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

In the Matter of	)	
	)	
Unlicensed Use of the 6 GHz Band	)	ET Docket No. 18-295
	)	
Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz	)	GN Docket No. 17-183
	)	

COMMENTS OF CHARTER COMMUNICATIONS, INC.

Charter Communications, Inc. ("Charter") supports the Commission's consideration of rules to increase the opportunities for unlicensed use in portions of the 5.925-7.125 GHz ("6 GHz") band while also protecting existing users of the band.[1]

As one of the country's leading connectivity providers, Charter appreciates the tremendous value of unlicensed spectrum. Unlicensed spectrum facilitates billions of dollars in U.S. economic growth and investment, and unparalleled innovation including Wi-Fi. Today, American consumers, businesses, and institutions increasingly rely on Wi-Fi in their day-to-day activities to connect, produce, and access information. They use this technology for healthcare monitoring, smart farming, connectivity for universities, military bases, hospitals and other large institutions, secure financial transactions, and more. In fact, Charter's advanced Wi-Fi network currently supports over 250 million wireless devices, and carries, both in the home and office, as much as 80 percent of the wireless traffic on devices also attached to traditional cellular networks.

[1] *See In re Unlicensed Use of the 6 GHz Band*, Notice of Proposed Rulemaking, ET Docket No. 18-295, FCC 18-147 (rel. Oct. 24, 2018) ("*6 GHz NPRM*").

To keep pace with our customers' increasing reliance on Wi-Fi, Charter is always enhancing its network capabilities by deploying cutting-edge Wi-Fi technologies. Charter recently became the first U.S.-based Wi-Fi provider to announce the introduction of the latest Wi-Fi technology—802.11ax or "Wi-Fi 6"—through its next generation Spectrum Wi-Fi router. In comparison to previous Wi-Fi standards, this latest technology is a game changer. Wi-Fi 6 will increase speeds, improve coverage, expand the amount of devices that can run simultaneously, boost Charter's already robust video streaming capabilities, and provide better battery life. Looking ahead, Charter plans to integrate its advanced Wi-Fi network with a variety of next generation wireless access technologies, including 5G and other licensed services, in order to create a cost-effective and seamless connectivity experience for its customers.

While the latest Wi-Fi technology and Charter's advanced network are ready to support enhanced speeds, coverage, and overall connectivity, more unlicensed spectrum is essential to deliver those enhancements to consumers. Demand for Wi-Fi is the highest it has ever been and is growing every day. Because of its success, the country is now approaching exhaust conditions in the existing unlicensed spectrum bands that support Wi-Fi. Accordingly, increasing the amount of spectrum available for unlicensed use will not only enable Charter to deploy next generation wireless technologies and services to consumers across the country, but will also ensure continued unlicensed innovation more broadly, which is a central component of the 5G transition. To that end, there is broad consensus across a variety of industries, as well as among policy makers, that hundreds of megahertz of additional unlicensed spectrum must be made available in the next few years. The 5.9 GHz band is the best near-term unlicensed spectrum opportunity to address the approaching Wi-Fi capacity crisis, but the unlicensed ecosystem's need for the 6 GHz band is not far behind.

The 6 GHz band's ability though to play an important role in protecting continued unlicensed innovation and facilitating the U.S. 5G transition will depend upon favorable rules that ensure full and efficient utilization of the band. The Commission should increase the power levels in the 6 GHz band, as well as allow for flexibility in how devices can operate in the 5.925-6.425 GHz ("U-NII-5") and 6.525-6.875 GHz ("U-NII-7") bands. First, the Commission should establish power spectral density limits of 21 dBm/MHz for devices not subject to automated frequency coordination ("AFC"), and 27 dBm/MHz for devices that are subject to AFC. In addition, the Commission should allow for indoor, low power devices to operate in the U-NII-5 and U-NII-7 bands without requiring AFC as it is proposing in the 6.425-6.525 GHz ("U-NII-6") and 6.875-7.125 GHz ("U-NII-8") bands.[2] Indoor, low power devices are not likely to cause any interference to licensed incumbents given the low power levels and sheltered location of the devices.[3] All of these modifications will greatly enhance the efficiency of the 6 GHz band.

Because of the configuration of the band plan and Wi-Fi channelization, permitting indoor, low power devices to operate in the U-NII-5 and U-NII-7 bands substantially will increase the amount of spectrum available to these devices. In particular, it will allow indoor, low power devices to operate across seven contiguous 160 megahertz channels as opposed to only one. These wider channels facilitate Gigabit Wi-Fi speeds using the latest Wi-Fi standards. As cable providers are aggressively deploying DOCSIS 3.1 and their 10G services, 160 megahertz channels are necessary to ensure Wi-Fi supports equivalent technologies. This especially will be beneficial to consumers as it will provide them with greater opportunities for

[2] *See id.* ¶ 59.

[3] *See id.* ¶ 70 (noting that "the ITU model shows a median building entry losses of approximately 18 dB for traditional construction and 30 dB for thermally efficient construction for horizontal incidence, with increasing building entry losses at larger elevation angles.").

using the 6 GHz band to support high-bandwidth, high-speed services and applications, including augmented reality and virtual reality applications, at lower costs.

The Commission should also increase the maximum conducted output power and power spectral density limits for client devices operating in the 6 GHz band. The current proposed rules only would allow client devices to operate with a maximum conducted output power of 63 milliwatts and a maximum power spectral density of 5 dBm in any 1 megahertz band.[4] But both of these proposed restrictions are likely to produce inefficient results given that the Commission is proposing higher power levels, respectively, for access points operating in the 6 GHz band.[5] These proposed power rules for U-NII devices in the 6 GHz band would result in access points having a longer range and higher signal strength than client devices. In practical terms, this means an access point would be able to communicate with a client device, but a client device would not be able to communicate back to an access point, resulting in a degradation of the user's signal or a total loss of the signal.

This result can be avoided if the Commission raises the power levels for 6 GHz band client devices so that they can transmit at the same power levels as proposed for access points in the band. Specifically, for conducted output power, this would require increasing the limit for client devices to 250 milliwatts across the 6 GHz band. Client devices will not transmit maximum power in all the directions because antenna profile limitations will limit the net effect of interference. For power spectral density, this would require setting the limit for client devices operating in any 2 megahertz to 21 dBm/MHz for all indoor, low powered devices. For higher power devices operating with AFC, the limits should be 27dbM/MHz. With these modifications,

[4] *See id.* ¶ 78.

[5] *See id.*

the Commission not only will improve the coverage capabilities of U-NII devices operating in the 6 GHz band, but also will enhance the user experience as customers will have access to a more seamless network with greater capacity.

CONCLUSION

Charter supports the Commission's efforts to explore new opportunities for unlicensed use in portions of the 6 GHz band as a means of promoting the next-generation of wireless broadband services. By adopting the approaches described here along with those offered by NCTA – The Internet and Television Association, the Commission will not only increase the amount of spectrum available for unlicensed use, but also expedite and enhance opportunities for the deployment of innovative wireless services to a wide range of consumers throughout the country.

Respectfully submitted,

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