

June 2nd, 2021

Beijing

Qualcomm

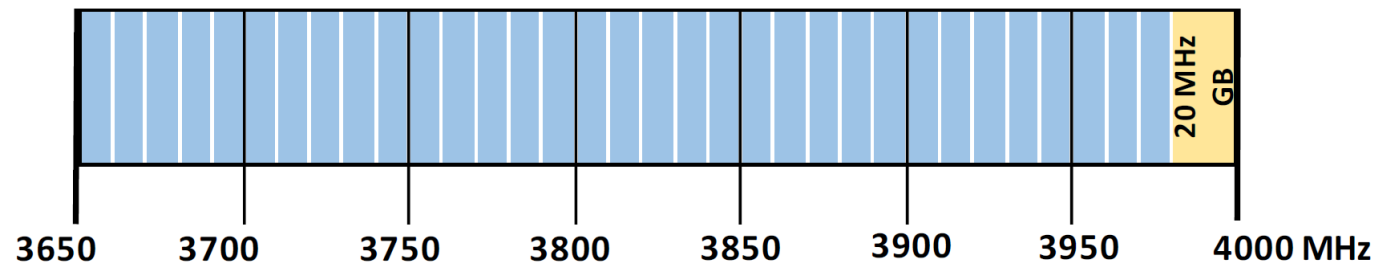
North America Spectrum Update

FuTURE Spectrum WG 2021 #2 meeting

Canada n77 spectrum

3650-3980 MHz for 5G

- The Canadian spectrum regulator (ISED) released the decision allocating 3650-3980 MHz for 5G on May 21st, 2021.
- There is no CBRS in Canada.
- Satellite companies have to move off the spectrum by March 31, 2025.
- There are some limited wireless (non-cellular) incumbents in the band. For the most part, they will have to vacate the band, but some will remain in 3900 to 3980 MHz which will have to be shared.
- The Canadian regulator adopted a band plan with 33 channels of 10 MHz each.
- ISED is adding a primary mobile service, except aeronautical mobile, allocation to the 3700-4000 MHz. Except for authorizations that may be issued to facilitate the relocation of existing gateway stations prior to the transition date, no new earth stations will be authorized in the 3700-4000 MHz band. New and transitioned FSS earth station licenses are limited to the 4000-4200 MHz band.



Source: <https://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf11699.html>

~~3 700 - 4 200~~ 4 000

FIXED
FIXED-SATELLITE (space-to-Earth) **CZZ**
MOBILE except aeronautical mobile

ADD CZZ: As of March 31, 2025, FSS earth stations will no longer be licensed in the band 3700-4000 MHz, except for in satellite-dependent areas and specific identified gateway locations. Any earth station operations in non-satellite dependent areas in the band 3700-4000 MHz after this date will be on a no-protection basis, as per the *Decision on the Technical and Policy Framework for the 3650-4200 MHz Band and Changes to the Frequency Allocation of the 3500-3650 MHz Band*.

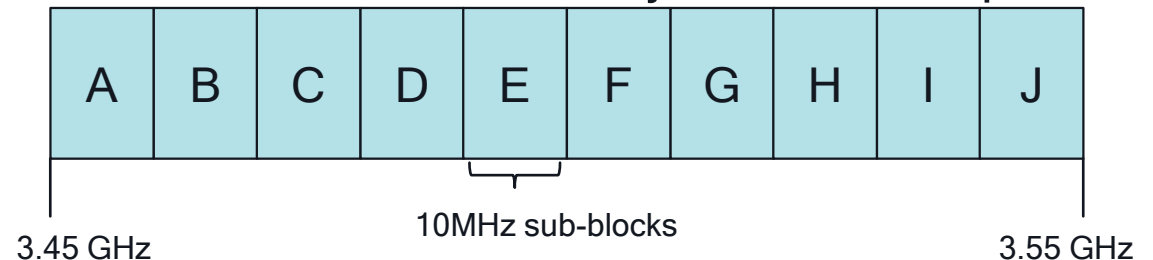
Canada 6 GHz spectrum

5925-7125MHz license-exempt

- ISED will allow license-exempt RLAN use in the entire 5925-7125 MHz band, as in the US.
- Standard-power RLANs under the control of an AFC system will be permitted to operate on a license-exempt basis in the 5925-6875 MHz frequency range.
- Low-power indoor-only RLANs will be permitted to operate on a license-exempt basis across the 5925-7125 MHz band with the use of a contention-based protocol (e.g. listen-before-talk).
- Indoor and outdoor very low-power RLAN devices will be permitted to operate on a license-exempt basis across the 5925-7125 MHz band with the use of a contention-based protocol (e.g. listen-before-talk).
- AFC
 - ISED will adopt an AFC system that is practical, consistent with the Canadian public interest and harmonized with the U.S. to the maximum extent possible.
 - Canadian AFC rules will include a requirement to protect licensed fixed service systems and radioastronomy sites.
- Final technical rules still need to be adopted.

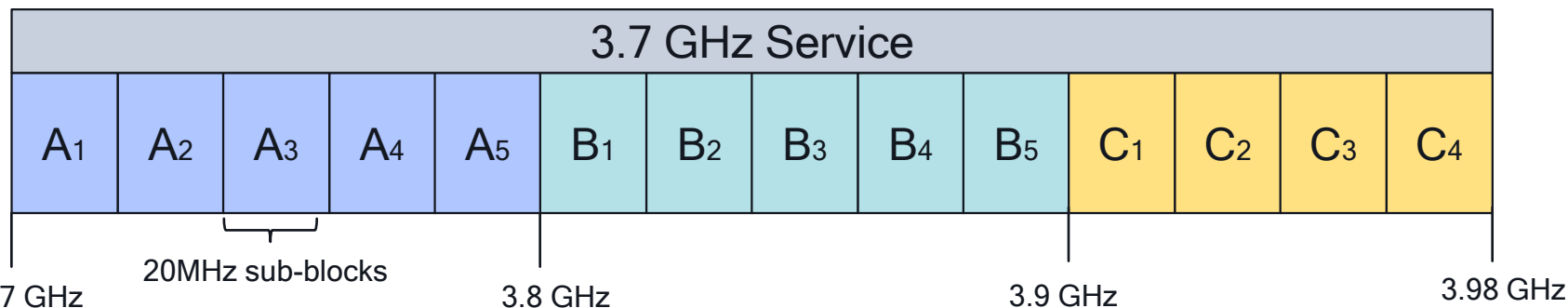
US 3.45-3.55 GHz Second Report and Order

- FCC released the second report and order on US 3.45-3.55 GHz in March of 2021. FCC will start auction of licenses for 3450-3550 MHz (3.45 GHz) band by December 31, 2021. Will grant 3.45 GHz Service licenses for 15-year terms.
- US Department of Defense will still need to use some of this spectrum at some locations, at some times. So, FCC adopted a cooperative sharing regime by defining Cooperative Planning Areas (CPAs) and Periodic Use Areas (PUAs) in portions of the US.
 - In CPAs, Defense Department will continue to use the spectrum. New wireless licensees must coordinate with federal users & not cause interference to federal operations. In PUAs, Defense Department needs episodic use of the spectrum. New wireless licensees may not cause interference to episodic federal operations.
 - The DoD will create an online portal through which a 3.45 GHz Service licensee must initiate formal coordination requests for its relevant systems within associated CPAs and/or PUAs. In addition, according to NTIA, an Incumbent Informing Capability (IIC) also could be developed to facilitate coordination within the PUAs. The DoD would use the IIC to schedule the time and frequency span for each episodic use in PUAs.
- There will likely need to be coordination between new wireless licensees & adjacent CBRS operations.







3.7 - 4.2 GHz (C-Band) Auction 107

- In August 2020, FCC established bidding procedures for December 8th, 2020 C-Band Auction (auction 107). Auction ended in February 2021.
- A licensee in the 3.7-3.98 GHz band may provide any services permitted under terrestrial **fixed or mobile** allocations with 15 years license term.
- Deadline for clearing the entire band is 2025, but satellite operators can receive large payments to accelerate the clearing process to Dec 2021 for the lower 120 MHz (including 20 MHz guardband) in 46 of the top 50 regions and Dec 2023 for the upper 180 MHz across the entire US (& the lower 120 MHz where it wasn't cleared in 2021). Expect them to meet the Dec. 2021 initial deadline.
- High bids were over \$81.11 billion or 94 cents per MHz/pop-- largest mid-band 5G spectrum auction worldwide. Big winners were Verizon (\$45 billion for big national footprint), AT&T (\$23 billion for smaller national footprint), & T-Mobile (\$9 billion for non-national footprint). Verizon is already deploying equipment in 60 MHz of initial 100 MHz to be clear in Dec 2021. AT&T owns other 40 MHz.





Thank you

Follow us on:    

For more information, visit us at:

www.qualcomm.com & www.qualcomm.com/blog

Nothing in these materials is an offer to sell any of the components or devices referenced herein.

©2018-2021 Qualcomm Technologies, Inc. and/or its affiliated companies. All Rights Reserved.

Qualcomm is a trademark or registered trademark of Qualcomm Incorporated. Other products and brand names may be trademarks or registered trademarks of their respective owners.

References in this presentation to “Qualcomm” may mean Qualcomm Incorporated, Qualcomm Technologies, Inc., and/or other subsidiaries or business units within the Qualcomm corporate structure, as applicable. Qualcomm Incorporated includes our licensing business, QTL, and the vast majority of our patent portfolio. Qualcomm Technologies, Inc., a subsidiary of Qualcomm Incorporated, operates, along with its subsidiaries, substantially all of our engineering, research and development functions, and substantially all of our products and services businesses, including our QCT semiconductor business.