

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

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

**COMMENTS OF UNITED STATES CELLULAR CORPORATION**

Unites States Cellular Corporation (“USCC”) hereby files these Comments in response to the Notice of Inquiry (“NOI”) released August 3, 2017 in the above-captioned proceeding.<sup>1</sup> The NOI seeks comment on providing “additional flexible access – particularly for wireless broadband services – in spectrum bands between 3.7 and 24 GHz (mid-band spectrum).”<sup>2</sup> Detailed comment is sought concerning three specific bands: 3.7-4.2 GHz; 5.925-6.425 GHz; and 6.425-7.125 GHz. The latter two bands are now allocated in part to the common carrier fixed microwave service (“FS”). As will be discussed below, USCC makes extensive use of these bands for microwave systems which interconnect its base stations and connect those stations to its core network. These facilities are absolutely vital to the continuing viability of USCC’s wireless network. Many of these facilities are used to provide backhaul in hard to reach rural areas for which few, if any, economically feasible alternatives exist to provide wireless voice and broadband services. USCC accordingly urges the Commission to proceed with great caution in allowing new, potentially interfering usages in the 6 GHz band.

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<sup>1</sup> *In the Matter of Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, Notice of Inquiry, 32 FCC Rcd 6373 (2017) (“NOI”).

<sup>2</sup> *Id.* at 6373.

## **I. THE COMMISSION MUST PROCEED CAUTIOUSLY IN ALLOWING NEW 6 GHz FREQUENCY USAGES**

USCC, founded in 1983 and headquartered in Chicago, Illinois, is one of the few remaining mid-sized wireless carriers, serving approximately 5 million customers nationwide, many of which are located in rural areas of the United States. USCC has sought to compete with other carriers, including the national carriers, by means of a superior network and excellent customer service,<sup>3</sup> with a strong focus on rural parts of the United States.

It is impossible to overstate the importance of USCC's microwave facilities to the performance of its network. USCC has approximately 2,050 6 GHz microwave licenses, operating on approximately 2,080 microwave "paths," which can serve multiple frequencies. USCC operates those microwave links in 22 states.<sup>4</sup> USCC has approximately 1,113 microwave licenses using 5.925-6.425 GHz frequencies and 937 licenses using 6.425-7.125 GHz frequencies.

According to the NOI, approximately 27,000 licenses have been issued nationwide for point-to-point operations in the lower 6 GHz band, and approximately 22,900 licenses have been issued for point-to-point operations on eligible frequencies in the upper 6 GHz band.<sup>5</sup> USCC's 2,050 licenses obviously are a substantial proportion of those authorizations, especially for a company of its size.

Several general points and points specific to USCC should be noted in connection with 6 GHz FS operations. First, the investment represented by those operations is substantial, running

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<sup>3</sup> In 2017, for the third consecutive year, USCC had the "Highest Wireless Network Quality Performance in the North Central Region," comprised of Wisconsin, Illinois, Indiana, Michigan and Ohio, according to the J.D. Power U.S. Wireless Network Performance Study – Volume 2.

<sup>4</sup> They are: California, Illinois, Indiana, Iowa, Kansas, Maine, Maryland, Missouri, Nebraska, New Hampshire, North Carolina, Oklahoma, Oregon, Pennsylvania, South Carolina, Tennessee, Texas, Vermont, Virginia, Washington, Virginia, and Wisconsin.

<sup>5</sup> See NOI, 32 FCC Rcd at 6381, 6384.

into the multiple millions of dollars. Carriers such as USCC have made those investments in the reasonable expectation of interference-free operation on their assigned frequencies.

Second, many 6 GHz microwave licensees, including USCC, had to move off of 2 GHz microwave authorizations at the time the PCS service was authorized in the 1990s. If the nation's 50,000 licensed 6 GHz microwave facilities now had to move to the 10.7-11.7 GHz band, that would not only be a huge technological challenge, but also would be profoundly unfair to licensees that have relied on the Commission's good faith in making the 6 GHz band available. Moreover, shifting USCC's network to the 11 GHz band, even if technologically feasible, which is in some doubt, would require a complete infrastructure redesign to even attempt to meet its present performance criteria, another large expense.

USCC estimates the initial cost of relocating its 2,050 6 GHz microwave facilities to the 11 GHz band to be \$102,500,000; that is, 2050 licenses x \$50,000.00 per relocation. This would be a considerable expense for a company of USCC's size in a highly competitive industry. However, that cost estimate is almost certainly low, as there are crucial propagation differences between the 6 GHz band and the 11 GHz band, which would necessitate additional microwave "hops" or fiber usage and additional tower leases. Moreover, the change would increase latency and likely result in a notable decrease in overall system performance, which would impact service quality. A fairer estimate of overall costs if this change had to be made would be approximately \$205,000,000, or double the cost of a simple replacement of 6 GHz by 11 GHz on each path. In any case, the costs to USCC and similarly-situated carriers would be very large.

Third, line of sight microwave transmissions are susceptible to interference caused by, for example, rain attenuation, foliage, or the rotating blades of windmills entering, even slightly, into a microwave "path." Thus, microwave transmissions have to be protected, and potential

interfering uses need to be scrutinized with great care. Moreover, even if interference does not take down a microwave path entirely, it can reduce its efficiency. USCC’s engineers, for example, believe that opening the 6 GHz band to unlicensed devices could raise receiver “interference” thresholds on its microwave links and thereby increase outage time. USCC designs its links to “reliability” of 99.9995% (*i.e.*, only 2.5 outage minutes per year). That number could increase, to the detriment of our customers and the public generally.

Fourth, microwave backhaul is most useful in rural areas which often lack fiber alternatives. Microwave has certainly been integral to USCC’s rural service initiatives. Whatever arguments may exist for permitting additional uses of 6 GHz spectrum in urban areas, to do so in rural areas would be flatly contrary to the Commission’s objective of expanding rural broadband networks. Also, USCC questions whether any alternative uses of 6 GHz spectrum for unlicensed radio access networks make as much sense in rural areas given the low population density and more limited propagation characteristics of such spectrum. The “highest and best use” for this spectrum would appear to be its existing use – namely, to provide backhaul over very challenging terrain.

Finally, and perhaps most importantly, the present system works. Microwave licensees carefully coordinate proposed frequency usages with frequency coordinators such as Comsearch. They work closely with other FS licensees, including other wireless carriers, to ensure interference-free operation for all. Given the backhaul demands which will be placed on all wireless carriers by 5G (and beyond) operations, this is a state of affairs worth preserving.

## **II. THE NOI’S PROPOSALS PRESENT CLEAR THREATS TO 6 GHz MICROWAVE OPERATIONS**

The NOI first discusses the potential for flexible use of the 5.975-6.425 GHz band, noting the proximity of this band to those bands designated for Unlicensed National Information

Infrastructure (“U-NII”) use (*i.e.*, the 5.15-5.35 GHz and 5.47-5.725 GHz bands), and seeks comment on whether U-NII operations might be expanded into the 5.925-6.425 GHz band.<sup>6</sup>

The NOI does note the secondary status of unlicensed devices and the need to protect incumbent usages in the band, including FS operations. The NOI accordingly proposes U-NII antenna restrictions, EIRP limits, or limiting devices to indoor use.<sup>7</sup> Such proposed restrictions obviously reflect a serious threat of interference to licensed operations. The Commission then asks whether unlicensed U-NII usages might be required to have a geo-location capability and access to a database in order to operate without causing interference to licensed services.<sup>8</sup> Of course, the problem with all unlicensed uses is precisely that they are not licensed and hence are not subject to meaningful Commission review and oversight. The potential for interference is always high when unlicensed and licensed radio transmission facilities operate on the same frequencies.

Perhaps recognizing that geo-location by unlicensed devices to prevent interference is an inadequate solution, the NOI next seeks comment on “whether it may be viable to realign or retune existing incumbent operations...”<sup>9</sup> Presumably, the 11 GHz band is intended. But that would be unacceptable for the reasons stated above.

The NOI itself provides two possible additional reasons why the proposed U-NII expansion would not work. First, it notes that the NTIA has “recently concluded that there is no viable solution for U-NII devices to share the 5.35-5.47 GHz band with incumbent federal

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<sup>6</sup> *See id.* at 6382-84.

<sup>7</sup> *See id.* at 6383.

<sup>8</sup> *See id.*

<sup>9</sup> *Id.*

systems.”<sup>10</sup> The NOI does not specify a reason, but interference concerns certainly must be involved. Second, the NOI notes that in the 580 megahertz of 5 GHz spectrum currently authorized for unlicensed operations, the most active use of the band appears to be in those portions not subject to Dynamic Frequency Selection (“DFS”) requirements.<sup>11</sup> DFS requires prior coordination to avoid using the frequencies of nearby radar systems. This indicates a preference on the part of U-NII users for pure “unlicensed” use without having to protect incumbent users. If DFS type requirements were imposed throughout the 6 GHz band, would they be adhered to by U-NII users? This is another reason for caution.

Lastly, the Commission has already authorized, over strong protests from microwave licensees, one licensee, Higher Ground LLC, to operate 50,000 mobile devices to transmit to geostationary satellites in the 5.925-6.425 GHz band. FS operations allegedly will be protected by a “database driven, permission-based, self-coordination authorization system.”<sup>12</sup>

USCC, however, believes there may be merit in the arguments raised by the Fixed Wireless Communications Coalition (“FWCC”) in its February 17, 2007 “Application for Review” of the Higher Ground grant to the effect that Higher Ground has not provided “credible assurance” to the Commission that its operations will protect the FS from interference. FWCC also argues that the “post hoc” interference remedies proposed by Higher Ground will be “useless.” The Commission should carefully consider those arguments and the evidence supporting them. USCC also urges the Commission to review Higher Ground’s actual

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<sup>10</sup> *Id.* at 6382.

<sup>11</sup> *See id.* at 6383.

<sup>12</sup> *Id.* at 6381; *see Higher Ground LLC, Application for Blanket Earth Station License*, IBFS File No. SES-LIC-20150616-00357, Order and Authorization, 32 FCC Rcd 728 (2017) (Applications for Review remain pending).

performance closely, as persistent interference problems from Higher Ground operations should result in closing the door on additional usages in this band.

### **III. THE COMMISSION ALSO SHOULD NOT ALTER FREQUENCY USAGES IN THE 6.425-7.125 GHz BAND**

The NOI's discussion of proposed new usages in this band is cursory.<sup>13</sup> It notes the existing uses of the band, including FS, as well as mobile and fixed satellite usages, and seeks comment on the "potential for more intensive FS or mobile use" of the band, again also mentioning the U-NII possibility and possible "other unlicensed operations."<sup>14</sup>

USCC suggests that the same cautions would apply to this band as to the lower 6 GHz band, and further notes that the existence of more currently-licensed usages in this band than in the lower 6 GHz band also would create increased interference potential from new frequency usages, whether licensed or unlicensed, but especially if unlicensed.

### **IV. CONCLUSION**

USCC currently is developing its strategy to evolve the network to 5G. 6 GHz microwave will be an essential part of that network. USCC also is considering replacement of high-cost and sometimes outage-prone fiber with microwave for backhaul in various markets in 2018. The NOI has cast those plans into doubt. USCC therefore asks the Commission to clarify that 6 GHz microwave will remain available to wireless licensees with the same level of interference protection they now enjoy, and urges the Commission to take no action in this docket that will cause interference to such licensees.

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<sup>13</sup> See *NOI*, 32 FCC Rcd at 6384-85.

<sup>14</sup> *Id.* at 6385.

Respectfully submitted,

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