



Spectrum Outlook Consultation

Presentation to RABC
November 24, 2017

EDMRS# 841557



Intent

- The [Consultation on the Spectrum Outlook 2018 to 2022](#) was published on October 6, 2017
- The consultation will inform ISED's spectrum release plan for the next 5 years by seeking input on:
 - Demand pressures (e.g. expected traffic and user growth) on spectrum for the following:
 - Commercial Mobile
 - Fixed Wireless and Backhaul
 - Satellite
 - Licence-exempt (limited to IoT and Wi-Fi devices)
 - New technologies, techniques and applications that will have an impact on spectrum requirements
 - Potential bands that can be released for the these four services/applications including timing and relative priority

A principled approach to releasing spectrum

- Guided by existing policy objectives in the *Telecommunications Act* and *Spectrum Policy Framework for Canada*
- Key elements to consider when releasing spectrum:
 - The timeliness of spectrum releases to ensure they are aligned with and reflective of market and technology developments
 - Maximizing the use of spectrum
 - Fostering innovation

New technologies and techniques

- New technologies and techniques such as:
 - Cognitive radio
 - Dynamic spectrum access
 - Smart antennas
 - Radio resource management techniques
 - Intelligent decision-making solutions
 - Geographic/operational awareness of the radio environment
- Provide new opportunities for optimizing the use of spectrum and promise to make it increasingly feasible to share spectrum in real time between multiple different services
- ISED will take this into account when assessing the potential changes to spectrum allocations and when prioritizing spectrum releases
- These may require that we examine new approaches to spectrum licensing in order to enable and support these technologies and techniques

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?

Demand – Commercial Mobile

- We considered three factors to assess the future spectrum requirements subscribership, traffic growth and technology advancements
- Impact of demand on commercial mobile spectrum requirements:
 - Continued growth in data traffic generated by an increasing number of users in various sectors and the data-intensive applications running on mobile networks may not be sustainable with the use of existing mobile spectrum only
 - 5G networks will require low frequency bands for coverage, mid-range frequency bands to provide both coverage and capacity, and high frequency bands to provide large bandwidths to meet high broadband speeds

Do you agree with the assessment on demand for commercial mobile services in the next few years? Is there additional information on demand that should be considered?

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?

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?

Demand – Licence-exempt

- Focused mainly on Wi-Fi and IoT applications (e.g. connected wearable devices, connected cars and cities) since they have seen the most significant growth in recent years
- Impact of demand on licence-exempt spectrum requirements:
 - There will be a growing demand for spectrum in the licence-exempt bands due to the growth of Wi-Fi devices seeking higher speeds and performance, and the potential volume of IoT devices
 - Licence-exempt devices are expected to be used for a wide variety of applications with various bandwidth, power and transmission range requirements which needs to be taken into account

Do you agree with the assessment on demand for licence-exempt applications in the next few years? Is there additional information on demand that should be considered?

What new technology developments and/or usage trends are expected to address traffic pressures and spectrum demand for licence exempt application? When are these technologies expected to become available?

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?

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?

Demand – Satellite

- Examined MSS, FSS and BSS (further detailed analysis on the C-band, Ka-band and Ku-band) and earth observation
- Impact of demand on satellite spectrum requirements:
 - Existing MSS spectrum is likely sufficient to meet this demand in Canada
 - Based on this expected demand it would be possible to consider how C-band could be used in the future
 - Congestion in the Ku-band and the emergence of NGSO systems indicate that there will be a need to consider additional spectrum for these types of satellite services
 - Increasing capacity requirements for higher resolution Earth observation systems require the consideration of additional spectrum for those services

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

ISED is seeking comments on the 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 C-band, Ku-band and Ka-band?

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?

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

Demand – Backhaul

- The demand for backhaul capacity is linked to the demand for other services, including commercial mobile, licence-exempt and satellite systems
- Impact of demand on back spectrum requirements:
 - The technical and policy changes that are currently being implemented and backhaul technology advances will serve to help operators respond to some of this demand
 - The expected capacity requirements and deployment scenarios of 5G will require that some new spectrum be made available in the next five years

Do you agree with the assessment on demand for backhaul in the next few years? Is there additional information on demand that should be considered?

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?

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?

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?

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?

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

Ongoing and planned releases

Band	Service/application	Status
600 MHz	Commercial mobile	Consultation on Technical , Policy and Licensing Framework for the 600 MHz band
AWS-2 (H-block)	Commercial mobile	Subject to future consultation
3500 MHz	Commercial mobile Fixed	Subject to future consultation
7 and 9 GHz	Satellite – EESS	Consultation on the revisions to the Canadian Table of Frequency Allocations
13 GHz	Backhaul	Being implemented as set out in the Backhaul Decision
28 GHz	Commercial mobile Fixed	Consultation on Releasing Millimetre Wave Spectrum to Support 5G
32 GHz	Backhaul	Being implemented as set out in the Backhaul Decision
37 GHz	Commercial mobile Fixed	Consultation on Releasing Millimetre Wave Spectrum to Support 5G
38 GHz	Commercial mobile Fixed	Consultation on Releasing Millimetre Wave Spectrum to Support 5G
64-71 GHz	Licence-exempt	Consultation on Releasing Millimetre Wave Spectrum to Support 5G

Potential bands for release

- Potential frequency bands that could be made available between 2018 and 2022 are based on:
 - Bands opened at WRC-15
 - Bands being considered at the upcoming WRC-19
 - Bands that have been released or are being considered for release in other countries
 - Equipment potentially being made available during the next five years
- For each band, the consultation indicates ISED's view on the potential new use and if the band should be reviewed/released in the next five years

Your view of the assessments on the bands being considered internationally for the four services/applications.

ISED is seeking comments on the potential frequency bands for release

- the proposed services and/or applications for each frequency band
- the potential timing of releasing for each frequency band
- the priority of the release of the frequency bands

Are there any other bands that should be considered for release in the next five years for the four services/applications that are discussed in the document?

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

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

Potential bands for release

Band	Potential service/ application	Band	Potential service/ application
814-824/859-869 MHz (800 MHz)	Commercial mobile	40-42.5 GHz	Commercial mobile Fixed Satellite
896-960 MHz (900 MHz)	Commercial mobile Fixed Licence-exempt	45.5-50.2 GHz	Commercial mobile Fixed Satellite
1427-1518 MHz (L-Band)	Commercial mobile Fixed	50.4-52.6 GHz (51 GHz)	Commercial mobile Fixed Satellite
1695 – 1710 MHz (AWS-3 unpaired)	Commercial mobile Fixed	71-76 GHz	Fixed Commercial mobile Licence-exempt
24.25-27.5 GHz	Commercial mobile Fixed Licence-exempt	81-86 GHz	Fixed Commercial mobile Licence-exempt
31.8-33.4 GHz (32 GHz)	Commercial mobile Fixed	Bands above 95 GHz	Licence-exempt Fixed

Existing services/applications currently allocated or in use are not necessarily included in this table; detailed use is provided in the discussion of each frequency band in the consultation.

Deadlines

- Comments due January 9, 2018
- Reply comment due February 8, 2018