IEEE P802.18
Radio Regulatory Technical Advisory Group (RR-TAG)

Draft response to NextNav's petition for rulemaking				
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Author(s):				
Name	Company	Address	Phone	email
Dave Halasz	Morse Micro			dave.halasz@morsemicro.com
Pelin Salem	Cisco Systems			pmohamed@cisco.com
Ben Rolfe	Blind Creek Associates			ben@blindcreek.com
Dorothy Stanley	HP Enterprise			dstanley@ieee.org

This document drafts a proposed response to NextNav's petition for rulemaking (WT Docket No. 24-240)

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Re: WT Docket No. 24-240.

Dear Secretary,

IEEE 802 LAN/MAN Standards Committee (LMSC) thanks the Wireless Telecommunications Bureau and the Office of Engineering and Technology of the Federal Communications Commission for issuing a public notice on NextNav's petition for rulemaking and for the opportunity to provide feedback on this important topic.

IEEE 802 LAN/MAN Standards Committee (IEEE 802 LMSC) is a leading consensus-based open standards development committee for networking standards that are used by industry globally. It produces standards for networking devices, including wired and wireless local area networks ("LANs" and "WLANs"), wireless specialty networks ("WSNs"), wireless metropolitan area networks ("Wireless MANs"), and wireless regional area networks ("WRANs"). Technologies produced by implementers of our standards are a critical element for all networked applications today.

IEEE 802 LMSC is a committee of the IEEE Standards Association and of Technical Activities, two of the Major Organizational Units of the IEEE. IEEE has about 400,000 members in over 160 countries and its core purpose is to foster technological innovation and excellence for the benefit of humanity. IEEE is also a major accredited standards development organization whose standards are recognized worldwide. In submitting this document, IEEE 802 LMSC acknowledges and respects that other components of IEEE Organizational Units may have perspectives that differ from, or compete with, those of IEEE 802 LMSC. Therefore, this submission should not be construed as representing the views of IEEE as a whole[1].

Please find below the IEEE 802 LMSC's comments on this petition for rulemaking.

Discussion: The 902 MHz - 928 MHz frequency band is extensively used by Part 15 devices, including IEEE 802.11ah-based Wi-Fi HaLow and IEEE 802.15.4-based Wi-SUN Field Area Network (FAN), to enable a thriving IoT ecosystem

IEEE 802 standards-based devices, specifically IEEE 802.11ah-based Wi-Fi HaLow and IEEE 802.15.4-based Wi-SUN FANs, have been operating in the 902 MHz to 928 MHz frequency band (collectively termed as 900 MHz) under Part 15 rules, with applications including door entry systems, environmental sensors, fire and security alarms, smart meters, smart-parking devices, smart signs, streetlights, and structural integrity sensors. As an example, there are estimated over 120 million smart electric meters[2] deployed across the North America.

Sub-1 GHz frequency has better penetration capabilities due to longer range and cleaner propagation spectrum, which allows IoT sensors and low power devices to operate efficiently. This band is necessary for proper coverage since there is no alternative spectrum available for the Wi-Fi HaLow and Wi-SUN FAN devices currently occupying this band.

[1] This document solely represents the views of IEEE 802 LMSC and does not necessarily represent a position of either the IEEE or the IEEE Standards Association or the IEEE Technical Activities.
[2] Information derived from Guidehouse Global AMI Tracker 4Q23 research data.

In addition to the IEEE 802 standards-based technologies deployed as Wi-Fi HaLow and Wi-SUN FAN, as well as LPWAN technologies such as SigFox and LoRa, there are millions of proprietary systems deployed in large scale outdoor applications in the 900 MHz band, such as agriculture, electric, gas and water meters (AMR), potable water towers, streetlights, utility supervisory control and data acquisition (SCADA) systems, oil and gas processing and distribution monitoring, and wastewater monitoring and processing stations.

Approval of the changes petitioned by NextNav will potentially disrupt the operation of the millions of currently deployed IoT devices and require cities and towns to spend millions of dollars to migrate their existing systems to different technologies. This is a heavy and seemingly unnecessary burden to urban and rural communities both financially and organizationally in replacing existing systems which are currently meeting application needs. For some of these applications, there may not even be a viable alternative available.

In addition to these outdoor networks, in a myriad of wireless consumer products such as cordless phones, intercoms, sensors, toys, garage door openers, operate in the 900 MHz band under the Part 15 rules. These products may not be able to coexist with the proposed NextNav deployments.

Discussion: NextNav did not demonstrate how Part 15 radiofrequency devices may operate with the proposed petition

NextNav completely failed to demonstrate how coexistence with millions of Part 15 devices can be achieved, which will risk seriously impacting day-to-day operations of a wide range of applications, as well as impeding ongoing technological development and investments.

First, NextNav wrongly asserts that "Part 15 devices do not have any allocation status in the Commission's rules". 47 C.F.R. § 2.106, n. 5.150 clearly explains that the 900 MHz band is designated for ISM applications and the devices operating at this frequency band must accept harmful interference from ISM devices.

Second, NextNav incorrectly indicates unlicensed devices have the lowest priority. § 90.353 LMS operation in the 902-928 MHz band (a) states, "LMS operations will not cause interference to and must tolerate interference from industrial, scientific, and medical (ISM) devices and radiolocation Government stations that operate in the 902-928 MHz band."

Lastly, NextNav's proposal to eliminate the testing requirements of current rule section 90.353(d) is without merit and contrary to public interest. NextNav contradicts itself by arguing that "Coexistence between the NextGen system and unlicensed Part 15 operations should be achievable" while seeking to eliminate the requirement for "field tests" to demonstrate such coexistence.

In summary, IEEE 802 LMSC opposes the following changes:

- Removal in § 90.353 (d)
- Removal in § 90.361 about interference from part 15 and Amateur operations.
- Addition to § 90.1410.

Discussion: NextNav wrongly asserts that IEEE 802-based location and ranging capabilities do not provide required levels of location/ranging accuracy.

The NextNav's petition references an outdated article discussing indoor ranging using other technologies. However, this information has been superseded by more recent developments by IEEE 802 LMSC. Robust, precise location and ranging capabilities are available in both IEEE 802.11 and 802.15.4 standards.

IEEE 802.11-based location and ranging technologies are deployed extensively today to provide location-based services and applications, supporting accurate location information for use cases that are applicable in environments served by the range of often extensive WLAN networks or personal area networks. IEEE 802.11-based location services can operate indoors and outdoors, with precision comparable to or better than the NextNav solution. The recently completed IEEE 802.11az-2022 standard[3] defines precision timing capabilities to enable sub-1 meter accuracy, with a new and ongoing project IEEE P802.11bk[4] defining operation in 320 MHz channels. Both of these standards support location information exchange between infrastructure WLAN and wireless client devices. Additional applications include, for example, access point to access point ranging to support the access point self-location detection capabilities that are required for deployment of 6 GHz standard power systems, where, when available, GPS/GNSS data is also used in a complementary fashion.

IEEE 802.15.4 standards[5] support location-based services through UWB that provides very precise ranging, with accuracy to within 3 cm. The accuracy and resolution available using IEEE 802.15.4 UWB exceeds that physically possible with the NextNav's solution by several orders of magnitude. Further data on performance for indoor applications such as use by emergency services is available[6]. There is also an ongoing project IEEE P802.15.4ab[7] which will further improve ranging precision and accuracy. The extremely low transmission power of UWB assures a near zero interference footprint. Multiple UWB systems are presently available that provide both indoor and outdoor location services.

The applications that NextNav asserts as need for rule change are readily addressed with other technologies that are currently available, operating under existing rules. Both IEEE 802.11 and IEEE 802.15.4 standards support location capabilities using unlicensed spectrum. These technologies are available today and operate without disrupting other services. The benefits that NextNav claims are readily achieved with existing technologies that operate without disrupting the many very important uses of the 900 MHz band. The NextNav solution is not an efficient use of the very limited sub-1 GHz spectrum.

Conclusion

IEEE 802 LMSC thanks the FCC for the opportunity to provide this submission and respectfully request to consider our comments.

[3] "IEEE Standard for Information Technology--Telecommunications and Information Exchange between Systems Local and Metropolitan Area Networks--Specific Requirements Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications Amendment 4: Enhancements for Positioning," in IEEE Std 802.11az-2022 (Amendment to IEEE Std 802.11-2020 as amended by IEEE Std 802.11ax-2021, IEEE Std 802.11ay-2021, IEEE Std 802.11ba-2021, and IEEE Std 802.11-2020/Cor 1-2022) , vol., no., pp.1-248, 3 March 2023, doi: 10.1109/IEEESTD.2023.10058117.

[4] See IEEE P802.11bk, https://www.ieee802.org/11/Reports/tgbk_update.htm [accessed: 2 September 2024].

[5] "IEEE Standard for Low-Rate Wireless Networks--Amendment 1: Enhanced Ultra Wideband (UWB) Physical Layers (PHYs) and Associated Ranging Techniques," in IEEE Std 802.15.4z-2020 (Amendment to IEEE Std 802.15.4-2020), vol., no., pp.1-174, 25 Aug. 2020, doi: 10.1109/IEEESTD.2020.9179124.

[6] Tiemann J, Friedrich J, Wietfeld C. Experimental Evaluation of IEEE 802.15.4z UWB Ranging Performance under Interference. Sensors (Basel). 2022 Feb 19;22(4):1643. doi: 10.3390/s22041643. PMID: 35214545; PMCID: PMC8877371.

[7] See IEEE P802.15.4ab, https://www.ieee802.org/15/pub/TG4ab.html [accessed: 2 September 2024].

Respectfully submitted

By: /ss/.
James Gilb
IEEE 802 LAN/MAN Standards Committee Chairman
em: gilb_ieee@tuta.com