Spectrum

Radio frequency spectrum characteristics, and its associated policies, impact all forms of wireless internet service delivery, including satellite and Wi-Fi based technologies. Radio frequency spectrum in Canada is managed by the Ministry of Innovation, Science, and Economic Development (ISED). Spectrum is a finite public resource utilized by various bodies, including commercial private sector entities and their consumers, as well as public sector entities including defence, police, emergency responders, and researchers.

Spectrum is periodically divided into frequency bands, which are allocated for one or more specific uses by international voting decisions at the World Radiocommunication Conference (WRC), which is supported by the International Telecommunications Union (ITU), an agency of the United Nations.

Countries usually adapt global policies developed by the WRC and ITU, and allocate frequency bands on a domestic basis. While the ITU coordinates frequency for different services (broadcasting, mobile, radio, etc.), individual countries determine how those frequencies are subdivided geographically and in terms of channel size.

In Canada, these are set out in The Canadian Table of Frequency Allocations (CTFA). Canadian spectrum allocations tend to align with those of the United States, allowing network operators to take advantage of economies of scale achieved by US telecommunications equipment ecosystems specific to each band.

Only a fraction of the complete electromagnetic spectrum can support radio communication, which is why it is important to use the resource as efficiently as possible. As radio communication technology advances, spectrum utilization becomes more efficient. This “spectral efficiency” allows a single block of spectrum to deliver a greater capacity to service more subscribers.

The Spectrum Management System (formerly Spectrum Direct) is a public database that allows users to view data collected and managed by the Canadian Spectrum Program, and search for spectrum used for communications and broadcasting purposes according to geographic area, frequency, licensee name, and other parameters.

Table 4. A curated and summarized list of radio frequency spectrum assigned for broadband technologies

RADIO FREQUENCY BANDS (MHZ)	INTENDED USAGE	COMMENTS
512 - 608,	• For Remote Rural Broadband Systems (RRBS)[96].	• RRBS service providers can operate on a secondary basis (i.e. no-interference, no-protection), with broadcasters getting priority. • The frequency range 614-698 MHz was permanently removed from this category in 2019, and was reallocated for mobile broadband services[97].
614-698 MHz	• For Mobile Broadband Services. Was formerly for RBBS and over the air television	• These spectrum licenses were auctioned off in 2019. • In Alberta, blocks are owned by Rogers, TELUS, and Freedom (now Shaw) [98].
763 - 768, 793 - 798	• Public Safety Broadband Block (PSBB). • For public safety broadband use.	• The 700 MHz band was formerly used for over-the-air television[99]. • This frequency band is favoured for delivering next-generation wireless services, as it carries well over long distances and is able to penetrate structures[100].
2500 - 2690	• For broadband radio services (BRS).	• These spectrum licenses were auctioned off in 2015. • In Alberta, blocks are owned by TELUS, Bell, Rogers, Corridor Communications Inc., Videotron, and Bragg Communications[101]. • This spectrum is best suited for expanding the capacity of mobile systems in urban areas. • Not ideally suited for mobile systems covering expansive rural and remote areas.
902 - 928, 2400 -2483.5, 5150 - 5350, 5470 - 5600, 5650 - 5850, 24050 - 24250	• For wireless broadband services (no spectrum license required).	• License exempt spectrum[102]. • Devices must adhere to specific Radio Standard Specifications. • Services operate under a secondary allocation basis (i.e. no protection and no-interference).

3475 - 3650	• For fixed wireless access (spectrum license required).	• Spectrum in some Tier 4 localized service areas has been made available for licensing. • Annual spectrum licence fees apply[103]. • Devices must adhere to specific Radio Standard Specifications[104,105].
3500[106]	• 200 MHz of spectrum available for “flexible use” such as mobile 5G or fixed wireless.	• To be auctioned off in June 2021. • There will be 50 MHz “set aside” spectrum in markets where enough spectrum is available for smaller and regional competitors.
3650 - 3700	• For wireless broadband services (spectrum license required).	• Licensing is shared wherein all licensees have equal access to the spectrum[107]. • Currently no annual spectrum licence fees.
4940 - 4990	• For fixed and mobile services in support of public safety.	• The primary uses of this band are designated for broadband mobile services for public safety, and fixed systems that support these broadband mobile systems[108]. • Additional spectrum in the 8 GHz range for public safety is being planned for auction in the ISED Spectrum Outlook 2018 to 2022.

In evolving rules around the future uses of spectrum, Innovation, Science and Economic Development works to ensure that Canadian spectrum users have enough for next generation technologies, and are also in step with the United States. The federal ministry’s most recent strategic outlook for spectrum was published in 2018, and is called Spectrum Outlook 2018 to 2022. It includes plans for supplying next generation 5G technologies, among other purposes.

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