

Reply Comments of
The Ultra Wide Band (UWB) Alliance
Before
The Federal Communications Commission
FURTHER NOTICE OF PROPOSED RULEMAKING
Mid-Band Spectrum Between 3.7 and 24 GHz

ET Docket No. 18-295
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Contents

- Introduction 3
- The Common Theme: There’s Need For More Study 4
- Applications in the Wireless Multi-verse 6
- Very Low Power Devices (VLP)..... 7
- Low Power Indoor Devices 11
- Multi-Stakeholder Group 12
- AFC 14
- Conclusion..... 15

Introduction

The Further Notice of Proposed Rulemaking (FNPRM) in the above referenced FCC Report and Order¹ generated many comments from various stakeholders. The following contains replies from the Ultra Wide Band (UWB) Alliance.

The UWB Alliance continues to endorse rule changes that encourage innovation while expanding the usefulness and value of the RF spectrum for all users. In the following we respond to comments submitted to the FCC in the FNPRM record and offer constructive suggestions that support efficient and effective use of the spectrum. Within these comments we focus on enabling many of the applications desired by stakeholders. Our position continues to be that new rules should adequately protect licensed users while providing fair and equitable access to the band by all unlicensed users.

While the UWB Alliance name suggests that we are representatives of one technology, many of our members are engaged in integration of multiple technologies to meet application needs. While we focus on UWB technology, we observe the consumer space is increasingly a multi-radio environment. Thus, the UWB Alliance encourages and supports the FCC's efforts to identify additional spectrum for the development and marketing of new and innovative wireless devices of all types.

We note that several commenters reference the UWB Alliance in their comments. In our replies we note that there is significant agreement between the analysis of many commenters and the analysis performed by the UWB Alliance. We note that the technical information they provide supports many of our recommendations.

The Wi-Fi Alliance suggests that it is acceptable for unlicensed devices to interfere with other unlicensed devices.² The tone of such comments suggests a narrow view of what affects the consumer experience. There was a time when one radio technology was thought to supply the answer to all requirements. We now know that this is impractical. Virtually every RF capable computing device made today contains multiple radios that are purpose specific to provide the best performance alternatives (e.g., smartphones may have Bluetooth, wireless WAN, Wi-Fi, NFC and UWB all in the same package). Effective coexistence between all unlicensed technologies is essential to achieving the best consumer experience. The technical analysis provided in various comments by the RLAN collective support (rather than contradict) the analysis provided in the UWB Alliance comments. Several of the comments from the Wi-Fi Alliance agree with our conclusion that innovations in intelligent footprint

¹ Federal Communications Commission Report and Order, *Unlicensed Use of the 6 GHz Band; Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz* (Report and Order). 35 FCC Rcd 3852 (5).

² [Comments of The Wi-Fi Alliance](#), ET Docket No. 18-295, GN Docket No. 17-183 (Filed June 29, 2020), at 13-14.

control are required for the promises of Wi-Fi and other broadband technologies to meet the commitments being made to consumers.

Despite the need to proceed carefully, there is no requirement to put innovative new devices on hold while the testing and mechanisms discussed in these proceedings are being determined. There are already technologies deployed to meet the elevated application performance expectations of many consumers. Short-range, high bandwidth, low-power devices are currently deployed that can provide superior precision, performance, device density, and security. UWB is an excellent partner capable of operating in conjunction with both licensed and unlicensed devices to meet the needs of all wireless users. Good examples of UWB in concert with other technologies for VR/AR, wireless gaming and precision location are [the products offered by the Montreal-based company, Spark](#).

Our review of the comments from stakeholders representing the various points of view show much diversity of positions. We note that there are multiple key comment topics which must be addressed:

- There is a common theme that real world empirical study is required
- Multiple radio technologies must coexist to fulfill requirements for specific applications
- Proper RF levels must be determined, including defining antenna and footprint control mechanisms for both LPI and VLP
- A new contention-based protocol must be developed and proven that provides equal access to all stakeholders (this should be done by a multi-stakeholder group)
- A new AFC system must be developed, implemented, and proven
- A multi-stakeholder group should be created, relying on leadership by existing licensed incumbents, overseen by the FCC, with no new 6 GHz unlicensed devices marketed or sold until agreement has been reached and the rules have been revised.

The Common Theme: There's Need For More Study

A common conclusion supported by otherwise opposing commenters is the need for further investigation into the engineering issues raised beyond that of mere computer modeling. As has been noted in numerous comments, the record includes conflicting simulation-based studies. Results differ greatly due to the assumptions made by those conducting the simulations and resulting parameters chosen. The obvious and responsible engineering solution to widely conflicting simulation results is to validate simulation results via empirical studies.

The Commission recognized in the Report and Order that numerous stakeholders were advocating for empirical testing prior to mass deployment of new higher power unlicensed devices under the new 6

GHz rules.³ While the Commission choose then not to require such testing, the record continues to indicate the strong support for requiring this important step.

The need for further study via testing and analysis is identified in the study conducted by the Wireless Research Center of North Carolina submitted in the comments of Apple Inc., Broadcom Inc., Cisco Systems, Inc., Facebook, Inc., Google LLC, Hewlett Packard Enterprise, Intel Corporation, Microsoft Corporation, NXP Semiconductors, Qualcomm Incorporated, and Ruckus Networks, which concludes:

*The work presented in this paper is at the early stage of understanding the impact that unlicensed use of the 6 GHz band may have to the licensed use of the existing legacy systems in the same frequency band. Additional information on the RF characteristics, antenna pattern and implementation of the incumbent system is needed. Testing and analysis are required to refine the path loss model between two on-body devices, and interference model to the legacy systems in 6 GHz band.*⁴

In addition to a general concern regarding the required testing and analysis, Microsoft – in separate comments - also correctly notes that time is needed before fully implementing changes to operation in the 6 GHz spectrum:

*At first, though, until one or more AFCs are developed and certified by the Commission, all entities may have a need to operate LPI devices.*⁵

We acknowledge the need for empirical testing and caution. Although we support new and innovative use of the 6 GHz spectrum, we note that there is much work to be done by and for all the affected incumbents and constituents. This must be done prior to allowing new unlicensed devices to operate in the 6 GHz spectrum in accordance with the rules as defined in the April 27 Report and Order.

We agree with comments from APCO⁶, AT&T⁷ and others regarding the need for real world testing before new devices are marketed. We endorse and applaud this recommendation. The wireless ecosystem requires many coexisting parts to achieve the promises being made to the consumer.

³ FCC Report and Order, identifying comments from Southern Company, National Spectrum Management Association and Fixed Wireless Communications Coalition calling for real world testing of impacts to critical systems, at page 68 paragraph 177.

⁴ [Comments of Apple Inc., Broadcom Inc., Cisco Systems, Inc., Facebook, Inc., Google LLC, Hewlett Packard Enterprise, Intel Corporation, Microsoft Corporation, NXP Semiconductors, Qualcomm Incorporated, and Ruckus Networks](#), ET Docket No. 18-295, GN Docket No. 17-183 (Filed June 29, 2020) Attachment B, at 11.

⁵ [Comment of Microsoft Corporation](#), ET Docket No. 18-295, GN Docket No. 17-183 (Filed June 29, 2020) at 5.

⁶ [Comments of APCO International](#), ET Docket No. 18-295, GN Docket No. 17-183 (Filed June 29, 2020), at 3.

⁷ [Comment of AT&T Services, Inc.](#), ET Docket No. 18-295, GN Docket No. 17-183 (Filed June 29, 2020), at 5.

Applications in the Wireless Multi-verse

Several commenters reference the need for expanded Wi-Fi rules to allow operation of new high-performance video game controllers, wearable video, augmented reality, virtual reality devices, and for expanded/enhanced automotive and health care applications.⁸ Microsoft points out that for Wi-Fi to accomplish the high-performance requirements delivered over LPI devices in a 1 to 3-meter range, a higher power spectral density is needed.⁹ However, these arguments are misleading and economically harmful. Consumers crave these exciting new tools now; increasing PSD or making complicated new rules is clearly not required when the devices already exist. For example, the healthcare applications given by the Wi-Fi Alliance¹⁰ are already addressed by products currently saving lives using UWB.

We find it especially interesting that the RLAN Group comments on the need for VLP for improved precision in location-based services¹¹ and for “high-precision asset and personnel tracking,”¹² quoting a 50% improvement in location accuracy over 80 MHz Wi-Fi. UWB is already widely used in these applications, greatly exceeding their target accuracy. This reflects an outdated “one size fits all” view of these complimentary radio technologies. Although we agree that new wireless technologies and applications should be encouraged, there need not be continuous churning for the sake of product turns. Additionally, any new technology should provide better performance and more spectral efficiency than the technology that it is meant to replace. Increasing power and rushing un-tested rules to ‘enable’ RLAN to work for new applications that already have solutions is unwise. There is no rush to quickly fill the need for these solutions.¹³ There is time and good reason to proceed with caution to get the next stage of wireless innovation.

We recommend that all stakeholders should work together to identify the optimum technologies to meet the expanding application scenarios. When considering Wi-Fi as one of the important technology tools in the 6 GHz band, the same care and consideration that went into the previously established unlicensed operation regulations should be employed. If there is a rush to open the spectrum to untested and uncontrolled Wi-Fi power levels, the new products may interfere with incumbent licensed operations. If unexpected interference occurs, then the new Wi-Fi devices would be forced to cease operation per regulatory requirements. This would harm both the manufacturers of the devices as well as the consumers who purchased them. The rules should be written to support creating new

⁸ Wi-Fi Alliance, at 4-6;

Microsoft at 6, and Apple, Broadcom, et al., at 2, 6-7.

⁹ Microsoft, at 2-3, 6.

¹⁰ Wi-Fi Alliance, at 5-6.

¹¹ Apple, Broadcom, et al., at 7.

¹² Id., at 38.

¹³ With the rapidly expanding availability of UWB precision ranging capability in consumer devices such as phones, the rationale for using Wi-Fi for ranging is no longer valid. In the multi-verse of the modern consumer device it is more efficient to use the optimal technology for specific applications.

ways to address the expanding set of use cases without causing consumers to undergo unexpected financial disappointment

It is clear that to ensure an optimal path forward and maximize future potential, adequate testing is required to clearly understand the potential impact of new unlicensed devices.

Very Low Power Devices (VLP)

We agree with the Apple, Broadcom et al., commentators – also known by their self-adopted name as the ‘RLAN Group’ – that expanding availability of spectrum for unlicensed users will produce substantial economic benefits for the country¹⁴ and agree that Very Low Power devices are an important part of the wireless present and future. We note that Very Low Power unlicensed devices have been used successfully in the 6 GHz band for over a decade, under rules that have proven to adequately protect incumbents. Devices operating under the wideband and ultra-wideband rules of Part 15 have been used in many of these cited applications such as watches, smartphones, and medical devices. Such devices are used in and on the human body at very low power levels (≤ -41.3 dBm/MHz).

We noted that the study by the Wireless Research Center of North Carolina presented in the RLAN group comments generally agrees with the analysis provided in the UWB Alliance comments regarding body area networking. The references that we provided for body area channel models were also based on empirical measurements.¹⁵ While not as comprehensive as the measurements in the BAN studies referenced by the UWB Alliance comments, the Wireless Research Center of North Carolina results are consistent. We further note that their study supports our conclusion that the attenuation due to body loss varies greatly and dynamically and tends to attenuate the signal only in the direction passing through the body (“the human body blocks or largely attenuates the signal from propagating in the direction blocked by human tissues”).¹⁶ In fact, a finding in this study is that interference footprint can be greater than what we assumed.

With the use of intentionally directional antenna patterns as we have suggested, performance of the desired link can be greatly improved and interference impacts are greatly reduced, benefitting both adjacent RLANs and other spectrum users.

The RLAN Group continues to assert that +14 dBm is “the lowest level at which manufacturers can design VLP devices that can reliably provide consumers with the minimum throughput and latency

¹⁴ Apple, Broadcom, et al., at 4.

¹⁵ See [Channel Model for Body Area Network \(BAN\)](#), IEEE P802.15-08-0780-12-0006, November 2010.

¹⁶ [Comments of The Ultra Wide Band \(UWB\) Alliance](#) ET Docket No. 18-295, GN Docket No. 17-183 (Filed June 29, 2020), Page 8 of Annex B.

requirements needed for expected applications in the range of likely operating environment.”¹⁷ The RLAN Group analysis combines the peak loss with very worst-case assumptions about the RLAN receiver sensitivity (the minimum specified receiver sensitivity defined for 160 MHz channel using 1024 QAM in IEEE Std P802.11ax¹⁸ of -43 dBm).

Table 1 shows the minimum receiver sensitivity required by P802.11ax.¹⁹ The progression of decreasing sensitivity is based upon the same specifications for 20 MHz channels introduced by IEEE Std 802.11a-1999.²⁰ The RLAN group performance expectations of ‘innovative’ RLAN solutions appears to be based upon technology assumptions that are more than two decades old.²¹

Modulation		FEC Rate	Minimum sensitivity (dBm)			
			20 MHz	40 MHz	80 MHz	160 MHz(1)
w/o DCM	With DCM					
N/A	BPSK	1/2	-82	-79	-76	-73
BPSK	QPSK	1/2	-82	-79	-76	-73
QPSK	16-QAM	1/2	-79	-76	-73	-70
QPSK	16-QAM	3/4	-77	-74	-71	-68
16-QAM	N/A	1/2	-74	-71	-68	-65
16-QAM	N/A	3/4	-70	-67	-64	-61
64-QAM	N/A	2/3	-66	-63	-60	-57
64-QAM	N/A	3/4	-65	-62	-59	-56
64-QAM	N/A	5/6	-64	-61	-58	-55
256-QAM	N/A	3/4	-59	-56	-53	-50
256-QAM	N/A	5/6	-57	-54	-51	-48
1024-QAM	N/A	3/4	-54	-51	-48	-45
1024-QAM	N/A	5/6	-52	-49	-46	-43

Table 1: P802.11ax Receiver minimum input level sensitivity

This assumes designers will achieve no better than the minimum defined in the standard, and that there have been no improvements in real world receiver performance for two decades. Neither assumption is consistent with innovation. Further, these assumptions are in contrast with existing wideband and ultra-wideband systems which achieve on the order of 40 dB better receiver sensitivity using channel widths of 500 MHz or greater.²² We do not intend to imply that RLAN designs will achieve the level of performance of wideband and ultra-wideband designs, merely we are pointing out

¹⁷ Apple, Broadcom, et al., at 2.

¹⁸ See [P802.11ax™/D6.0](#) Unapproved Draft, dated November 2019.

¹⁹ Ibid.

²⁰ IEEE Std. 802.11-1999 December 1999.

²¹ See IEEE Std 802.11-2016 Table 17-18—Receiver performance requirements for the OFDM PHY first incorporated into the standard by amendment IEEE Std 802.11a-1999.

²² Example, Qorvo (Decawave) DWM1001 Data Sheet <https://www.decawave.com/dwm1001/datasheet/>

that there is reason to expect real-world implementations will not perform as poorly as assumed by the RLAN Group.

This dated assumption is then combined with the extreme case body loss assumptions which, as demonstrated by the study they provided, may be as much as 40 dB less than assumed. Again, the RLAN group does not address the impact that such high power will have on the overall system performance. Further asserted is that the use of the highest available data rate is required to meet energy consumption (battery life) requirements for VLP applications. The RLAN Group also continues to assume a 0.04% activity factor is appropriate for interference analysis while opposing the UWB Alliance suggestion to limit activity factor to 5% as an effective means to improve coexistence.

The RLAN Group raises interesting points about the need for high instantaneous data rate to reduce energy consumption through reduced activity factor (aka duty cycle). We agree that reducing duty cycle is a good thing, both for conserving battery and improving coexistence. The RKF study continues to assume extremely low activity factor, on the order of 0.04% as used previously (by reference to ECC Report 31624). From Table 1 we see that a trade-off is available between data rate (and thus required duty cycle for given burst) and sensitivity, with an increase in link margin of 30 dB achieved by reducing data rate to approximately half. Falling back to a lower instantaneous rate for the infrequent conditions where higher link margin is needed, would (still using the RKF assumptions) result in an activity factor that is less than 0.1% or 5 times less than the limit proposed by the UWB Alliance.²³ From the RLAN Group's own study, the need for additional link margin due to body loss is infrequent and so falling back to a more robust modulation for those periods would have little impact on overall energy consumed. Reducing transmit power is another feasible trade-off for reducing energy consumption.

The RLAN Group provides an interesting analysis of required throughput. They differentiate between data rate and throughput as follows: data rate is the instantaneous rate of communication while throughput is the time-average of the data rate (i.e., rate at which information bits are conveyed over periods of many seconds or longer).²⁴ They further state that the required throughput is 400 Mbits/sec.²⁵ The reference given for this required throughput gives this as a sustained throughput number in certain situations. If we combine these with the highest instantaneous PHY data rate available in P802.11ax (9607.8 Mbits/sec) we have an activity factor at least 4.16%. This is substantially greater than what is assumed in the RKF studies analyzing potential for interference with incumbent users. In addition to noting the inconsistency between these assumptions (and thus the potential for the simulated interference effects to be substantially understated), we would like to note

²³ Ultra Wide Band (UWB) Alliance at 24-25.

²⁴ Apple, Broadcom, et al., at 11.

²⁵ Simone Mangiante et al., [VR is on the Edge: How to Deliver 360° Videos in Mobile Networks](#), (Aug 25, 2017) § 3 Tbl. 1.

that the interference footprint mitigations which we have proposed would improve both the RLAN link margin when needed, as well as reduce the interference potential substantially.

In their comments the Wi-Fi Alliance asserts that +14 dBm power is required to “take advantage of all of the technology that relies on the use of unlicensed spectrum” and that VLP is a “force multiplier for other innovative technologies — including IoT, cloud, and edge computing.”²⁶

While we agree that there is great potential in very low power devices, we must point out that wideband and ultra-wideband technology is part of the “all” of users that rely on the use of unlicensed spectrum and do not depend upon such high power. We further note that many of the important use cases which they assert ‘require’ +14 dBm are currently served by wideband and ultra-wideband technologies operating at 50 dB less power, including many applications in healthcare, precision location, automotive, and also emerging applications for virtual reality. We believe that combining the unique capabilities of enhanced Wi-Fi with the capabilities of wideband and ultra-wideband technologies will enable a brighter future for all.

We also agree that “a harmonized regulatory framework for affordable and ubiquitous VLP devices is important to market scale and commercial viability”²⁷ but note that such a harmonized framework has existed on a global scale for over a decade. We further agree that expanding unlicensed access for new very low power technologies will have great benefit.

While we agree with the Wi-Fi Alliance on many points, we find some inconsistencies in their comments. The present and future implementations of wireless systems are, as we continue to point out, a multi-verse of technologies which must work together to achieve the most value for the consumer. Applying ‘the right tool for the job’ provides the greatest value. Leveraging the complimentary characteristics of all available technologies is essential to maximizing the quality of user experience.

Ignoring interference impact on (and from) other technologies is counter to goals of achieving the most value from the available spectrum. As previously noted, high power transmissions without control of the RF footprint will result in suboptimal RLAN performance, as well as, degrading the function of other services. The ‘new normal’ of multi-radio devices is that all these technologies must work together. The regulatory framework which the UWB Alliance has suggested will encourage innovation to enhance coexistence of overlapping RLANs as well as benefit other users. Coexistence is essential to achieve the promise of expanding unlicensed access. Rejecting coexistence is counter to the need of most users and the general public’s interest.

²⁶ [Comments of the Wi-Fi Alliance](#), ET Docket No. 18-295, GN Docket No. 17-183 (Filed June 29, 2020) at 4.

²⁷ Ibid.

As we have already pointed out, the study referenced in the RLAN Group comments reinforces the analysis we presented in our comments. It suggests that the impact footprint of +14 dBm body worn AP is greater than our analysis predicted.²⁸ Thus, we find their position somewhat perplexing. We realize that Wi-Fi and UWB are not the only potential unlicensed users of the 6 GHz spectrum. Of note is the latest specification from 3 GPP which includes an NR-U channel plan for the 6 GHz band. The mechanisms which we have previously suggested, along with new measures such as an effective contention-based protocol, can serve the benefit of all users.

The UWB Alliance is working to achieve coexistence so as to maximize the opportunity for all users. We look forward to working with all stakeholders including the Wi-Fi alliance in this pursuit.

Low Power Indoor Devices

The RLAN Group is also demanding higher PSD for indoor APs. The RLAN Group asserts that higher PSD is required to “achieve coverage areas and performance levels comparable with today’s Wi-Fi solutions,”²⁹ which continues to operate on an outdated assumption that increasing the sphere of influence (and thus interference footprint) is advantageous to the consumer experience. This is inconsistent with the notion of a ‘spectrum crisis’ due to the high density of RLAN devices and thus need for more channels. The ‘crisis’ is brought about by RLAN performance degradation due to the interference of overlapping uncoordinated RLANs. Increasing the RF footprint degrades the consumer experience.

As the market has matured, consumer APs have become very inexpensive.³⁰ While in the past it might have made sense to maximize the coverage area of a single AP to save cost, in 2020 and beyond it is much more reasonable to optimize capacity over range. This will provide the best overall system performance which is better served by more lower power APs covering smaller areas and thus reducing the interference footprint.

The RLAN group uses the same argument here as for VLP, assuming the worst receiver sensitivity of -43 dBm (160 MHz channels at the highest order modulation). We note that this provides for only 7 channels in the band 6 GHz band, thus coordinating overlapping RLANs via channel assignment only provides limited mitigation to spectrum saturation. This is particularly relevant in urban areas where

²⁸ Apple, Broadcom, et al., Attachment B, *Wireless Research Center of North Carolina Report – On-Body Channel Model and Interference Estimation at 5.9 GHz to 7.1 GHz Band*, radiation patterns at 7, conclusions at 8.

²⁹ Id., at 3.

³⁰ Searching for 802.11ac capable access points on amazon.com on July 26, 2020 showed many available for well under \$100. The same price pressures will drive 802.11ax products to similar prices points rapidly.

spectrum is crowded. The conclusion of this reasoning is that 1.2 GHz is simply not enough bandwidth to support consumers using conventional RLAN.

If the same assumptions are applied to the next generation 802.11 Extremely High Throughput the situation becomes even worse. Sensitivity for 320 MHz channels at 4096 QAM will reduce the expected receiver sensitivity to -34 dBm, and only 3 orthogonal channels will be available in the band to accommodate all RLAN users. Given the projections from the RLAN group for billions of new devices being deployed it is critical to increase the capacity rather than increase coverage area which automatically reduces the number devices deployable in a given area.

Multi-Stakeholder Group

Another key comment area is the creation of a mechanism to ensure effective co-existence and protection of incumbents via the formation of a Multi-Stakeholder Group (MSG). An effective contention-based protocol is a cornerstone to the operating requirements put forth by the FCC in the Report and Order. Fundamental to this development is that the contention-based protocol be required to allow fair access to spectrum for all unlicensed devices and create an additional layer of protection to incumbent users.³¹ Upon reviewing the Wi-Fi Alliance's comments about this extremely important mechanism, we find that we must agree with APCO and NAB regarding the risk to all wireless users. Wireless users even include those who purchase new Wi-Fi equipment. Due to aggressive marketing there will be elevated performance expectations for all applications. We find the comments presented by the Wi-Fi Alliance to be self-serving and fixated on short-term profit rather than being focused on cooperative coexistence. Their comments display possible intentions for domination and dismissal rather than cooperation. This is shown in Wi-Fi Alliance comments:

Accordingly, currently employed contention-based protocols would effectively augment protection of the licensed services, and Wi-Fi Alliance supports requiring such protocols for VLP implementations.

Because of the short range of both VLP and UWB devices in particular, as well as the nature of UWB operations, much of the interference potential between the two unlicensed applications will be confined to particular locations under the control of a single entity. The Commission need not protect entities from causing interference to their own operations.³²

While we agree with the requirement for a contention-based protocol, we strongly disagree that the existing protocol in use by Wi-Fi devices is sufficient. We also find the assertion that unlicensed applications in a given location will be under the control of a single entity inconsistent with the use cases cited for VLP such as VR/AR and mobile hotspots. While it is true there will multiple radios

³¹ Report and Order at Paragraph 102: "In addition to providing equal access to the spectrum for unlicensed devices, a contention-based protocol can also be used to avoid co-frequency interference with other services sharing the band."

³² Wi-Fi Alliance at 13-14.

operating in a single device, which may fit the characterization of ‘under control of a single entity,’ is also assured that there will be multiple entities independently operating their personal devices.

These statements and conclusions are contrary to the intent stated in the Report and Order. The Commission states that formation of the MSG is to include all constituents with interest in this spectrum, naturally including licensed incumbent users, but also specifically mentioning UWB and other unlicensed wireless users beyond just Wi-Fi.

One stated purpose of the MSG is to determine appropriate methods for providing fair access to all users in this spectrum while protecting incumbents. The Commission specifically states as a goal “equal access to the spectrum for unlicensed devices,”³³ which is essential for enabling consumers devices to provide the performance consumers are being promised.

Instead of considering these goals objectively, the Wi-Fi Alliance states – as noted above – that the CSMA method currently implemented is completely adequate, and further suggests that ‘self-interference’ of overlapping RLANs and resulting performance impacts on the user experience are ‘not our problem.’ However, it is evident that the full potential of economic value and success will not be achieved by creating devices which will self-interfere. Consumer adoption is dependent on performance to expectations in crowded environments.

We agree with APCO’s concerns regarding the MSG and feel that the governance framework should rely on leadership by existing licensed incumbents. The development, testing, and selection of protocols requires consideration of the needs of all users, including existing licensed incumbents as well as unlicensed users. A single dominating view will not meet the FCC’s stated objective for the group. Licensed users have a right to ensure that quick and untested solutions are not rushed into practice. After reading the comments posted by the Wi-Fi Alliance, the MSG may become akin to allowing the ‘fox to guard the hen house.’ Having stated that all they want to do is what they have already implemented seems not conducive to the required task of development of an effective protocol. In addition, clear objectives for the MSG need to be mandated by the FCC, and there must be mechanisms in place to ensure the objectives are met in the delivered solution.

We strongly support APCO’s comments regarding what is necessary for the success of the Multi-Stakeholder Group.³⁴ It is incumbent upon all stakeholders including the FCC to be diligent in determining the optimum measure of equal access.

³³ Report and Order at Paragraph 102.

³⁴ [Ex Parte Letter from APCO International](#), ET Docket No. 18-295, GN Docket No. 17-183 (Filed July 17, 2020), at 3.

AFC

Given the dependence on AFC to the continued interference-free operation of licensed incumbents, it is imperative that the entire AFC system be tested and proven. There is much complexity in the many functions which must all operate properly for the system to provide the intended protections. There are many new “moving parts” that are required but not yet specified or developed. Prior implementations of AFC have had fewer complex requirements to meet.

We agree with AT&T³⁵ and APCO³⁶ that identification of and mitigation of interfering devices is essential to the effective sharing of the band between unlicensed and licensed users. The rules must provide for the identification, control, and shutdown of potential unlicensed devices causing interference to essential incumbents. We also find compelling the comments of APCO that identifying and mitigating interference is expensive, time-consuming, and not always possible; yet assuring such protection of licensed services is an essential requirement for unlicensed operation.

The reality is that when unlicensed devices are sold in volume it is difficult if not impossible to remove them from the market.

The R&O and FNPRM proposed rules do not provide any mechanisms for identification or shutdown of interfering devices. The best path to assuring continuous interference-free operation for these vital incumbents requires detailed empirical testing conducted by an independent third-party test organization. The cost of error or retracting devices already launched to market is an impractical situation to manage.

We find that the NAB raises serious concerns in their remarks:

*In the Order, the Commission adopted new rules permitting uncoordinated unlicensed operations across the entire 6 GHz band. The Order unlawfully fails to protect the myriad existing licensed users in the band from potential interference arising from such unlicensed use. Television broadcasters in particular have both fixed and mobile operations in the 6 GHz band, which require different protective measures to be adequately insulated from harmful interference. The Order neglects to include proper safeguards for either type of broadcast operation.*³⁷

An AFC system has never been required to deal with instantaneously appearing devices that are licensed, protected, and mobile. The fact that broadcasts use mobile systems is critical and the protections guaranteed by their licenses must be provided. Developing the ability to sense these mobile broadcast devices, notify the required parties, and command shut down of the offending unlicensed device will require significant development and testing. The task to develop this complex

³⁵ AT&T at 4.

³⁶ APCO Ex Parte at 4.

³⁷ National Association of Broadcasters v. Federal Communications Commission, No. 20-_____, Petition for Review filed by National Association of Broadcasters, (D.C. Circ., July 24, 2020), at 2. Petition available at <https://www.nab.org/documents/filings/PetitionforReview6%20GHz7.24.20.pdf>.

system has yet been to be initiated and yet the R&O is set to be implemented now. Current AFC systems such as the White Space system are slow (up to twenty minutes recognize an interferer) and can take even longer for problem resolution. This type of response will not protect mobile newscasters that require immediate access to the airwaves wherever there is news.

Conclusion

The UWB Alliance strongly supports expansion of licensed exempt operations with rules that provide incentives for innovation along with efficient and effective use of available spectrum.

As noted earlier, there are multiple key areas in which to address comments from stakeholders:

- Real world empirical study is required
- Multiple radio technologies must coexist
- Proper EIRP and conducted power levels must be determined for both LPI and VLP
- An equal access contention-based protocol must be developed
- A real time AFC system must be developed, implemented, and proven
- A multi-stakeholder group should be created, relying on leadership by existing licensed incumbents, overseen by the FCC, with no new 6 GHz unlicensed devices marketed or sold until agreement has been reached and the rules have been revised.

Each of these items should be addressed to maximize the success of these bold moves by the FCC. The new rules should provide a common baseline that extend the use of existing technology solutions while encouraging and rewarding innovation. Achieving the goal of providing equal access to the radio spectrum will further expand the application space and maximize the return on the utilization of this precious resource.