

**Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, DC 20554**

In the Matter of	)	
	)	
Amendment of Rules Governing Ultra-	)	RM-11844
Wideband Devices and Systems	)	

**REPLY OF THE GPS INNOVATION ALLIANCE**

The GPS Innovation Alliance (“GPSIA”) hereby submits its reply in the above-captioned proceeding regarding the Petition for Rulemaking filed by Robert Bosch LLC (the “Petition”), urging the Commission to open a comprehensive review of the Commission’s ultra-wideband (“UWB”) rules. The Petition calls for sweeping changes that would eviscerate the Commission’s existing UWB rules, including the carefully constructed protections that allow UWB devices to operate while guarding against interference to the Global Positioning System (“GPS”) and other important incumbent services. The GPSIA supports continued innovation in radio technologies but strongly believes that the existing UWB rules are technically sound and strike the right balance between protective safeguards and enabling new non-interfering shared spectrum uses. In contrast, neither Bosch nor any party filing in the proceeding has presented any data on which the Commission can justify disrupting this balance and commencing a rulemaking to reexamine the existing UWB rules. Accordingly, the GPSIA continues to oppose the petition for rulemaking.

**1. Neither the Petition Nor Comments in Support Adequately Address the Substantial Risk of Interference To GPS If the Rules Are Changed As Proposed**

The Petition proposes to allow UWB devices to operate at significantly higher power levels across multiple applications and with different emission types without regard to existing

protections (including limits on outdoor, mobile applications). Several U.S. and non-U.S. companies that manufacture or hope to manufacture UWB devices filed brief statements in support of Bosch's Petition.<sup>1</sup> Bosch also filed comments on its own petition reiterating its argument that the UWB rules essentially should be reversed. Among other things, according to Bosch, power limits should be relaxed and the limitations and definitions in the rules should be changed to allow a broad range of UWB devices to operate.<sup>2</sup> Bosch reiterated that it believes such action is warranted because there are no documented cases of interference from a UWB device to either narrowband or wideband allocated radio services.<sup>3</sup> Bosch also claims that such interference is "highly unlikely."<sup>4</sup>

The manufacturers supporting the Petition briefly recount the potential benefits of permitting UWB devices to operate without the constraints of the existing rules.<sup>5</sup> They also argue that a range of new applications will be made available<sup>6</sup> and contend that UWB manufacturers will no longer be burdened with an "inefficient" and "unfair" waiver process.<sup>7</sup> Bosch and some parties argue that change in the UWB rules is needed because UWB devices, in

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<sup>1</sup> The non-U.S. companies are based in or owned by entities in Germany, Norway, Ireland, Israel, and Japan.

<sup>2</sup> Those benefiting from the rule change would include radiolocation and communications systems using fixed infrastructure and certain outdoor mobile and fixed radio determination applications, including motion sensors and perimeter protection systems used in ranging, tracking, and object classification.

<sup>3</sup> *In the Matter of Amendment of Rules Governing Ultra-Wideband Devices and Systems*, Petition for Rulemaking of Robert Bosch LLC, CG \$M-11844 (filed June 18, 2019) ("*Bosch Petition*") at 4.

<sup>4</sup> *Bosch Petition* at 5.

<sup>5</sup> *See, e.g., Novelda Comments* at 2.

<sup>6</sup> *See, e.g., UWB Alliance Comments* at 4-5.

<sup>7</sup> *Decawave Comments* at 2; *InnoTec21 GmbH Comments* at 1-2.

the future, will not be protected against interference from unlicensed devices that may start operating in the 6 GHz band.

However, supporting parties said little about the significant interference that UWB operations would likely cause to existing licensed and unlicensed services under the proposed rule changes. The record is devoid of any meaningful discussion of the methods by which UWB devices operating under the new proposed rules could ensure that existing services will be protected from interference. Bosch and the majority of the comments that rely on technical representations made in the Petition focus exclusively on how to protect narrowband and broadband channelized communications transmissions, which generally build significant margin into their link budgets to accommodate for atmospheric anomalies, terrain blockage and other forms of signal attenuation.<sup>8</sup> No commenter addresses the potential impact of higher-power UWB emissions to sensitive non-communications spectrum uses (most significantly, GPS) that are power constrained with signals effectively buried in the ambient noise floor. In cases where the UWB emissions appear to be random noise to a Global Navigation Satellite System (“GNSS”) receiver, the degradation to Carrier to Noise Ratio ( $C/N_0$ ) can be modeled by adding the received UWB emissions to the receiver noise floor power. For instance, a UWB device with an EIRP of -75.3 dBm/MHz located six feet from the GNSS antenna will result in a 1 dB degradation of  $C/N_0$ .<sup>9</sup> In cases where the UWB emission contains Continuous Wave (“CW”) power, the degradation could be greater than for an equal-power noise like emission.<sup>10</sup>

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<sup>8</sup> See, e.g., *Bosch Petition* at 5.

<sup>9</sup> See B.M. Titus, et al., *Assessing Ultra Wide Band (UWB) Interference to GPS Receivers*, 15 INST. OF NAVIGATION 1251, 1255 (2002).

<sup>10</sup> *Id.* at 1256.

## **2. The Product of a Rigorous and Transparent Public Process, the FCC's UWB Rules Provide Critical Protections to Important Services While Allowing UWB Devices To Operate**

From the inception of the Commission's consideration of UWB technologies, the Commission recognized the complexity of the interaction between UWB and other radio systems and the need to protect GPS.

We are particularly concerned about the impact of any potential interference to the GPS band at 1559 – 1610 MHz. We also would be concerned about interference to any additional frequencies allocated to GPS, *e.g.*, the planned L5 frequency in the 960-1215 MHz band. ... GPS will be increasingly relied upon for air navigation and safety, and is a cornerstone for improving the efficiency of the air traffic system. We note also that GPS may be used by commercial mobile radio E-911 services to enable police and fire departments to quickly locate individuals in times of emergency. Moreover, use of GPS is expanding for use by businesses and consumers for all sorts of applications, such as for navigation by automobiles, boats and other vehicles, surveying, hiking, and geologic measurements. Therefore, any harmful interference to GPS could have a serious detrimental impact on public safety, businesses and consumers.<sup>11</sup>

Given the important interests at stake and the complexity of the technical and interference considerations, the Commission, in developing the UWB rules, placed a high priority on, and called for, submission of technical evaluations, analyses and testing to assess the risk of interference in restricted frequency bands including those that are used by defense, safety-of-life services, and GPS. The Commission worked closely with NTIA and the Department of Transportation, each of which undertook experiments to study the interference potential of UWB operations.<sup>12</sup>

Following a six-year rulemaking process, the Commission adopted Part 15 technical and operational rules designed to allow UWB devices to operate under requirements that would

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<sup>11</sup> *Revision of Part 15 of the Commission's Rules Regarding Ultra-Wideband Transmission Systems*, Notice of Proposed Rulemaking, 65 Fed. Reg. 37332 (2000) (hereinafter "*2000 UWB NPRM*"), para 28; *see also* Comments of U.S. GPS Industry Council, ET Docket No. 98-153, at 3 (Sept. 12, 2000).

<sup>12</sup> *See* NTIA Letter to FCC, ET Docket No. 98-153 (Oct. 30, 2000); NTIA Test Plan, 65 Fed. Reg. 40614 (June 30, 2000); DOT Interim Test Results and Analysis, ET Docket No. 98-153 (Oct. 30, 2000).

protect the vitally important and critical safety systems operating in the restricted frequency bands, including GPS operations.<sup>13</sup> These rules have enabled UWB devices to be certified for sale and operation in the United States in compliance with the rules; when a device cannot meet the rules, the regulatory regime allows the device to be considered under the Commission's waiver standard.

The Commission was appropriately cautious in developing UWB rules in light of the interests at stake and the desire to create common guidelines that would apply to diverse UWB technologies. The Commission should not take action to disturb these rules in the absence of compelling supporting documentation. No party has presented such back-up support.

Bosch and certain commenting parties complain about the Commission's waiver process. To the extent that process is at the heart of their dissatisfaction with the rules, the Commission should focus its attention on reforming the waiver process, rather than initiating a rulemaking to eliminate entirely a set of rules that provides critical protections to important services. As GPSIA has suggested before, a more streamlined process could easily be put in place to eliminate the back and forth between the waiver applicant and commenting parties. For example, some UWB waiver requests have lacked sufficient technical and operational information to adequately describe the interference potential of the proposed operations pursuant to the requested waiver.<sup>14</sup> In those instances, parties whose operations could potentially be at

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<sup>13</sup> *Revision of Part 15 of the Commission's Rules Regarding Ultra Wide Band Transmission Systems*, ET Docket 98-153, Report and Order, 17 FCC Rcd 7435, 7450, para. 33 (2002) (hereinafter "2002 UWB Order"). The FCC further amended Part 15 of its rules in 2004 to provide greater flexibility to UWB technologies, but it left intact the protections for GPS. *See Revision of Part 15 of the Commission's Rules Regarding Ultra-Wideband Transmission Systems*, First Report and Order, 19 FCC Rcd. 24558 (2004).

<sup>14</sup> *See Proceq USA Inc. Corrected Petition to Modify Waiver of Part 15 of the Commission's Rules Applicable to Ultra-Wideband Devices* (filed May 17, 2019) at n. 6.

risk of interference have been forced to request additional information in comments on the waiver request in order to obtain a complete understanding of the proposed UWB operation at issue in the particular waiver request. The Commission could facilitate a more streamlined waiver review process by providing guidance on the technical and other information that should be included in the first place in any request for a waiver of the UWB rules.

### **3. No Commenter Provided Technical or Test Data To Support Amending the FCC's Proven and Effective Part 15 UWB Rules**

As noted above, at the outset of the development of the current Part 15 UWB framework, the Commission emphasized the need for empirical technical and test data to serve as a basis for UWB rules and the importance of subjecting such data to scrutiny through public comment.<sup>15</sup> Despite this longstanding guidance from the Commission, and notwithstanding the generally sophisticated nature of UWB devices, no party responding to the Petition filed technically substantive comments that support amended UWB rules. Specifically, no commenter provided hard data or test results to demonstrate that the testing and analysis that formed the basis of the FCC's UWB rules should now be jettisoned and a proceeding opened to reexamine those conclusions. Nor did any commenter offer even a rudimentary technical discussion to support the assertion that the current rules impede the development or manufacture of new UWB technology.<sup>16</sup>

The UWB tests conducted in 2002 demonstrated that the interference to GPS due to pulse-based UWB devices was highly dependent on the pulse repetition frequency – in other

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<sup>15</sup> See, e.g., *2000 UWB NPRM* at ¶ 1, affirming that “testing and analysis is needed before the risks of interference [from UWB transmitters] are completely understood”..., and the need to “provide ample opportunity to complete these tests and ensure that analyses of the test results are submitted in the record for public comment.”

<sup>16</sup> See generally Comments filed on CG RM-11844.

words, the interference was not simply dependent on the power density, but on the characteristics of the signal wave form.<sup>17</sup> The proponents of the Bosch petition advocate that swept frequency, stepped frequency, frequency hopping systems, OFDM, and potentially other signal wave forms should all fall under the definition of UWB. Coupling these additional signal wave forms with the expanded uses of GPS (including GNSS), the myriad of interference scenarios would be enormous<sup>18</sup> and would not be strictly dependent on power density. Accounting for all of these factors in one comprehensive rulemaking on an industry-wide basis would exhaust far more resources than the existing waiver process, which allows for scrutiny of each applicant and its unique signal on a case-by-case basis.

With respect to interference protection for higher priority incumbent spectrum uses, a handful of commenters explained that UWB devices operating under the FCC's current rules have not been the subject of interference complaints.<sup>19</sup> Evidence of non-interference over the last 17 years, however, only serves to reinforce that the existing Part 15 rules are safe and effective and provides no basis for amending the UWB rules.

Given the complete absence of fresh technical and test data supporting the Petition, the Commission need not dedicate additional finite resources to evaluate amended UWB rules. In fact, the technical record underpinning the development of the current UWB rules remains the most current and complete data set, and neither the Petition nor any filed comments in the instant proceeding offer technical justification to revisit these rules.

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<sup>17</sup> See, e.g., Ming Luo, et al., *Testing and Research on Interference to GPS from UWB Transmitters*, 14 INST. OF NAVIGATION, 1-13 (2001).

<sup>18</sup> Back in 2002, signal wave forms such as stepped frequency, swept frequency, hopped frequency, were studied extensively and addressed. See, e.g., *2002 UWB Order*, paras. 29, 32.

<sup>19</sup> See *Decaware Comments* at 2, asserting that the current Part 15 rules have allowed interference free UWB operations for 17 years; see also, *Piper Networks Comments* at 2, asserting that Piper technology will not create interfere “at the power levels required by current UWB regulations.”

#### **4. The FCC Should Dismiss Further Calls To “Harmonize” the FCC’s UWB Rules with Controversial and Unresolved European Standards**

Filed comments offer insufficient support for “harmonization” of the FCC’s UWB rules with ECC rules or ETSI standards. Specifically, Piper Networks, Inc. (“Piper”) “suggests incorporation of (ECC) rules and (ETSI) standards would be the best way to harmonize UWB technology worldwide.”<sup>20</sup> ZIGPOS GmbH recommends that “[m]easurement procedures and definitions for UWB certification should be aligned ... (with ETSI), allowing more flexibility in technology realization and thus higher innovation in applications.”<sup>21</sup> A handful of other comments make passing reference to “global harmonization.”<sup>22</sup> None of those commenters provides further evidence of possible benefits that might arise from “harmonization.”

Even if filed comments offered meaningful support for “harmonization” – which they *do not* – policy and technical concerns raised in GPSIA’s previously filed opposition render further discussion unnecessary. For example, certain key ETSI standards referenced by the Petition in the context of “harmonization” are unresolved, likely to undergo substantial revision, and presently unavailable to both the general public and ETSI members.<sup>23</sup> Accordingly, stakeholders before the Commission can do nothing more than guess at what the “rules” and “standards” in Europe might be that would replace the already effective FCC’s UWB rules. It would be both impractical and inappropriate to include such standards, which cannot be effectively evaluated, in a notice and comment proceeding before the FCC.

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<sup>20</sup> *Piper Comments* at 2.

<sup>21</sup> *ZIGPOS Comments* at 3.

<sup>22</sup> *See Novelda Comments* at 2; *Decawave Comments* at 2.

<sup>23</sup> *See GPSIA Opposition* at 9-12.



Nor do filed comments address the other technical controversies related to “harmonization” raised in GPSIA’s Opposition. For example, UWB standards fall under the EU Radio Equipment Directive (“RED”), which is a “closed” regulatory framework prescribing in detail how devices entering the European market should perform, but which fails to take into consideration the impact of RED-approved devices on various other radio services and systems.<sup>24</sup> Under such a closed regulatory framework a device may meet all prescribed RED requirements, but may still create harmful interference into other sensitive spectrum uses without giving the victim devices an opportunity for recourse. Such policy and technical shortcomings make it important for the FCC to carefully avoid the false promises that “harmonization” offers in the instant context.

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<sup>24</sup> See *GPSIA Opposition* at 11.

5. **CONCLUSION**

The Petition fails to demonstrate that the FCC rules are not working in the manner in which they were designed to function or that circumstances for either UWB or incumbent protected services have changed to the point that review of the rules is warranted. For the reasons set forth above, GPSIA urges the Commission to dismiss the Petition without initiating an inquiry or rulemaking proceeding.

Respectfully submitted,

/s/ J. David Grossman

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Dated: September 3, 2019

## CERTIFICATE OF SERVICE

I, J. David Grossman, hereby certify that I have on this 3rd day of September, 2019, pursuant to 47 CFR § 1.405, caused a copy of the foregoing **Reply of The GPS Innovation Alliance** to be served upon all persons identified in the Petition at the e-mail addresses listed below:

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I declare under penalty of perjury that the foregoing is true and correct. Executed this 3rd day of September, 2019 in Washington, DC.

/s/ J. David Grossman  
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