

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D. C. 20554**

In the Matter of)
)
Facilitating Shared Use in the 3.1-3.55 GHz Band) WT Docket No. 19-348

To: The Commission

**PETITION FOR RECONSIDERATION
ARRL, THE NATIONAL ASSOCIATION FOR AMATEUR RADIO**

ARRL, the national association for Amateur Radio, also known as the American Radio Relay League, Incorporated (“ARRL”), pursuant to Section 1.106 of the Commission’s rules,¹ files this Petition for Reconsideration (“Petition”) of the Report and Order adopted by the Commission in the above-captioned proceeding (“Report and Order”).² In this Petition, the ARRL requests that the Commission reconsider its Order removing the secondary allocation for the Amateur service at 3300-3500 MHz and requiring that Amateur operations in the 3450-3500 MHz band cease “on a date consistent with the first possible grant of flexible use authorizations to new users.”³

The Amateur services in this band long have been operated on a secondary allocation status functionally similar to the *de facto* secondary status of Part 5 experimental licenses whose continued operation was (correctly) approved in this same proceeding. Continued

¹ 47 C.F.R. § 1.106.

² *Facilitating Shared Use in the 3.1-3.55 GHz Band*, Report and Order, WT Docket No. 19-348, FCC 20-138, 85 Fed.Reg. 64062 (publ. Oct. 9, 2020).

³ *Id.* at 20-138, para. 26.

operation of amateur stations similarly should be permitted in the vacant portions of this spectrum that otherwise will go unused, subject to the same secondary status and requirement to cease operation should any interference actually occur or reasonably be predicted to occur.

The Commission's conclusion that amateur operations are incompatible with the mobile and fixed services intended to be provided by the new non-federal primary licensees, and that the primary licensees will use "all frequencies in the band" in all geographic areas,⁴ is speculation without grounding in the record nor in the actual experience of commercial operations conducting similar services in equivalent bands. In any event, secondary status provides a flexible and meaningful adjustment mechanism that allows primary users to employ all the spectrum in all of their licensed geographic areas unimpeded, should they in fact do so.

For the same reasons, amateur stations should be permitted to continue to operate until a primary licensee is actually ready to use the spectrum, including in 3450-3500 MHz. Nationwide build-outs take time, measured in months and years, and often do not reach rural areas at all, or at least until urban and suburban areas are built out. Radio amateurs reside and experiment in some of those rural areas, and with antennas pointed sky-ward that in many instances would fully protect primary users.

The public interest is in using the spectrum, not in leaving it vacant until some future use is ready to be implemented. Given the short propagation paths and narrow antenna beamwidths for many of the terrestrial services at these frequencies, build-out covering most of the country, including rural areas, will be measured in years rather than days. The

⁴ *Id.* at para. 24.

Commission itself recognizes this timeframe with its 12-year construction deadlines proposed in the Further Notice that accompanies the Report and Order in this proceeding.

Given the engineering talent and abilities of radio amateurs, and the undisputed secondary status protecting all primary users without exception, there is no rationale that supports shutting down radio amateur operations just to leave spectrum capacity vacant. Unlike agricultural land, spectrum does not improve by being “rested” between uses. Unused spectrum value simply is lost and cannot ever be recovered. The Commission’s decision in this proceeding undermines its longstanding policy objective to provide for and encourage more intensive use of spectrum.

REMOVAL OF THE AMATEUR SECONDARY ALLOCATION WASTES VALUABLE SPECTRUM CAPACITY AND BENEFITS NO ONE

Radio Amateurs have made good use of this spectrum for decades on a purely secondary, non-interfering basis. The record contains hundreds of comments expressing concerns with the cessation.⁵ While we understand that more intense use for 5G is planned for this spectrum in the future, there is no proceeding open to consider future uses for most of the spectrum at issue, *i.e.*, 3300-3450 MHz. The remaining spectrum, 3450-3500 MHz, is included in spectrum addressed in the Further Notice of Proposed Rulemaking associated with this proceeding but build-out that would raise concrete interference scenarios is years away in many parts of the country and timing will vary by licensee and geography.

The Commission’s decision to remove the Amateur secondary allocation throughout the 3300-3500 MHz band appears to be based upon a mistaken conclusion that amateur secondary “sharing” of this spectrum is equivalent to the type of “sharing” that occurs with

⁵ See the comments of hundreds of licensed radio amateurs in the record, including, *e.g.*, Comments of ARRL at p. 7-8 (dated Feb. 21, 2020).

primary government and other primary commercial users, when in fact Amateur secondary operations are quite different in usage, scope, and signal range. Amateur operations in this spectrum use relatively low-power and are engineered by individual amateurs to eliminate potential for interference to other users. The process is dynamic. Amateurs do not employ the type of high power radar used by federal and non-federal users. Nor are amateur uses comparable to other commercial users that rely on high power and continuous operation.

The correct analogy to understand the types of Amateur operations in this spectrum is to consider those conducted by experimental licensees operating under the Commission's Part 5 rules. Like experimental licensees, amateur uses are individually engineered to prevent interference and operate under FCC rules that require shutting down if interference is detected or predicted by a primary user. Secondary use allows the spectrum to be more intensely used on an opportunistic basis, putting to good purpose spectrum capacity that otherwise would be wasted. This has been well understood by primary and secondary users alike with few if any problems experienced in the real world. The sharing is based upon radio propagation science, and has been highly successful for both Part 5 licensees – who most often employ much higher radiated powers in this spectrum range than radio amateurs - - and similarly-situated Part 97 licensees who also use the spectrum for experimental purposes.

Amateur service licensees use the spectrum in ways indistinguishable from the Part 5 Experimental Service licensees that the Commission (correctly) authorized to continue with their *de facto* secondary operations in this band in the subject Order. This is befitting the Amateur Service, which has among its major purposes, as defined by the Commission, “to contribute to the advancement of the radio art” and to advance “skills in both the

communication and technical phases of the art.”⁶ Examples of amateur uses of the spectrum follow.

Weak signal point-to-point communications occur sporadically in time and geography, and often apply new technologies, methodologies, and coding to improve the communications capability of equipment in this high frequency range. Frequently signals traverse mountaintops and very rural areas where other activity is unlikely.⁷ This type of operation is conducted on an unscheduled basis, often on weekends, and employs highly directional antennas. If another signal is detected, these amateurs generally have the capability to move their frequency to an unoccupied slot or adjust their antenna direction enough to eliminate both reception and transmission to any other system. Since the purpose of this type of activity is to hear or decode weak signals, operators use every possible means to avoid frequencies with other signals. The frequency-agility of their equipment and the very narrow beamwidths of their antennas provide the means to eliminate possible interference. Their purpose in detecting weak signals provides the incentive to avoid any frequency with detectable radiation, whether or not any resulting signal-to-noise ratio of the amateur and the other signal would result in harmful interference.

Another amateur use is to operate radio beacons to study propagation in the 3.4 GHz spectrum range.⁸ Studies made by Amateurs and experience with propagation anomalies at these frequencies provide the basis for better understanding the capabilities for using this spectrum. Amateur beacons are fixed and low power, and therefore relatively easy to engineer into the environment if other users initiate operations, or to relocate or shut down if

⁶ See the basis and purpose of the Amateur Radio Service, outlined in the Commission’s Rules at 47 C.F.R. § 97.1.

⁷ See, e.g., Comments of Wayne Overbeck (filed Feb. 19, 2020).

⁸ See, e.g., Comments of the San Bernardino Microwave Society at para. 5 (filed Feb. 18, 2020).

they cannot be “engineered in.” In the meantime, amateur beacons are providing a valuable resource for better understanding the capabilities of this spectrum.

Another aspect of amateur experimentation is bouncing signals off the moon (Earth-Moon-Earth communication).⁹ Amateurs around the world study and test the means for this type of communication. Contacts five thousand miles distant are not unusual – with greater distances also achieved at times. This field of activity has led to a chain of improvements in antennas and equipment design in the 3.4 GHz spectrum. An added experimental activity is improving digital codes such that amateur digital communications are being conducted using significantly less transmitter power and antenna gain than just five years ago. In this type of communication, the transmitting antennas tend to have relatively high gain, and therefore narrow beamwidths and are pointed upward toward the moon. Interference with terrestrial operations therefore is extremely unlikely, and if a site were located within the short range to a commercial facility, most likely changes could be made that would eliminate any potential for harmful interference.

Similarly, use of the spectrum that had been allocated to the Amateur Satellite Service on a secondary basis, 3400 – 3410 MHz, presents little potential for interference. An amateur satellite downlink signal would be extremely unlikely to be discerned even on a clear frequency without a high-gain antenna tracking the satellite, which no terrestrial service would have. An Amateur uplink signal in this band similarly would present little potential for interference due to its low power, the narrow beamwidth of any antenna used for this purpose, and the fact that the antenna would point sky-ward.¹⁰

⁹ See, e.g., Comments of Al Ward (filed Feb. 5, 2020).

¹⁰ See Comments of the Radio Amateur Satellite Corporation (filed Feb. 21, 2020).

Other frequencies will not necessarily be available when needed, and this limitation threatens to constrain future experiments with space communications technologies as the number of amateur satellite experiments increase in number and purpose. As noted by the Radio Amateur Satellite Corporation (AMSAT), “the prevalence of WiFi interference to amateur satellite operations led AMSAT to determine nearly 15 years ago that the 2.4 GHz allocation would no longer be useful for satellite downlinks from high earth orbit.” AMSAT further stated that “this allocation [3400-3410 MHz] remains useful.... As worldwide amateur satellite communications in other desirable microwave allocations increase, the 3.40 – 3.41 GHz allocation could be utilized as a command channel or secondary data downlink for AMSAT ground stations in Region 2, without interfering with the primary communications on the other allocations or other satellites utilizing those segments. Additionally, the segment could serve as the uplink or downlink for a satellite in geostationary orbit above the Americas, without potential interference to worldwide activities involving space stations in high earth orbit or lunar orbit.”¹¹

The 3300-3500 MHz band also is used for links employed in digital high-speed data mesh networks and for amateur television repeaters. These amateur uses are fixed and generally employ high-gain antennas with narrow beamwidths for point-to-point communications. This architecture limits their interference potential. Multiple bands can be and often are used within the same network to escape interference from WiFi and other users in certain geographic areas. The advantage that radio amateur systems have is that their links can be “engineered in” on a case-by-case basis for the very purpose of avoiding interference if enough spectrum is available in appropriate amateur bands. Removing one band from the mix can completely change the feasibility and quality of the entire network. Much as multiple microwave links criss-cross

¹¹ *Id.*

Manhattan, many co-channel with others, so too can fixed microwave links be engineered by radio amateurs to make better and more productive use of the spectrum.¹²

Design of and work with mesh networks has attracted an ongoing stream of computer-literate youth to the amateur ranks. The networks themselves are commonly employed for digital experimentation with a wide range of technologies and services, with a bedrock purpose of emergency readiness and availability during actual emergencies. As set forth in the Comments of the Amateur Radio Emergency Data Network (AREDN): “thousands of hams have built or are in the process of constructing high-speed data networks...”¹³ The networks use the .9, 2, 3, and 5 GHz amateur bands.”¹³ The more band choices available, the more likely that a suitable link can be engineered for a specific path. Removing the 3.4 GHz band from the mix, without regard to whether the spectrum is actually being used, severely lessens the capability of the networks to survive in the increasingly crowded spectrum. Especially given the impending expansion of WiFi in the 5.9 GHz band, removing the 3.4 GHz band will further limit the possibilities for successful experimentation and networks.

CONCLUSION

All of the above amateur experimental activities make good use of the spectrum and should be permitted to continue on a secondary basis unless and until a new primary licensee is ready to operate in a geographic area where interference would result. Given the nature of amateur *ad hoc* operations, if the Commission concludes that registration or other mechanism

¹² See, e.g., Comments of the Amateur Radio Emergency Data Network (filed Feb. 12, 2020) (“AREDN”) and Comments of the Amateur Television Network (filed Nov. 20, 2020) and *Ex Parte* Notice filed Sept. 23, 2020.

¹³ See *Id.*, Comments of AREDN.

similar to that found in Section 97.303(g) would be helpful, a reasonable requirement along those lines should be considered.¹⁴

Accordingly, the ARRL respectfully requests that the Commission reconsider its deletion of the secondary amateur allocation in the 3.3-3.5 GHz band and its Order that all Amateur operations sunset in the 3450-3500 MHz portion of the band “on a date consistent with the first possible grant of flexible use authorizations to new users.”¹⁵

Respectfully submitted,

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**ARRL, THE NATIONAL ASSOCIATION
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By:

A handwritten signature in blue ink that reads "DR Siddall". The initials "DR" are written in a stylized, overlapping manner.

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November 9, 2020

¹⁴ See ARRL, Ex Parte Notice dated Sept. 23, 2020 at p.3.

¹⁵ *Supra* note 2, 85 Fed.Reg. at p. 64064, para. 14.