Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Amendment of Part 90 of the	)	**WP Docket No. 07-100**
Commission's Rules	)	
	)	

Joint Comments of the
Telecommunications Subcommittee of the American Petroleum Institute
and the Regulatory and Technology Committee of the
Energy Telecommunications and Electrical Association

The Telecommunications Subcommittee of the American Petroleum Institute ("API") and the Regulatory and Technology Committee of the Energy Telecommunications and Electrical Association ("ENTELEC") jointly submit these comments in response to the Federal Communications Commission's Order on Reconsideration and Eighth Further Notice of Proposed Rulemaking ("FNPRM") on the 4.9 GHz (4940-4990 MHz) frequency band. The FNPRM seeks input regarding "technical details and key policy questions to maximize the use of the band to support public safety, leverage technological advancements (such as 5G), foster a robust equipment market, and address non-public safety use of the band."[1] API and ENTELEC offer proposed rule changes to increase the overall utility of the band, while still promoting the safety of the public.

Background

API is a national trade association representing more than 625 companies involved in all phases of the petroleum and natural gas industries, including exploration, production, refining, marketing and transportation of petroleum, petroleum products and natural gas. Among its many activities, API acts on behalf of its members before federal and state regulatory agencies. The API Telecommunications Subcommittee evaluates and develops responses to state and federal proposals affecting telecommunications facilities used in the oil and gas industries. API is supported and sustained by companies that make use of a wide variety of wireline, wireless and satellite communications services on both a private and commercial basis. All wireless services used by our membership require RF spectrum resources, of both narrowband and broadband varieties.

[1] *See* In the Matter of Amendment of Part 90 of the Commission's Rules, *Order on Reconsideration an*d Eighth *Further Notice of Proposed Rulemaking*, WP Docket No. 07-100, FCC 21-106 at para. 4 (rel. Oct. 1, 2021) ("FNPRM").

ENTELEC is a user association focusing on communications and control technologies used by petroleum, natural gas, pipeline and electric utility companies. The Regulatory and Technology Committee is comprised of ENTELEC's members and provides policy advocacy and targeted educational opportunities and resources on behalf of those members.

As such, our membership overwhelmingly believes the 4.9 GHz band offers the Commission a great opportunity to provide broadband spectrum needed by Critical Infrastructure Industries (CII), which includes organizations whose main operations are based on oil, gas, electric, and renewable energy exploration, transmission, and/or production. As such, ENTELEC and API are optimistic that the Commission will adopt rules to promote the core uses of this band, instead of recent trends to auction or otherwise optimize broadband spectrum for larger wireless carriers' interests.

Comments

Our comments offer alternative perspectives on several proposed changes that, if adopted, will significantly improve the utility of the 4.9 GHz band for critical infrastructure companies, which, like public safety, have an important need for broadband spectrum. The proposed changes will also serve to stimulate new technologies that require dedicated radio spectrum to enhance their functionality, such as unmanned aerial systems and robotics.

Below, we address several specific proposals that were included in the FNPRM:

I. CII Status.

API and ENTELEC urge the Commission offer CII entities co-primary status within the entire 4.9 GHz band for the services described herein.[2] Such status should not be tied to offering "public safety services"[3], since by their nature the operations of CII entities, including oil, gas, utilities, and railroads are defined by Section 90.7 of the FCC's rules to protect safety of life, health, or property. Also, consistent with Section 90.7 of the rules, the CII's use of the 4.9 GHz band should not be made commercially available to the public. This makes CII use significantly similar to public safety use so as to accommodate co-primary sharing of the 4.9 GHz band.[4] As the Commission noted, API previously reached an agreement with Public Safety organizations that would have promoted shared use of the 4.9 GHz band between CII and Public Safety.[5] The Commission rejected that agreement in favor of the previous State-centric leasing rules, which have now been rescinded.

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[2] *See FNPRM* at paras. 61-65.
[3] 47 C.F.R. § 90.1203(a).
[4] *See* In the Matter of Amendment of Part 90 of the Commission's Rules, *Sixth Further Notice of Proposed Rulemaking,* 33 FCC Rcd 3261, 3285, para. 70 (2018) *(recognizing CII "use radio communications 'as a critical tool for responding to emergencies that could impact hundreds or even thousands of people'").*
[5] *See* FNRPM at n. 149.

II. Use Cases, Licensing, and Coordination.

API and ENTELEC strongly agree with that spectrum should be allocated on a shared basis[6] for the following use cases (collectively termed "ADR"):

a) Manned Aerial Systems ("Aerial")
b) Unmanned Aerial Systems ("Drones")
c) Robotic Systems ("Robotics")

API and ENTELEC feel that the Commission needs to consider the growth of ADR (specifically Drone and Robotic) use cases and the technical challenges of RF interference, especially with Drone and Aerial use in large open areas. Interference can be mitigated more easily with a larger channel pool. Thus, we believe that the 4.9 GHz band should consist of two sub-bands to support new uses and legacy uses.

The first sub-band would include 20 MHz of the 50 MHz in the 4.9 GHz band, lightly licensed by a user license that would be made available to any FCC FRN holder and coordinated by operational area (not per transmitter) with a real-time Automated Frequency Coordination system, such as a Federal Aviation Administrations "B4UFLY" solution or a more flexible version of a Spectrum Access System (SAS). Since each operation in this band supports the ADR use cases, this sub-band is termed the "ADR band".

The licensing and coordination scheme in the ADR band would need to have two levels. First, Priority Access (PA) would be needed for CII and Public Safety. Included with PA would be a method to reserve spectrum both indoors and outdoors over a limited pre-certified operational area. This would allow locations such as refineries, sub-stations, metering areas, or prisons (among others) to have an expectation of some level of service when needed. The second level, named the General Access (GA) level, would consist of the remaining users, who would only be allowed to pre-register in-building areas. This would allow manufacturing and other facilities use of robotics that are needed for operation.

The ADR would consist of channels 1-5 (4940-4945 MHz) and 14-18 (4985-4990 MHz), designated as 1 MHz channels, plus channels 6 (4945-4950 MHz) and 13 (4980-4985 MHz) serving as 5 MHz channels. This would afford flexibility in channel use and size, as a basic video offering could utilize a 1 MHz channels whereas larger throughput requirements could be met with the 5 MHz blocks.

The remaining 30 MHz of the 4.9 GHz band would be termed the "Remaining Band" and consist of six, 5 MHz channels numbered 7-12 (4950-4980 MHz). Remaining band use cases would support fixed wireless and manned aerial use cases as it does now, but not drones or robotics. It would be licensable to only Public Safety and CII entities subject to coordination. CII would have "co-primary" status in the Remaining Band. Any incumbent Public Safety use within the new ADR Band would need to operate in the Remaining Band to receive protection as primary users. Since hardware in this band can operate over the entire 50 MHz, there will be no relocation costs other than re-coordination.

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[6] *See FNPRM* at para. 62.

III. Aggregation Limits.

With the new band plans, API and ENTELEC see a need to segment the aggregation limit. We would be supportive of two separate limits within the ADR band:

a) Aggregation of the 1 MHz wide ADR channels up to 5 MHz total
b) Aggregation of the 5 MHz wide channels 6 and 13 together (total of 10 MHz) within the ADR band

For the Remaining Band spectrum containing channels 7-12, we would support an aggregation limit of up to 15 MHz total.

IV. Aerial Height Limit.

Since Drones have a limit of 400 feet above ground level ("AGL") under FAA part 107, API and ENTELEC believe that the Drone use case should have the same limit in terms of 4.9 GHz operation. For manned aerial vehicles, we agree with the 1500-foot AGL limit as proposed for all channels within the ADR band. This 1500-foot limit would also apply to Drones under the FCC rules, if an FAA waiver for higher operation for a Drone has been granted.

V. Nationwide Coordinator.

For a nationwide coordinator to be feasible in the ADR band, an automated service such as a SAS or "B4UFLY" must be provided as opposed to a service relying on manual coordination.[7] This would have to be created or adapted from current service. For the remaining band a single coordinator, such as how Part 90 services are coordinated, is possible. API and ENTELEC support common sense coordination for both the ADR and Remaining Band, whether they adopt automated coordination or a single point of coordination.

VI. Border Coordination.

API and ENTELEC seek an exemption from any 160-km coordination or usage restriction along the border with Mexico in the Gulf of Mexico for ADR usage. Such exemption would require that if interference is reported, a good faith interference reduction plan should be agreed upon by both parties. If no reduction plan can be agreed upon, then the operation of 4.9 GHz at both facilities must cease.

Realize that propagation conditions within the Gulf of Mexico must be considered in terms of border coordination, as this will certainly exceed a land-based criterion for Drone or Aerial uses. However, given the remoteness of the Gulf of Mexico, the chances for there to be a bona-fide issue are not very high. A bi-lateral notification requirement would serve to generate cooperation. If two relatively close assets on opposite sides of the border create interference with each other, it would be better to first require operations adjustments to minimize this impact

[7] *Id.* at para. 69.

rather than to have restrictions for use of the band in that area.

VII. Propagation Calculations.

We do not believe that contour analysis would be the best way to handle interference calculations.[8] We also are under the impression that TIA-10 would be a good solution only for fixed use cases, and not directly for ADR use cases. Therefore, we recommend that the SAS-based coordinator research and validate a proper hybrid model for analysis to accommodate good results for all use cases.

VIII. ADR band EIRP Limit.

API and ENTELEC are in support of low power operations for the ADR band but find that the power output limit should be in the order of 14 dBm/1 MHz.[9] There should also be no directional antenna requirement. Using a directional antenna to increase the EIRP to a higher value, as not limited by the rules, would be necessary for higher altitude or longer distance communications. However, simple systems at short ranges would not require overcomplicated antenna designs and could comply easily.

IX. Remaining Band EIRP Limit.

API and ENTELEC support transmitter output for short and long-range point-to-point or point-to-multipoint transmissions. We feel that the minimum antenna gain requirements should align with the communications distance sought to maximize channel re-use. We would like to suggest a two-tiered approach to enable both short and longer links:

a) For links of less than 8 km, a minimum antenna gain of 21 dBi with a corresponding maximum EIRP of 40 dBm. A 25 dB minimum front-to-back requirement is also recommended.

b) For links of greater than 8 km, a minimum antenna gain of 26 dBi with a corresponding maximum EIRP of 60 dBm. A 25 dB minimum front-to-back requirement is also recommended.

c) For a multipoint link of less than 8 km where the subscriber station wishes to use an omnidirectional antenna, the maximum EIRP should be limited to 27 dBm.

X. Polarization.

API and ENTELEC do not believe a polarization requirement should be addressed in the rules.[10] Given the advancements in Multiple-in, Multiple-Out (MIMO) technologies, plus the Drone and Aerial use cases affecting linear polarization purity, such a recommendation would be

[8] *Id.* at para. 31.
[9] *Id.* at para. 60.
[10] *Id.* at para. 33.

either limiting or impractical.

XI. Technology.

We do not believe the Commission should restrict technology in this band. In fact, it is important for the Commission to note that this spectrum is part of the 3rd Generation Partnership Project (3GPP) band n79 for 5G technologies. Unfortunately, the minimum channel size supported by the standard in n79 is currently 40 MHz[11]. Based on our suggested aggregation limits, a 10 or 15 MHz channel size would need to be adopted by 3GPP for 5G technologies to be practical.

XII. Buildout Requirements.

API and ENTELEC agree that a buildout requirement in the Remaining Band of 12 months is sufficient to ensure that licensing is properly utilized.[12]

XIII. Leasing.

API and ENTELEC do not believe in a leasing model with public safety serving as spectrum "landlords"[13]. We believe that the Commission best performs that function as the primary issuer of spectrum, even if that would be on a secondary basis.

[11] 3GPP TR 38.814 V15.0.0, page 7, 2018
[12] *FNPRM* at para. 60.
[13] *Id.* at para 67.

Conclusion

API and ENTELEC firmly believe that the 4.9 GHz band, if enabled with an eye towards the future, can support both upcoming needs in Drones and Robotics, as well as licensed spectrum for critical data links used by both Public Safety and CII that would otherwise be unreliable. We hope the Commission will consider our suggestions, as we feel the technical viability of 4.9 GHz for interests outside of the larger wireless carriers is key to its success.

Respectfully submitted,

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