

Before the

FEDERAL COMMUNICATIONS COMMISSION

Washington, DC 20554

In the matter of WIRELESS TELECOMMUNICATIONS BUREAU and OFFICE OF  
ENGINEERING AND TECHNOLOGY seek comment on NEXTNAV PETITION FOR  
RULEMAKING

WT Docket No. 24-240

RM-11989

Open Research Institute, Inc. is a non-profit devoted to open source digital radio research and development. The vast majority of ORI's technical work is prototyped and demonstrated on the Amateur Radio bands. All work is published free of charge to the general public. ORI submits these comments in response to the call for comments concerning the NextNav Petition for Rulemaking. NextNav's product is a NextGen PNT (Positioning, Navigation, and Timing) network, which aims to deliver widespread, accurate PNT services using 5G NR (New Radio) signals in compliance with 3GPP standards. The network builds on NextNav's experience with the Terrestrial Beacon System (TBS), incorporating 5G positioning reference signals (PRS) to enhance the

accuracy and resilience of PNT services.

The Federal Communications Commission is committed to developing spectrum sharing models that enable expanded and effective use of our airwaves. Effective spectrum sharing is realized when multiple users and operators can successfully coexist within the same geographic area. Guidance on the next generation of spectrum strategy, including details about dynamic spectrum sharing demonstrations, reports, and timelines, can be found in the NTIA's National Spectrum Strategy.

A diversity of users and operators on a band, bringing in new products, launching new services, and exploring new use cases is an indication of successful spectrum management. Successful spectrum management is a necessary but insufficient condition for a vibrant and healthy radio service. Technical feasibility, cost, differentiating performance, and market forces are also critical to success. However, bad regulations can short even the very best product designs to ground. A failure of regulations drives away users and operators and prevents new products and use cases from getting past the prototype stage.

The Petition for Rulemaking of NextNav Inc. asserts that the 900 MHz band is "underutilized". The petition asserts that changing 900 MHz regulations is required in order for their economically infeasible product to succeed. The petition asserts that only NextNav products can provide a particular type of PNT Global Positioning System (GPS) backup service and without NextNav the 900 MHz band will "continue to be

underutilized” and “the country will continue to lack terrestrial PNT”. The petition claims that the service is “state of the art and best in class”, that their service is “transformative”, that they are the only game in town, and that they deserve the 900 MHz band to be reconfigured just for them. The petition asks for a spectrum swap and license consolidation, arguing that they already control so many of the M-LMS licenses that it’s just common sense that they should be awarded a significant band reconfiguration.

Even if the assertions were all true, NextNav’s success is dependent on integration with 5G products and robust partnerships with 5G operators. However, there are no demonstrated product integrations, no announced partnerships, no field tests, and no interference mitigation plans. There is one simulation described that confirmed an uncontroversial relationship between bandwidth and performance. The petition essentially invites 5G networks to “add mobile broadband capacity” to the band. NextNav overstates the value of their product. They do not describe the multiple existing solutions that currently provide backup to GPS.

What is stopping 5G operators from implementing terrestrial PNT leveraging their own hardware, on their existing frequencies, by using the 5G protocols that NextNav describes? Why would 5G operators include yet another radio for 900 MHz in their chipsets and software stack? What is the economic incentive for 5G to buy NextNav’s products? Why 900 MHz instead of 600, 700, or 800 MHz? Anyone who wants to use

this system will have to go through NextNav. Is purposefully setting up a commercial monopoly the best use of 900 MHz?

The petition is not aligned with modern spectrum sharing strategies. This is a petition for statically and exclusively assigned spectrum during a time where dynamic spectrum sharing strategies should get priority and emphasis.

The petition fails to support the technical claims. Mobile handsets can determine location without GPS using a variety of methods including triangulation and WiFi Access Point MAC tracking. NextNav's product would have to be substantially better than current methods in order to justify nationwide exclusive use of a band with a diverse set of incumbents. This has not been shown. The Minimum Operational Network allows aircraft to navigate in the case GPS is unavailable or denied. NextNav claims that a "differentiator" of their system is a "unique" altimetry barometer sensor that allows altitude positioning. However, barometer altitude sensors are not new. It is not obvious that there is an aviation requirement or a market for NextNav's product. The petition does not justify customizing the 900 MHz band for one company's future product because that product does not provide a truly transformative level of technical performance.

Current Amateur Radio use of the band includes point-to-point links, amateur television stations and repeaters, and voice repeaters. Some of the amateur repeater systems on 900 MHz are linked and serve a wide area (<https://www.scrba.org/>

BandPlans/33cm.htm). Recent Amateur Radio experimental use of the band includes a variety of modern and innovative digital modes, including MMDVM and our own Opulent Voice protocol (<https://www.openresearch.institute/2022/07/30/opulent-voice-digital-voice-and-data-protocol-update/>). The open source amateur transceiver project Faraday RF was designed for 900 MHz (<https://github.com/FaradayRF/Faraday-Software>). Amateurs operate DMR and P25 repeaters in this band. Below is a list of amateur P25 repeaters just in Colorado. ([https://www.repeaterbook.com/repeaters/feature\\_search.php?system=The%20900%20P25%20Network%20System&state\\_id=%25&type=systems](https://www.repeaterbook.com/repeaters/feature_search.php?system=The%20900%20P25%20Network%20System&state_id=%25&type=systems))

Meshtastic relies on the 900 MHz band. This open-source “Signal-App-extending GPS mesh communicator” is lightweight, inexpensive, and popular. (<https://wikifactory.com/@geeksville/meshtastic>)

Amateur equipment choices for 900 MHz range from bespoke to commercial off the shelf. Amateur practice is to listen first, use minimum power required to complete the communication, and cause no interference. The practices of the amateur service are compatible with the other users and operators of the 900 MHz band as it is today.

Amateur radio generates substantial educational benefit. If the petition is granted, then there will be substantial disruption to deployed amateur systems and experiments. Mobile broadband and terrestrial PNT as described in the petition are much more difficult to share a band with than something like Meshtastic or MMDVM.

Given the transmit powers listed in the proposal, and assuming physical deployments including mobile broadband, many incumbents would be negatively affected with no discernible upside and no practical options for sharing.

Reorganizing the band as proposed will drive away amateur and open source activity. These two spheres enable highly valuable personal and professional individual technical development, which are of great economic, social, and civic value. There are multitudes of engineers that got their technical start with amateur radio and open source work. A big reduction of accessible and inexpensive educational opportunities in telecommunications is likely if this petition is adopted. We recommend the petition be denied.

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