

**Before the  
Federal Communications Commission  
Washington, D.C. 20554**

In the Matter of )  
 )  
Petition for Rulemaking: Amendment of ) CG RM-11844  
Rules Governing Ultra-Wideband Devices )  
and Systems )

**ULTRA WIDEBAND ALLIANCE REPLY COMMENTS  
FOR THE  
ROBERT BOSCH LLC PETITION  
FOR  
AMENDMENT OF RULES GOVERNING  
ULTRA-WIDEBAND DEVICES AND SYSTEMS**

**Tim Harrington**  
Chairman and Executive Director, UWB Alliance

**Benjamin A. Rolfe**  
Chief Technology Officer,  
UWB Alliance

Filed: September 3, 2019

## **1 Introduction**

The UWB Alliance is pleased to provide a reply to comments on the above-captioned petition for a comprehensive review of Part 15, Subpart F, regulations governing Ultra-Wideband (UWB) devices and systems. In our comments filed on 8/15/2019<sup>1</sup> The UWB Alliance expressed support for a review and revision of the UWB rules. The UWB Alliance remains in support of the petition.

The UWB Alliance is a leading consensus-based industry alliance promoting UWB technology and interoperability. The Alliance membership has developed innovative products widely used throughout the world. Application of UWB Technology is growing explosively, finding commodity application in the automotive and consumer electronics sectors. With such rapid growth in interest and application, the opportunity for review and revision of the UWB rules is well timed. We appreciate the opportunity to provide these comments to the Commission.

In reviewing the comments filed, we note overwhelming support by commenters, however we note valid concerns raised by the single commenter in opposition to the petition. The vast majority of comments filed are in support of the Bosch petition. Two organizations, the GPS Innovation Alliance (GPSIA) and Aviation Spectrum Resources, Inc. (“ASRI”) filed requests for extensions. GPSIA subsequently filed comments in opposition to the petition.

## **2 Support for the petition**

The UWBA’s review found positive comments filed by 11 organizations. Most noted the proven coexistence properties of UWB and the growing need for coexistence in licensed exempt spectrum to gain the maximum value from that spectrum. Responses came from entities and individuals with extensive industry experience with UWB, including many people who were involved in the original rulemaking process that resulted in the first Report and Order in 2002. Several commenters had suggestions for review in addition to the specific areas of the Bosch petition that would further the value of the rulemaking process. Many recalled the promise in that order to review the industry experience and revise the rules accordingly, and that the time has come.

---

<sup>1</sup> [https://ecfsapi.fcc.gov/file/1081670360966/UWBAlliance\\_Supports\\_Bosch\\_Petition\\_RM-11844\\_08152019%20.pdf](https://ecfsapi.fcc.gov/file/1081670360966/UWBAlliance_Supports_Bosch_Petition_RM-11844_08152019%20.pdf)

Specific suggestions supported by many or most of the positive comments include removing the outdoor restrictions for communication devices, revising the definition of UWB bandwidth to become more technology neutral, harmonizing measurement procedures with international standard to reduce costs and improve consistency, and consideration of increased PSD without altering out of band emissions limits that protect licensed services. Alignment with the wideband rules in Subpart C §15.250 is also suggested.

Commenters repeatedly note that experience has proven the Commissions' "ultra-conservative" characterization. Also commonly noted is that the waiver process has shown relaxing certain restrictions will not cause harmful interference.

Vortezon<sup>2</sup> commented in support of the petition, and adds to the request that the Commission consider to "substantially increase maximum allowable ERP" noting that with appropriate technical standards equivalent protection of incumbent services could be assured, while expanding the opportunity to "spur innovation and create safety and security" in areas such as security and surveillance systems.<sup>3</sup> Several other comments also suggested increased PSD without altering out of band emission limits as a way to encourage alternatives to high power narrower band technologies that are not as effective in dense environments.

Alteros<sup>4</sup> supports the petition and "believes that a win-win regulatory position is possible for the manufacturers of Wi-Fi/WLAN equipment, UWB equipment, 5G devices, and those incumbents, who currently utilize licensed and unlicensed spectrum for their critical applications and functions, to be able to operate with spectrum, allowing for maximized co-existence, performance, and choice."<sup>5</sup> Alteros notes that with a few of the suggested changes, UWB would more easily address many of the high-throughput needs driving new applications such as Virtual Reality and Augmented Reality (VR/AR), noting that such applications will typically have many devices in a small space; Alteros has proven UWB is an excellent technology for such situations and non-disruptive to other services. Alteros notes "We find that the recommendations in Bosch's Petition represent an opportunity for modernizing not just UWB, but wireless delivery in general."<sup>6</sup>

---

<sup>2</sup> <https://ecfsapi.fcc.gov/file/1081934492860/Vortezon%20%20UWB%20Comments.pdf>

<sup>3</sup> Ibid.

<sup>4</sup> <https://ecfsapi.fcc.gov/file/10819040765552/Bosch%20Petition%20Comments%20final.PDF>

<sup>5</sup> Ibid.

<sup>6</sup> Ibid.

Robert Bosch LLC<sup>7</sup> notes that proposed review could enable alternatives to conventional WLAN and address more effectively the stated goals of the ongoing 6GHz NPRM, and that revision to Subpart F will enable moving forward, and not just moving into ever more spectrum. Bosch also notes some aspects of the current rules that encourage practices that are wasteful of spectrum resources, instead of the intended effect of motivating efficient use of spectrum. Specifically allowing frequency sweeping or hopping in calculating the occupied bandwidth will remove the incentive for artificially sloppy bandwidth expansion.

Piper Networks<sup>8</sup> notes the need and value of providing additional flexibility in encouraging innovation and advancement: “The Commission should update the rules applicable to UWB devices to provide more operational flexibility to UWB operators while ensuring harmony and non-interference with existing incumbent operators in shared bands.”<sup>9</sup>

Vayyer Imaging<sup>10</sup> commented on removing the provision in §15.519(a)(1) which requires an ‘acknowledgement’ so that hand-held sensors would be allowed. Vayyer, along with other commenters, notes alternative ways to ensure a device transmits only when necessary and does so without causing interference. Vayyer endorsed removing outdoor prohibition, allowing frequency swept/hopping systems, noting current rules favor pulsed (IR) but the suggested changes would make the rules more technology neutral, which has proven to be more effective in fueling innovation.<sup>11</sup>

Novelda<sup>12</sup> notes in their support for the petition that globally harmonized measurement techniques and requirements promotes innovation worldwide by lowering the cost to test and certify devices, enabling products to be growth to many more consumers. Novelda also notes the waiver process has effectively proven the alternate testing methods codified in international standards to be effective. Further in their comments, it is put forward that while the waiver process is very valuable, the associated costs and delays prevent smaller manufacturers from realizing their innovations.<sup>13</sup>

---

<sup>7</sup><https://ecfsapi.fcc.gov/file/10819238030136/2019%20COMMENTS%20on%20PETITION%20FOR%20RULE%20MAKING%20FINAL%20FOR%20FCC%20FILING.pdf>

<sup>8</sup> <https://ecfsapi.fcc.gov/file/10819202637830/Piper%20Networks%2C%20Inc.%20Comments%208.19.2019.pdf>

<sup>9</sup> Ibid.

<sup>10</sup> [https://ecfsapi.fcc.gov/file/1081950166208/Vayyar\\_Coments\\_FCC.CG\\_RM-11844.pdf](https://ecfsapi.fcc.gov/file/1081950166208/Vayyar_Coments_FCC.CG_RM-11844.pdf)

<sup>11</sup> Ibid.

<sup>12</sup> <https://ecfsapi.fcc.gov/file/10818044114813/FCC%20-%20RM%2011844%20-%20Novelda.docx>

<sup>13</sup> Ibid.

ZIGPOS<sup>14</sup> asserts the economic value of the review and revision process would allow further growth and increased competitiveness of manufacturing sites in the US. ZIGPOS states revision of the “still very conservative” UWB will “allow for further growth and increased competitiveness of automated production systems and advanced manufacturing sites by introduction of innovative precise RTLS uniquely enabled by UWB radio.”<sup>15</sup>

InnoTec21<sup>16</sup> expressed strong support for the petition by noting the characterization of the Commission and the promise in 2002 to review and revise based on experience, which has now been gained. They express that “UWB application has proven now for a long time since 2002 that it is causing no harmful interference to any authorized radio service” and this is the experience the commission was seeking and waivers acknowledge the need for change.<sup>17</sup> They also note that commonly used interference mitigation techniques such as listen before talk (LBT) and low duty cycle had not figured into the current rules, but such techniques could be encouraged in the revised rules further enhancing performance, coexistence, and spectrum efficiency. Several other commenters mentioned these techniques. InnoTec21 call for consideration of such interference mitigation techniques in order to allow higher PSD in-band and remove outdoor restrictions while maintaining equivalent protection to critical services.

Michael McLaughlin<sup>18</sup> echoes the common point that the current rules were intended to be revisited and that 17 years of experience with UWB without any reported interference is a strong signal the review is now needed. He goes on that UWB is proven to be an extremely efficient spectrum user and a review of the rules such that more applications can benefit from the advantages of UWB is now necessary. Mr. McLaughlin also puts forward that the waiver process has been used to modify the existing UWB rules for a large number of applications and manufacturers but is not consistent. He identifies as a priority review of the prohibition on fixed outdoor transmitters, which has been lifted by waiver requests, with no negative impacts. He notes that Bosch’s suggestion to focus on the interference to licensed spectrum users in general,

---

<sup>14</sup> [https://ecfsapi.fcc.gov/file/1081742132904/2019-08-16\\_FCC-Comment-on\\_CG-RM-11844-BOSCH\\_from\\_ZIGPOS-GmbH\\_signed.pdf](https://ecfsapi.fcc.gov/file/1081742132904/2019-08-16_FCC-Comment-on_CG-RM-11844-BOSCH_from_ZIGPOS-GmbH_signed.pdf)

<sup>15</sup> Ibid.

<sup>16</sup> [https://ecfsapi.fcc.gov/file/10817917801960/2019-08-16\\_FCC-Comment-on\\_RM-11844-BOSCH\\_from\\_IT21.pdf](https://ecfsapi.fcc.gov/file/10817917801960/2019-08-16_FCC-Comment-on_RM-11844-BOSCH_from_IT21.pdf)

<sup>17</sup> Ibid.

<sup>18</sup> <https://ecfsapi.fcc.gov/file/108161423407346/FCC%20-%20RM11844%20-%20Decawave.docx>

rather than limiting the UWB applications (paragraph 40) should be an important guiding principle.<sup>19</sup> He encourages the FCC to consider alignment of Subpart F with Subpart C §15.250.

### **3 Comments in opposition to the petition**

The sole submission opposing review and revision of Subpart F comes from the GPS Innovation Alliance (GPSIA)<sup>20</sup>. We agree with GPSIA that protecting critical services such as GPS is a priority. The UWB Alliance supports careful consideration of the needs of all spectrum users and endorses changes to that effect. However, to allay GPSIA's concerns, the petition only requests that the FCC begin the rulemaking process. The rule making process is designed to ensure such consideration and provides the opportunity to address specific technical concerns with specific provisions in the rules. We feel that goals of the UWB industry are compatible with the goals of the GPS industry, and the revision process can afford even greater protection for GPS as a result.

We disagree with the GPSIA characterization of the petition as radical change. Hyperbolic statements such as stating “little consideration given to the significant interference impact on existing licensed and unlicensed services”<sup>21</sup> have no basis, as obviously such consideration is key in the rulemaking process. Suggesting that a rulemaking effort will “squander scarce Commission resources and would not serve the public interest” is unfounded by the record of support for the Bosch petition. We note the petition suggests only modest, incremental changes to align the rules with current reality. UWB is an extremely efficient and valuable use of spectrum and expanding the opportunity is a solid investment of commission resources.

GPSIA suggests “the proposed rules unwind fundamental interference protections incorporated into the UWB rules that would radically change the way UWB devices are certified and operated.”<sup>22</sup> While we agree that detailed technical arguments are premature at this stage, we strongly disagree with this statement. Review and revision as suggested by the petition will not “unwind” anything. We see nothing in the petition that would allow increased emissions in the 1164 MHz through 1610 MHz bands used by GPS, nor would the UWBA advocate as such.

---

<sup>19</sup> Ibid.

<sup>20</sup> <https://ecfsapi.fcc.gov/file/10819305204706/GPS%20Innovation%20Alliance%20Opposition%20FINAL%20081919.pdf>

<sup>21</sup> Ibid.

<sup>22</sup> Ibid.

GPSIA states that “the record in that proceeding is replete with discussion of the likelihood that UWB transmissions in GPS spectrum would increase the noise floor and decrease the value and reliability of existing services.”<sup>23</sup> This refers to a “discussion” that is now nearly two decades old, and ignores the subsequent experience clearly showing such “likelihood” to be unsubstantiated.

The primary protections built into the current Rules which protect GPS are band separation and the extremely low power level restrictions in bands used by GPS. The UWB Alliance specifically endorses maintaining the power limits currently in place for the GPS bands. We agree that these limits have been proven to protect GPS. We note that in the Bosch petition, there is no suggestion to allow higher peak or power spectral density (PSD) in the GPS bands. We further note proponents of allowing higher PSD in certain UWB bands have all focused on bands well separated from the GPS bands and are not aware of any suggestion that higher power be allowed in the GPS bands.

The GPSIA is concerned that revision to the rules may result in more UWB-enabled devices deployed. While we agree that this is a potential outcome, we point out this is a positive outcome and not inherently harmful. In the original record cited by the GPSIA there is also substantial evidence, both analytical and empirical studies, that the aggregate impact of very low power UWB is far less than the effect on effective noise floor of unintentional emissions. One change since that record is that GPS receivers have been embedded into everything, and everything in which a GPS receiver has been integrated contains high speed digital circuitry that is emitting into the GPS band far more than what is allowed by Subpart F. A modern GPS receiver is dealing with a “noise floor” much higher than the worst case UWB contribution in the cited “discussion”. The actual experience with GPS enabled devices such as mobile phones, personal devices and so on shows that the GPS receivers work just fine. We emphasize that under the Bosch proposal we have not suggested nor endorsed any change that might increase risk to GPS from UWB operation.

The GPSIA notes the economic value of GPS. The UWB Alliance agrees that location services have become a critical economic opportunity. We note that other licensed exempt services authorized under Subpart C and Subpart E such as Wi-Fi and Bluetooth and are operating closer to the GPS band and with out of band limits much higher than even the in-band power allowed for UWB communication devices. We point out that changes to Subpart F would

---

<sup>23</sup> Ibid.

encourage alternatives to these high-power technologies and effectively reduce risk to critical services such as GPS.

We believe the GPSIA may have mistaken the intention of the Bosch petition with respect to adoption of measurement techniques for UWB. In the petition – and subsequently in Bosch’s comments – they emphasize the goal is to harmonize testing and certification procedures. There is no mention of increasing power in protected 1164 to 1610 MHz bands used by GPS. However, we further believe that with current technology that a modest increase in maximum PSD as suggested by GPSIA (-30dBm) in the 3.1 to 10.3 GHz bands authorized for UWB communications devices would be possible while retaining the same level of emissions into the GPS band, thus ensuring continued protection.

The GPSIA comments refer specifically to the “new category” of devices due to changes to §15.503 and §15.510 suggested in the Bosch petition. We note that the primary purpose of these changes is to align the definition in the regulations with the effect of granted waivers. We note that the suggested revisions in the Bosch petition retain the current power limits of -75.3 dBm in 1164-1240 MHz and 1559-1610 MHz where GPS operates. We further note that operation under this category is restricted to specific authorized users, and not general licensed exempt users. The intention of these restrictions is preserved in the Bosch proposal.

While we agree with some of the points made by GPSIA, we find nothing compelling in their arguments to prevent the Commission from moving forward. We are confident that GPS stakeholders will be represented in the proceeding and we look forward to working with all stakeholders in achieving a positive outcome. We believe the record strongly supports the ability of UWB use without causing harmful interference and provides an opportunity to apply UWB as an alternative to higher-risk approaches to existing and emerging need for high-bandwidth communications. We encourage the GPSIA to work with us to achieve a positive outcome.

#### **4 Recommendations**

We continue to endorse moving forward with the rulemaking process. Filed comments show overwhelming support. The sole opposing comments raise concerns which are readily addressed in the rulemaking process.



Changes as suggested in the petition and by commenters such as removing restrictions on outdoor operation, to harmonize measurement techniques, alignment with §15.250, consideration of increasing in-band power modestly for communication devices, allowing more flexible definition of UWB devices and moving towards more technology neutral rules will have broad benefit. Now is the time to move forward with changes that will stimulate innovation and result in a greater utility from the spectrum.

## **5 Conclusion**

Considering the points mentioned above, we therefore respectfully request the Commission to begin rulemaking to revise and update the rules governing UWB operation.

Respectfully Submitted,

/s/ Tim Harrington

Tim Harrington  
Chairman and Executive Director,  
UWB Alliance  
22156 Old Santa Cruz Highway  
Los Gatos, CA 95033  
(408) 309-2503