**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 IEEE 802**

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# **INTRODUCTION**

IEEE 802 respectfully submits these responses to the FCC (“the Commission”) in the above mentioned proceeding.

IEEE 802, as a leading consensus-based industry standards body, produces standards for wireless networking devices, including wireless local area networks (“WLANs”), wireless specialty networks (“WSNs”), wireless metropolitan area networks (“Wireless MANs”), and wireless regional area networks (“WRANS”). We appreciate the opportunity to provide these comments to the Commission.

# **BACKGROUND**

The broad success of wireless networks since initial marketing of the Wi-Fi brand in 1999, is a testament to the engineering, innovation and industry success as envisioned by the Commission when it began this “experiment”. From the days of 1 Mbps, this industry has applied countless engineering resources and billions of dollars towards improving its network speeds, its connectivity, and security, and providing benefits to many other industries that now count heavily on Wi-Fi. All this success, and all of the jobs it helped create are in spite of the challenging radio frequency environment with requirements for protecting the incumbents it shares this spectrum with. Dynamic Frequency Selection (DFS), devised as a means of protecting radars from Wi-Fi devices, has been proven to be an effective mechanism providing an apparent perfect record of non-interference.

However, its success has become its own worst enemy, as the billions of devices in service have begun to crowd all of the available channels. Now with the addition of new unlicensed technologies in this band, congestion clouds its future. The Commission’s 2013 attempt to provide additional bands for unlicensed services has since been met with limited success. The promise of 775 MHz of contiguous spectrum, from 5150 MHz to 5925 MHz, spurred the industry to develop new technologies that could efficiently provide 1 Gbps of throughput, and support many new and innovative applications. The recent decision to hold back the 120 MHz in the middle of the band (5350-5470 MHz), has forced a whole rethinking of the future of those applications and the industry, as well as those that depend on it. This proceeding now provides new hope for that future.

# **UNLICENSED SHARING OF 5.925-7.125 GHz**

In accordance with this Notice of Inquiry, and to best enable that future, we believe that the 5.925 GHz to 6.425 GHz and 6.425 GHz to 7.125 GHz bands should be designated as U-NII bands, with limits equal to the current U-NII-1 band.

Based on the segmentation of incumbents, operating under different rules, Parts 74, 78 and 101, these bands should be assigned as these separate U-NII bands:

U-NII-5: 5.925 GHz to 6.425 GHz (sharing with FS and FSS incumbents)

U-NII-6: 6.425 GHz to 6.525 GHz (sharing with BAS and CARS)

U-NII-7: 6.525 GHz to 6.875 GHz (same as U-NII-5)

U-NII-8: 6.875 GHz to 7.125 GHz (sharing with BAS and CARS)

And in order to expedite the release of this badly needed spectrum, the Commission should consider optimal timing for these different bands, based on the complexity of the technology required to mitigate interference to incumbents. The U-NII-5 and U-NII-7 bands should therefore be the first candidates for release.

# **INCUMBENT PROTECTION**

Although there is no precedent for Wi-Fi protecting these specific incumbents, there are a number of approaches that we are certain will be as effective as DFS has been in protecting radars. Some examples of methods similar to those in use today for this purpose are:

* Indoor deployments utilizing transmit power control, and taking advantage of Building Entry Loss (as specified in ITU P.2109, formerly P.(BEL)) to limit interference to incumbents. Until the recent changes in the U-NII-1 band, this was employed to protect satellite services.
* Database control of spectrum access is not necessary indoors, but could be employed if higher power is to be used.
* Fixed outdoor devices may require geo-location database spectrum access to ensure protection of incumbents. Although there are currently few deployments using this method, it has been shown to be effective in protecting broadcast TV and wireless microphones. Techniques similar to IEEE 802.11 Enablement, devised as a protection mechanism in the 3550-3700 MHz band, could be employed to ensure that all devices operate under constraints determined by protection criteria based on ULS data.
* Specialized antennas may also be employed to control interference to incumbents.

# **UNLICENSED SPECTRUM NEEDS**

Two independent spectrum needs studies have been undertaken during this past year have shown that the expected spectrum shortfall will be a significant problem within the next three to five years, so action by the Commission is needed soon. A coalition of most of the largest companies with Wi-Fi investments is in the process of completing a comprehensive study of the incumbents, and effective means for protecting them. In order to provide the most benefit to the unlicensed services, we suggest that the NPRM should address U-NII-5 and U-NII-7 as soon as possible, utilizing requirements comparable to the U-NII-3.

The U-NII-6 and U-NII-8 bands, which will have to protect mobile services could take more time to develop, and should follow once the protection mechanisms have been proven.

# **INCUMBENT PROTECTION DATA INTEGRITY**

In order to assist in guaranteeing protection for incumbents, it is essential that the FCC ULS database be scrubbed to ensure all entries are correct and current. Higher Ground, which has been approved for use of this band has done an exhaustive study of the ULS database, and could be employed in assisting the FCC with this task. In addition, licensees could be asked to indicate intent to continue use, and present a timeline for any prospective phase out plan

The Commission should also check that the number and location of FSS ground stations is correct and current. And as with the FS incumbents, licensees could be asked to indicate intent to continue use, and present a timeline for any phase out plan.

# **GLOBAL HARMONIZATION**

The Commission should take a leadership role in support of efforts to globalize these rules.

# **URGENCY**

We are specifically avoiding Federal spectrum (7125 MHz to 7250 MHz) sharing at this time due to the urgency of the need for additional unlicensed spectrum for unlicensed services. Sharing with Federal users will take significantly more time than with non-Federal.

Two separate spectrum needs studies show serious impairment of expected Wi-Fi connections within the next three years without a spectrum add, affecting consumers and businesses that rely on Wi-Fi.