on the needs of the specific use cases. For example:
- Applications such as telehealth and robotic surgery, which can benefit society as a whole, require prioritization over other traffic (URLLC);
 - Video traffic treated differently from web browsing in terms of delay (eMBB);
 - Mission critical users, including emergency first responders, require minimum delay (URLLC), sometimes combined with maximum speed and bandwidth (eMBB); and,
 - Smart metering and advanced agricultural monitoring only require small amounts of data sent in an intermittent fashion (mMTC).
54. A regulatory framework in which differentiation of data and traffic is not allowed would impede the implementation of Network Slicing to serve different use cases requiring vastly different network characteristics and performances. In the IoT future, billions of devices other than smart phones and laptops will be connected to the network, each

⁸ CRTC, *Telecom Regulatory Policy CRTC 2009-657: Review of the Internet traffic management practices of Internet service providers*; Available from: <https://crtc.gc.ca/eng/archive/2009/2009-657.htm>.

⁹ <https://crtc.gc.ca/eng/archive/2017/2017-104.htm>

having their own different requirements for network access. The network characteristics to allow self-driving cars to communicate with each other and the road system are starkly different from those required to provide in-home virtual or augmented reality entertainment experiences.

55. Ensuring the best use of the limited and shared air interface across these multiple slices of the network will require sophisticated network management and orchestration techniques. To preserve the ability of network operators to serve these markets, it is important to maintain flexibility to create products and services that treat the unique requirements of different devices on the network differently.
56. The RABC supports a net neutrality framework that allows and incentivizes innovation, customization, and investment in networks while at the same time creating networks without unjust discrimination or undue preference. This means a framework that provides:
 - Consumers with access to the lawful content, applications, and services they want;
 - Operators with the freedom to manage their networks to assure that their users receive the quality and access that they have demanded; and,
 - Content and Application Providers with an environment that allows for customized experiences based on the demand of their customers.
57. As Mr. Seidl stated about the *Telecommunications Act*, “the broadly worded statutory provisions have stood the test of time and have allowed the CRTC the flexibility required to address more modern concerns. They have been able to adapt to modern technology and needs, including net neutrality.”¹⁰ The current legislative tools provide the government and Canadian regulators with the necessary flexibility to allow the network management required to deliver innovative new communication services while protecting the principles of net neutrality, creating a win-win-win situation for Canadians, network operators, and content and application providers. No legislative changes are required, and any changes should ensure that the current legislative flexibility is maintained.

Question 6.1 *Are the right legislative tools in place to balance the need for flexibility to rapidly introduce new wireless technologies with the need to ensure devices can be used safely, securely, and free of interference?*

Effective Spectrum Regulation

58. RABC believes that spectrum management in Canada has generally worked very well and that the necessary legislative tools are all in place.

¹⁰ CRTC, *Chris Seidl to the Standing Committee on Access to Information, Privacy and Ethics*, 2018 February 06; Available from: https://www.canada.ca/en/radio-television-telecommunications/news/2018/02/chris_seidl_to_thestandingcommitteeonaccesstoinformationprivacya.html.

59. Given that spectrum is an important shared and finite natural resource, the primary goal of the Canadian spectrum management authorities should be to ensure that spectrum is made available for radiocommunications services and applications to best serve the interests of Canada and Canadians. This involves appropriately allocating spectrum for various purposes, and making sure that it is used in an orderly and efficient manner. Since spectrum knows no borders, this must also be done with a view to appropriately sharing the spectrum internationally, both at our borders and within the international spectrum framework as determined by the International Telecommunications Union (“ITU”).
60. An essential part of spectrum management is to mitigate interference. Simply put, when two or more radio signals occur simultaneously at the same location and on the same frequency, they can interfere with each other and disrupt the services intended to be delivered. Therefore, spectrum must be managed to prevent interference.
61. RABC submits that current Canadian legislation adequately provides all the tools and methods necessary to manage the spectrum and mitigate interference. This includes the ability to define various licensed and unlicensed regimes for various spectrum bands and applications, to develop and prescribe various spectrum policies and technical standards, including the determination of necessary requirements for operating radiocommunications systems and the certification of radio equipment. Additionally, provisions exist for monitoring and enforcement, including the ability to impose fines or penalties where necessary.
62. We are witnessing a proliferation new devices, technologies, operators and users. Many new spectrum stakeholders are emerging such as automobile makers, medical device manufacturers, home appliance makers and makers of pet tracking devices. The spectrum manager must engage with these new stakeholders to inform them of applicable regulations and standards that must be complied with. This can be challenging in some cases because the manufacturer is not thinking in terms of making a radiocommunication “device”, but rather is focused on making a wirelessly connected “thing”. The challenge can be compounded because international manufactures may not understand that Canadian regulations apply to products sold in Canada, and that Canadian standards may differ from standards in other countries.
63. The spectrum manager must also continuously re-evaluate the optimal use of the spectrum and make changes to adapt as new technologies and services ebb and flow. The spectrum manager must often take steps to protect and/or migrate legacy systems and services in an orderly way as various new technologies come onto the scene. In doing so, the spectrum manager must often take complex technical considerations into account and possibly impose technical constraints as well in order to facilitate incompatible systems to co-exist without impairment.
64. The RABC plays an important role advising and assisting the government in many aspects of this process. Indeed, we have often heard spectrum managers and players from other

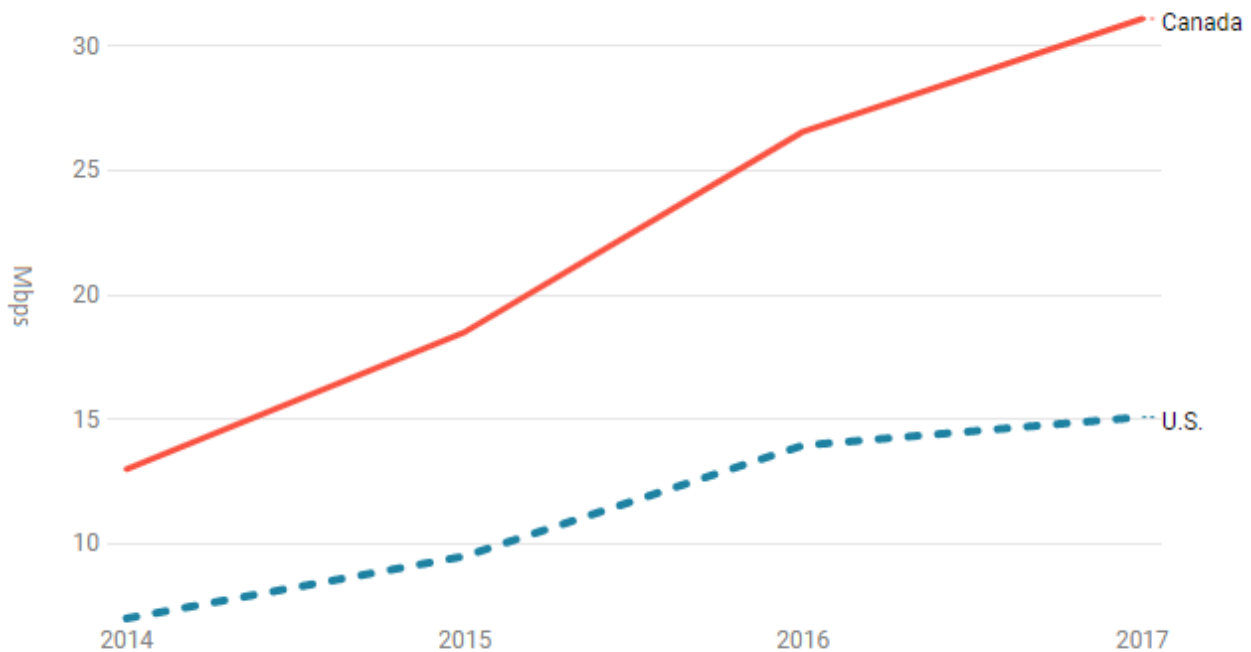
countries marvelling at the effectiveness of Canadian spectrum management and particularly the unique RABC model and ability of the spectrum manager to avail itself of contributions from the RABC, and expressing regret at their inability to form a similar entity for various legislative or political reasons.

65. Having said that spectrum management in Canada has generally worked well, we would be short-sighted if we did not recognize the challenges faced by industry and spectrum regulators. The spectrum management challenges described below are evident in Canada and in other countries. RABC believes that spectrum managers face increasing challenges to fulfill their roles in several aspects:
- Technological advancements and the accelerating pace of change;
 - Increasing demand for spectrum;
 - International coordination requirements; and
 - New stakeholders in spectrum management.

Technological Advancements And The Accelerating Pace Of Change

66. Technologies have been advancing enormously and exponentially in many industries. Computing, information and radiocommunication technologies are no exception.
67. Over the last few decades, processing power, which refers to the speed and number of operations that a processor can handle in an amount of time, has both increased and dramatically reduced in cost. Processing power increased dramatically in the PC market leading to such cheaply available processors that powerful devices in very compact formats such as mobile devices and cloud computing became a viable option.
68. Similarly, mobile communications technologies experienced an astounding growth. Starting with the first generation (1G) in the 80's, mobile phones function was strictly limited to making voice calls. With the introduction of second generation (2G) mobile technologies in the 90's, besides making voice calls, mobile data was enabled with speed in the hundreds of Kbps (kilo bits per second). When the third generation (3G) launched around the year 2000, mobile internet speeds were in the range of tens of Mbps (Mega bit per second), an increase of 10 thousand times compared to 2G. The current fourth generation (4G) was marketed around 2008 as being capable of data speeds in the hundreds of Mbps. With continuous enhancement and improvements, 4G mobile internet speed continues to exponentially. Based on the annual reports issued by OpenSignal (<https://opensignal.com/>), one can determine that the average mobile internet speed in Canada has more than doubled from 2014 to 2017 (as shown in Figure 1). From 2G to the current 4G wireless networks, mobile internet speeds have increased over 100 thousand times in a short period of time of a few decades.

Figure 1: Average Mobile Internet (LTE) Network Speeds



69. Not only has the pace of technology advancement increased over the years, the speed of consumer adoption of various technologies has also increased. This is due to the critical mass of end users having access to technologies with lower cost barriers and higher benefits. For example, while it took decades for the telephone to reach 50% of households, it only took five years or less for cellphones to accomplish the same penetration in 1990¹¹.
70. Harvesting the power of computing and computers, and the combination of mobility, broadband connectivity and cloud/Artificial Intelligence (AI), will be the basis for unimaginable products and services for consumers and industries alike. Spectrum management will have to be flexible to adapt to the constant change and evolution of these products and services.

Increased Demand For Spectrum

71. The radio frequency spectrum is a unique, finite resource that is an integral component of wireless infrastructure. In addition to the fact that the range of services for which spectrum is used continues to grow, data traffic overall has been growing exponentially. These factors dramatically increase the pace of spectrum consumption, causing demand to increasingly outstrip supply. This spectrum crunch has placed greater pressure on regulators to correctly ration and balance spectrum demand between various competing uses.

¹¹ <https://hbr.org/2013/11/the-pace-of-technology-adoption-is-speeding-up>

72. With a focus on ensuring that industries and consumers benefit from world-class networks and advancements in new digital technologies and services, spectrum regulators are constantly facing the issues of spectrum reallocation of existing services to new services and of sharing spectrum between services.

Participation In International Process For Spectrum Management

73. International coordination of spectrum is handled at the ITU, Regional or Bilateral levels. Harmonization of spectrum is critical for the development of wireless technologies. Harmonization and coordination of spectrum management on international and regional levels allows economies of scale to be captured for network infrastructure and devices, therefore benefiting operators and end users by lowering the equipment cost. Harmonization and coordination also facilitate interference management on a cross border basis and is required to support network technologies with global or regional coverage, such as satellite.

74. With wireless communication becoming a critical component of nations' infrastructure and with increased participations from nations around the world, Canada needs to actively participate, contribute and influence the direction of ITU discussions taking to consideration of Canadian situation and requirements. Adequate resources allocations from Canadian stakeholders, private and public alike, is a must to avoid running the risk of being left behind in the race to implement new wireless technologies.

New Stakeholders In Spectrum Management

75. Today spectrum management encompasses a broad category of users ranging from private, commercial, consumer, defence, national security, scientific and public safety. In the immediate future, as discussed earlier 5G and new satellite use cases/applications are not only intended for the traditional telecom service providers and users but also for myriad of vertical industries from manufacturing, transportation, healthcare, education etc. Spectrum management will require consideration of requirements and inputs from vertical industries that may not have previously dealt with spectrum management. The complexity of issues and the number of stakeholders will surely be drastically increasing. The spectrum regulator will have to be equipped with adequate and appropriate skilled resources to deal with this complexity.
76. Notwithstanding these new challenges, RABC believes the fundamental role of the spectrum manager remains essentially the same and believes that the current legislative framework is sufficiently flexible to meet these challenges without requiring additional change.
77. Moreover, the RABC is of the view that the current Canadian legislation provides the tools and methods necessary to manage the spectrum and mitigate interference and the current legislative framework is sufficiently flexible to meet emerging challenges without requiring additional change.

Question 7.1 – *Is the current allocation of responsibilities among the CRTC and other government departments appropriate in the modern context and able to support competition in the telecommunications market?*

78. The RABC does not have a consensus position regarding the allocation of responsibilities among the CRTC and other government departments. However, should the government decide that changes are necessary, RABC respectfully suggests that careful attention should be taken to make sure that the function RABC has served for 75 years, as well as its collaborative relationship with the spectrum manager, are taken into account and preserved.

Conclusion

79. RABC appreciates the opportunity to provide these comments.

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