

**BEFORE THE
FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D.C. 20554**

In the Matter of)	
)	
)	
Spectrum Horizons)	ET Docket No. 18-21
)	
Battelle Memorial Institute Petition for)	RM-11713
Rulemaking to Adopt Fixed Service Rules)	(Terminated)
in the 102-109.5 GHz Band)	
)	
Request for Waiver of ZenFi Networks, Inc.)	WT Docket No. 15-245
and Geneva Communications LLC)	(Terminated)
)	
James Edwin Whedbee Petition for Rulemaking to)	RM-11795
Allow Unlicensed Operations in the 95-1,000 GHz)	
Band)	
)	

REPLY COMMENTS OF CHARTER COMMUNICATIONS, INC.

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I. INTRODUCTION AND SUMMARY

Charter Communications, Inc. (“Charter”) files these reply comments in response to the Federal Communications Commission’s (“Commission”) Notice of Proposed Rulemaking (“NPRM”), seeking comment on proposals to make the spectrum above 95 GHz more readily accessible for commercial development.¹

Charter welcomes the Commission’s continued efforts to create incentives for investment in innovative technologies and services, including new mobile broadband services, in spectrum bands not previously considered suitable for commercial use. Charter is actively exploring the use of mid-band and millimeter wave spectrum to potentially deliver fixed and mobile wireless service to its customers. The Commission’s actions to augment these resources by promoting the development of spectrum horizon frequencies will deliver tremendous public interest benefits for consumers and for the U.S. economy. But as the record reflects, the unique physical properties of spectrum above 95 GHz and the nascent stage of related technologies and services require the Commission to adopt a regulatory framework that balances the need to encourage further investment in these spectrum bands with the necessary flexibility for spectrum whose potential use is still being explored.²

Charter also agrees with the many commenters who urge the Commission to allocate more of the spectrum above 95 GHz for unlicensed operations than proposed in the NPRM. Unlicensed spectrum has fostered creativity and experimentation in other spectrum bands, which in turn has yielded technologies that have seeded billion dollar industries—including Wi-Fi,

¹ See *In re Spectrum Horizons*, Notice of Proposed Rulemaking and Order, 33 FCC Rcd 2438 (2018) (“95 GHz NPRM”).

² See *id.* at 2451 ¶ 27.

Bluetooth, cordless phones, and security systems.³ By increasing the amount of unlicensed spectrum in bands above 95 GHz, the Commission will help foster an environment that allows for experimentation and innovation to produce the next potential breakthrough in wireless services.

II. CHARTER SUPPORTS THE COMMISSION'S EFFORTS TO EXPLORE ADDITIONAL SPECTRUM BANDS FOR WIRELESS SERVICES

Charter commends the Commission for its continued dedication to identifying new spectrum bands for commercial development. The Commission's actions to promote the development of spectrum bands above 95 GHz, along with millimeter wave and mid-band spectrum bands, will deliver tremendous public interest benefits for consumers and for the U.S. economy. Charter already is exploring the use of mid-band and millimeter wave spectrum to deliver fixed and mobile wireless service to consumers, working with its vendors to conduct 5G and 4G LTE trials examining the use of wireless technologies in multiple markets throughout the country, including Orlando, Florida; Bakersfield, California; Columbus, Ohio; Coldwater, Michigan; and Reno, Nevada.⁴ These trials are providing critical information to Charter, and are demonstrating the possibility of using both high- and mid-band spectrum to provide wireline-like broadband connectivity and speeds to areas beyond the reach of Charter's wired network, including to those in rural and underserved areas.

With this NPRM, the Commission continues its long tradition of crafting forward-looking spectrum policies that have stimulated new technology developments and driven U.S. economic

³ See, e.g., *#SOLUTIONS2020 Call to Action Plan – Final*, Public Notice (Mar. 27, 2017), https://apps.fcc.gov/edocs_public/attachmatch/DOC-344081A1.pdf.

⁴ See e.g., Letter from Elizabeth Andron, Senior Vice President, Regulatory Affairs, Charter Communications, Inc., to Marlene H. Dortch, Secretary, FCC, at 1, GN Docket No. 17-258 (Apr. 20, 2018); Juan Pedro Tomàs, *Charter Eyeing 5G Fixed Wireless Broadband Service*, RCR Wireless News (Jan. 29, 2018), <https://www.rcrwireless.com/20180129/5g/charter-communications-testing-5g-in-us-tag23>.

growth and job creation.⁵ As numerous commenters observe, the evolution to 5G services, the continued growth of mobile voice and data services, Internet-of-Things applications and devices, and other innovative offerings will require an ongoing supply of spectrum.⁶ Charter therefore supports the Commission’s proposal to adopt a flexible “multi-platform approach” to “unleash the innovation to bring forth a new generation of . . . technology in the bands above 95 GHz” notwithstanding the fact that the physical characteristics of the spectrum may present propagation difficulties, at least at some frequencies, and may not yet even be fully understood.⁷ The Commission’s proposed framework—allocating portions of the spectrum for licensed use, and other portions for unlicensed use, and adopting a new category of experimental licenses—appropriately reflects the physical limitations of above 95 GHz spectrum as well as the developmental stage of technologies and services that may be possible in these spectrum bands.⁸ Importantly, by taking this approach, the Commission will help ensure that the spectrum is put to new and innovative uses.

Charter likewise urges the Commission to adopt flexible service rules in the above 95 GHz spectrum bands that will allow for a range of spectrum uses and sharing arrangements, which will be necessary as Charter and others explore this spectrum for diverse and as-of-yet unknown use cases. Charter agrees with commenters advocating for the Commission to adopt

⁵ See, e.g., *In re Use of Spectrum Bands Above 24 GHz for Mobile Radio Services*, Second Report and Order, Second Further Notice of Proposed Rulemaking, Order on Reconsideration, and Memorandum Opinion and Order, 32 FCC Rcd 10,988 (2017) (“*Spectrum Frontiers Second Order*”); *In re Amendment of Parts 2 and 15 of the Commission’s Rules to Permit Use of Radio Frequencies Above 40 GHz for New Radio Applications*, Notice of Proposed Rulemaking, 9 FCC Rcd 7078 (1994).

⁶ See, e.g., Comments of Qualcomm Inc., ET Docket No. 18-21, at 2-3 (filed May 2, 2018) (“Qualcomm Comments”); Comments of Ericsson, ET Docket No. 18-21, at 1 (filed May 2, 2018) (“Ericsson Comments”); Comments of Consumer Technology Association, ET Docket No. 18-21, at 1-2 (filed May 2, 2018) (“CTA Comments”).

⁷ 95 GHz NPRM, 33 FCC Rcd at 2451 ¶ 26.

⁸ See, e.g., CTA Comments at 7-8; Qualcomm Comments 7-8, 10-11; Comments of Facebook, Inc., ET Docket No. 18-21, at 3-5 (filed May 2, 2018) (“Facebook Comments”).

many of its proposed service rules for fixed point-to-point operations in the 95-100 GHz, 102-109.5 GHz, 111.8-114.25 GHz, 122.25-123 GHz, 130-134 GHz, 141-148.5 GHz, 151.5-158.5 GHz, 174.5-174.8 GHz, 231.5-232 GHz, and 240-241 GHz bands, which are primarily adopted from its rules for the 70/80/90 GHz bands.⁹ In particular, Charter supports the Commission's proposal to specify the power limit in above 95 GHz spectrum in terms of maximum EIRP density.¹⁰

Given the evolving nature of use cases for these spectrum bands, however, Charter agrees with CTIA that the Commission should adopt a higher power density level that is consistent with RF exposure and interference concerns to combat the limited propagation of the bands under consideration.¹¹ Similarly, like Ericsson and T-Mobile, Charter requests that the Commission refrain from adopting its proposed antenna gain performance standards so as not to foreclose the creation of innovative developments that could achieve similar results.¹² Instead, for above 95 GHz spectrum bands, the Commission should adopt the Fixed Wireless Communications Coalition's proposal requesting the Commission to relax its antenna gain standards for the 70/80/90 GHz bands to enable small planar antennas.¹³

Like other commenters, Charter also urges the Commission to permit fixed point-to-multipoint systems, in the spectrum above 95 GHz.¹⁴ Technological developments in planar

⁹ See, e.g., Ericsson Comments at 10, 13-14; Comments of T-Mobile USA, Inc., ET Docket No. 18-21, at 6-7 (filed May 2, 2018) ("TMO Comments").

¹⁰ See *95 GHz NPRM*, 33 FCC Rcd at 2455 ¶ 34.

¹¹ See Comments of CTIA, ET Docket No. 18-21, at 7 (filed May 2, 2018) ("CTIA Comments").

¹² See Ericsson Comments at 16; TMO Comments at 7-9.

¹³ See *95 GHz NPRM*, 33 FCC Rcd at 2456 ¶ 37.

¹⁴ See, e.g., Ericsson Comments at 14; CTIA Comments at 7-8; Facebook Comments at 4-5; Comments of Starry, Inc., ET Docket No. 18-21, at 3 (filed May 2, 2018) ("Starry Comments"); Comments of The mmWave Coalition, ET Docket No. 18-21, at 4 (filed May 2, 2018).

array antenna beamforming suggest there will soon be little difference between point-to-point and point-to-multipoint systems, and operators should be able to leverage these improvements to develop new offerings. Charter envisions that this approach could yield significant synergies with its existing and planned services. Additionally, Charter supports the Commission's proposal to include fixed services in above 95 GHz bands currently allocated for fixed satellite and mobile satellite services,¹⁵ although sharing these bands may require separate regulatory treatment due to interference concerns.

Lastly, Charter is in agreement with the many commenters who encourage the Commission to pursue a regulatory framework that would encourage exploring the use of this spectrum for mobile services.¹⁶ Although there are significant limitations imposed by uplink propagation challenges inherent in end user handheld devices, Charter urges an approach that will not foreclose the use of such devices consistent with the way Wi-Fi is used today.

As the Commission is aware, Charter is committed to launching a wireless offering in 2018, and sees wireless as a driver for future communications growth. Charter already is providing wireless connectivity to the over two hundred million wireless devices attached to its network, carrying as much as 80 percent of wireless traffic in the home and office. Under the right service rules, Charter could use the spectrum above 95 GHz to, among other things, complement its existing non-wireline services in a variety of settings, including in large-scale indoor venues and enterprises.

¹⁵ See, e.g., Qualcomm Comments at 9-10; CTIA Comments at 2-3.

¹⁶ See, e.g., Qualcomm Comments at 7-8; CTIA Comments at 4-5; TMO Comments at 5-6; Facebook Comments at 2.

III. THE RECORD DEMONSTRATES THAT THE COMMISSION SHOULD ALLOCATE SIGNIFICANT SPECTRUM ABOVE 95 GHZ FOR UNLICENSED USE IN ORDER TO REALIZE THE FULL POTENTIAL OF THESE SPECTRUM BANDS

While Charter supports the Commission’s efforts to explore spectrum bands above 95 GHz, the record clearly indicates that the Commission should allocate additional spectrum in these bands for unlicensed use, significantly beyond what is proposed in the NPRM. Under the Commission’s current proposal, there would be only 15.2 gigahertz of unlicensed spectrum in the 95-275 GHz range¹⁷—which is out of proportion with the 16 gigahertz of unlicensed spectrum in below 95 GHz bands. As Boeing indicates, “[s]uch an identification would make less than 10 percent of the frequency bands between 95 and 275 GHz available for unlicensed innovation and operation.”¹⁸

This disparity also conflicts with the Commission’s stated goal for this proceeding—which is to “spur innovation in spectrum that until now has seen relatively little deployment.”¹⁹ It is the case that “[b]y proposing . . . only a small fraction of [the above 95 GHz] spectrum . . . for unlicensed use, the Commission reduces the band’s potential to support new innovation and growth”²⁰ given that unlicensed spectrum historically has been a “driver of innovation.”²¹ Indeed, some of the most widely adopted wireless broadband technologies today, including Wi-Fi and Bluetooth, were innovations developed in unlicensed spectrum. And for spectrum bands above 95 GHz, as the record demonstrates, most of the use cases are still in the “very nascent”

¹⁷ See *95 GHz NPRM*, 33 FCC Rcd at 2464 ¶ 59.

¹⁸ Comments of The Boeing Co., ET Docket No. 18-21, at 10 (filed May 2, 2018) (“Boeing Comments”).

¹⁹ *95 GHz NPRM*, 33 FCC Rcd at 2449 ¶ 21.

²⁰ Comments of Apple Inc., ET Docket No. 18-21, at 5 (filed May 2, 2018) (“Apple Comments”).

²¹ *95 GHz NPRM*, 33 FCC Rcd at 2451 ¶ 26.

and experimental stages.²² As a result, limiting the amount of unlicensed spectrum risks inadvertently foreclosing innovative applications and technologies, especially for outdoor settings.²³

Charter therefore adds its support to those commenters urging the Commission to allocate additional spectrum bands above 95 GHz for unlicensed operations,²⁴ including at least the 116-122 GHz band,²⁵ which would create a greater contiguous block of unlicensed spectrum around 120 GHz. By adopting this approach, the Commission will both promote the efficient use of spectrum above 95 GHz and spur the development of new services and technologies in these spectrum bands.

IV. CONCLUSION

For the foregoing reasons, the Commission should continue on its course to explore opportunities for making spectrum above 95 GHz available for wireless broadband services. The Commission has appropriately recognized that because of both the unique physical properties of this spectrum and the early developmental stages of technologies and services that will operate in it, now is the time to begin exploring the possibility of making this spectrum available for commercial use. These same characteristics also weigh in favor of allocating even more spectrum above 95 GHz for unlicensed operations. Most use cases for this spectrum are still being developed, and allocating more spectrum for unlicensed operations, including at lower

²² See, e.g., Ericsson Comments at 8-10; Qualcomm Comments at 2-3; CTIA Comments at 5; Facebook Comments at 3; Comments of Starry at 2; see also *Spectrum Frontiers Second Order*, 32 FCC Rcd at 11,022 ¶ 105 (referring to “nascent stage of technological developments” in millimeter wave bands).

²³ For this reason, Charter also opposes any proposal that would limit unlicensed operations in the frequency bands above 95 GHz to indoors only. See *95 GHz NPRM*, 33 FCC Rcd at 2464 ¶ 59 & n.143 (discussing petition for rulemaking by James Whedbee).

²⁴ See, e.g., Apple Comments at 4-6; Facebook Comments at 3-4.

²⁵ See, e.g., Boeing Comments at 11; Starry Comments at 7.

frequencies, will best facilitate the innovation and experimentation in these spectrum bands to ensure that they are put to their highest and best use.

Respectfully submitted,

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