

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

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

OPPOSITION OF THE GPS INNOVATION ALLIANCE

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Dated: August 19, 2019

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OPPOSITION OF THE GPS INNOVATION ALLIANCE

The GPS Innovation Alliance (“GPSIA”) hereby submits its comments opposing the Petition for Rulemaking filed by Robert Bosch LLC (the “Petition”). The Petition urges the Commission to open a comprehensive review of the Commission’s ultra-wideband (“UWB”) rules, a settled regulatory framework that has provided fundamental interference protections to many existing services including public safety services and services important to the safety of life, such as the Global Positioning System (“GPS”) while enabling UWB technologies to develop. The Petition calls for sweeping changes that would implement “flexible” rules allowing UWB technologies to operate across multiple applications, employ different emission types, rework definitions, and eliminate carefully drawn technical restrictions and operating parameters with little consideration given to the significant interference impact on existing licensed and unlicensed services.¹ The Petition fails to provide sufficient facts, data, or analysis to justify this radical revision of the rules.

¹ See *Consumer & Governmental Affairs Bureau Reference Information Center Petitions for Rulemakings Filed*, Public Notice, Report No. 3130, RM-11844 (rel. July 18, 2019).

The Commission's UWB rules are based on results from transparent and repeatable studies, analyses and use cases, and actual experimental data. There is nothing in the Petition that justifies in any way a review or deviation from the best practices for interference studies established in the public record of the original UWB proceeding. Grant of the Petition via the undertaking of any inquiry or rulemaking proceeding would squander scarce Commission resources and would not serve the public interest.

I. INTRODUCTION AND SUMMARY

The GPSIA was formed in February 2013 to protect, promote, and enhance the use of GPS and Global Navigation Satellite Systems ("GNSS") technologies. GPS and GNSS systems, as well as augmentations to those systems, operate in frequency bands allocated to the Radionavigation Satellite Service. Members and affiliates of GPSIA are drawn from a wide variety of fields and businesses reliant on GPS, including manufacturing, aviation, agriculture, construction, transportation, first responders, surveying, and mapping. GPSIA member services often involve safety of life (e.g., aviation, timing) and critical commercial services (e.g., precision agriculture.) GPSIA also includes organizations representing consumers who depend on GPS for boating and other outdoor activities and in their automobiles, smartphones, and tablets.

Protection of GPS signals from interference is a core mission of GPSIA and, for that reason, GPSIA has participated in Commission proceedings affecting UWB operations. Many of the GPSIA members were members of the GPS Industry Council that participated in the Commission's original UWB proceedings.

As a coalition of organizations interested in preventing interference to GPS, GPSIA has serious reservations regarding Bosch's proposal to launch a proceeding aimed at fundamentally

changing the UWB rules. The Petition proposes “generic” rules for UWB devices that would unwind carefully developed protections for high priority spectrum uses.² The Petition also urges the Commission to adopt European Union Radio Equipment Directive (“RED”) standards which are, in fact, controversial and incomplete. The Petition does not articulate any compelling reason for the Commission to take these disruptive steps and says little about the expected consequences to existing services. The Petition states a desire to be free from “overly conservative rules” but the Petition is otherwise devoid of specific facts, data and analysis regarding technical, market or policy reasons that would justify disturbing a set of rules that has allowed UWB technologies to develop while providing critical interference protection to important existing services. The Petition thus falls short of the Commission’s standard for rulemaking petitions and, if granted, would involve significant waste of Commission resources. The Petition should therefore be dismissed.

II. THE PETITION FAILS TO MEET THE STANDARD TO SUPPORT A NEW RULEMAKING

In order to petition the Commission to amend a rule, an interested party is required to “set forth the text or substance of the proposed rule, amendment, or rule to be repealed, together with *all facts, views, arguments and data* deemed to support the action requested, and shall indicate

² Attached as Exhibit 1 is a redlined version of the Commission’s UWB rules showing the significant changes proposed by the Petition.

how the interests of petitioner will be affected.”³ Petitions that fail to meet the Commission’s requirements “may be denied or dismissed without prejudice to the petitioner.”⁴

A. THE PETITION OFFERS NO FACTS, DATA OR ANALYSIS THAT CHANGE THE ANALYSIS OR FINDINGS IN THE COMMISSION’S UWB PROCEEDINGS

The UWB rules set forth the technical and operational conditions under which unlicensed UWB devices may operate on frequencies *already occupied by other users* – licensed and unlicensed – including those that support public safety. The Commission’s UWB rules are a product of a rigorous public process in which the Commission recognized the importance of protecting “the vitally important and critical safety systems operating in the restricted frequency bands, including GPS operation” when allowing UWB devices to operate under the Part 15 rules.⁵ The Commission received thousands of documents from more than 150 organizations and multiple governmental and private analyses of potential interference resulting from UWB devices.⁶ 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,⁷ the need for meaningful emission limits and associated

³ 47 C.F.R. § 1.401(c) (emphasis added).

⁴ 47 C.F.R. § 1.401(e).

⁵ *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) (*2002 UWB Order*). The Commission specifically recognized GPS operating at 1559-1610 MHz as well as the then planned, now deployed, L5 GPS in the 960-1215 MHz band would be susceptible to UWB device interference that would degrade the use of the GPS signal. *Id.* at 7450, para. 34.

⁶ *Id.*, 17 FCC Rcd 7435-36, para. 2. See U.S. GPS Industry Council Comments, ET Docket No. 98-153, at 1, 5 (filed December 7, 1998); U.S. GPS Industry Council Reply Comments, ET Docket No. 98-153, at 2 (filed February 3, 1999); U.S. GPS Industry Council Comments, ET Docket No. 98-153, at 3 (Sept. 12, 2000).

⁷ See U.S. GPS Industry Council Comments, ET Docket No. 98-153, at 3 (Sept. 12, 2000).

measurement procedures to provide full protection to GPS and other safety-related services,⁸ and the results of technical tests conducted to evaluate interference potential from wideband sources and to determine the UWB emission levels necessary to prevent interference to GPS operations.⁹

The potential of UWB devices to interfere with GPS was (and continues to be) well established. Based on the robust record, the Commission prudently chose a conservative approach to ensure interference from UWB devices will not degrade the performance of GPS signals.¹⁰ In later reviewing this decision, the Commission found no reason to disturb the accepted interference analyses.¹¹ The Petition offers no facts, data or analysis that refute the analyses or findings in the Commission's UWB proceedings.

B. GPS WAS IMPORTANT WHEN THE COMMISSION FIRST DEVELOPED THE UWB RULES AND IS EVEN MORE IMPORTANT TODAY

GPS is a critical service to civilian and military sectors in the United States, the U.S. economy and the continuing proliferation of GPS-based applications.¹² The Commerce Department recently estimated that GPS has generated roughly \$1.4 trillion in economic benefits since it was made available for civilian and commercial use in the 1980's. Most benefits have accrued in the last 10 years and are spread among many major commercial sectors in the United States that have adopted GPS including 14 of 16 industries deemed to be "critical

⁸ See *id.* at 41-47.

⁹ See *2002 UWB Order*, 17 FCC Rcd. at 7461, para. 71.

¹⁰ *Id.*

¹¹ See *Revision of Part 15 of the Commission's Rules Regarding Ultra-Wideband Transmission Systems*, ET Docket 98-153, Order, 19 FCC Rcd 24558, 24559, paras. 1-2 (2004) (*2004 UWB Order*) (choosing to only modify Part 15 rules and not altering the UWB rules).

¹² See NTIA, RTI International, *Economic Benefits of the Global Positioning System (GPS)*, June 2019, https://www.rti.org/sites/default/files/gps_finalreport.pdf, at ES-1 (*NTIA Economic Benefits of GPS*).

infrastructure.”¹³ The interference concerns addressed by the UWB rules are, if anything, even more important today given the natural proliferation of GPS and GPS-enabled devices embedded in practically all walks of American life. The UWB rules have provided significant protections to many existing spectrum uses while enabling UWB technologies to develop, and the public interest would not be served if the Commission were now to start a process to reverse course on these important protections without compelling reasons backed up by meaningful facts and data.

III. THE PETITION FAILS TO IDENTIFY COMPELLING REASONS TO LAUNCH A COMPREHENSIVE RULEMAKING PROCEEDING

The Petition does not justify why the Commission should consider a complete overhaul of the FCC’s UWB rules. The Petition argues that the UWB rules should be replaced with a “flexible” scheme that, in some instances, the Petition vaguely suggests, could be supplemented with undefined mitigation techniques to prevent interference to existing spectrum users. Rather than offering facts, data or other information that would support this top-to-bottom review, the Petition resorts to generalized promises of potential future benefits and conclusory statements about noninterference. As outlined below, the Petition’s stated reasons for opening a proceeding to replace the UWB rules do not hold up to scrutiny.

- (A) *According to the Petition: The regulations are overly conservative and are not necessary to prevent interference to narrow bandwidth incumbents. “[T]here is no evidence of increases in ambient noise from aggregate UWB devices and systems that have become operational since 2002.” There are “no documented instances of interference from any UWB device to a licensed radio service.”*¹⁴

The fact that there has been no evidence of increased ambient noise from UWB devices or documented instances of interference from any UWB devices proves the *opposite* point — the

¹³ *Id.*

¹⁴ *Petition* at 2, 8.

UWB rules are working, *as intended*, to prevent increases in the noise floor and interference to existing users. The absence of an increased noise floor or a rise in interference is hardly a reason to start a rulemaking to overhaul the rules; once that damage is done, it cannot be undone. GPSIA strongly disagrees with the Petition’s contention that the UWB regulations are not necessary to prevent interference to narrow bandwidth incumbents. There has been no change in the technical analysis underpinning the development of the UWB rules.

(B) *According to the Petition: The large number of waivers demonstrate that the rules need to be overhauled. “[T]he most notable evidence of the need to revisit the UWB technical rules is the large number of waivers that have been and continue to be issued in order to bring a UWB device to the United States market place.” “[I]t is apparent that the Commission is regulating UWB by waiver, rather than by a set of rules that appropriately regulates the interference potential of these devices.”¹⁵*

GPSIA disagrees with the Petition’s assertion that the fact that waivers have been granted means that the regulatory regime is failing and the rules should be abolished or modified. According to the Commission’s equipment certification database, approximately 442 grants of equipment certification for UWB devices have been issued since the UWB rules were established. The Petition complains of the “large number of waivers,” but a relatively small number of waivers have been sought for UWB devices that could not comply with the rules.¹⁶ In most instances, a waiver was granted subject to reasonable requirements to manage the risk of interference from nonconforming operations.

¹⁵ *Petition* at 9, 25. GPSIA does not object to putting in place specific requirements to govern UWB waivers that will minimize the delay and expense that burden all interested parties when a waiver is requested. In fact, GPSIA recently suggested that the Commission facilitate this process by identifying technical information that should be included in UWB waiver requests so that other spectrum users at risk of potential interference can readily assess the extent of that risk of the specifically proposed application.

¹⁶ Contrary to the Petition’s suggestion that all UWB devices have required a waiver, the Petition discusses only six instances, and Commission records reveal less than a dozen sought and granted for specific UWB devices since inception of the UWB rules.

The existing UWB rules allow certain devices to operate without waivers if they adhere to the delineated power and waveform limits, *i.e.*, comply with the rules. These limits were developed through rigorous testing and extensive analysis of UWB effects on existing receivers for such services as broadcast radio and GNSS. When the FCC adopted the UWB rules, it deliberately sought to exclude UWB devices from operating in bands below 2 GHz¹⁷ except for a few types of devices with extremely low interference potential. The fact that waivers have been granted means that the Commission has determined that *additional* non-disruptive waveforms will not result in harmful interference when deployed and operated as per conditions set forth in the waiver.

This is exactly the way these rules should operate and the way the FCC intended; the UWB rules encompass a broad array of applications that widely differ in their technical and operating behavior. The UWB rules were designed to ensure that the Commission could effectively oversee the many equipment certification applications seeking nonconformity with pre-existing Part 15 rules. Broadening the UWB rules to allow these devices without waiver would require adopting the same operational restrictions across all UWB devices, which is an impractical tradeoff.

(C) *According to the Petition: Re-examining the UWB rules would “benefit companies operating and manufacturing in the United States.”*¹⁸

GPSIA does not dispute that all new opportunities to manufacture equipment present potentially beneficial opportunities for some U.S. manufacturers. But the prospect of increased opportunities for U.S. manufacturers cannot be the sole basis on which the Petition is evaluated –

¹⁷ *Revision of Part 15 of the Commission's Rules Regarding Ultra-Wideband Transmission Systems*, ET Docket 98-153, NPRM, 15 FCC Rcd 12086, 12098, para. 30 (2000) (*2000 UWB NPRM*).

¹⁸ *Petition* at 2.

at least not under an evaluation conducted pursuant to the Communications Act. As noted above, the Commission must also evaluate whether there is any basis for it to expend the resources necessary to overhaul carefully crafted rules, including the impact on potential rule changes to other services. If the Commission considers the impact that changing the UWB rules would have on U.S. manufacturers positioned to participate in the UWB market under restructured rules, it must also consider the potential impact on manufacturers of equipment in the existing services that would be put at risk, including, for example, manufacturers of GPS and commercial and military aviation equipment.

(D) *According to the Petition: “There is a need to harmonize the UWB rules with those in Europe and elsewhere to facilitate a worldwide marketplace for standardized UWB products.”*¹⁹

Throughout the Petition, Bosch relies on certain European Telecommunications Standards Institute (“ETSI”) standards to support proposed revisions to Commission UWB service rules. However, Bosch fails to note that a significant number of ETSI standards are still under development and have uncertain outcome. Bosch asserts that prior concerns about relaxing minimum transmission bandwidth requirements have been obviated in Europe by ETSI EN 303 883,²⁰ which permits emissions from different classes of UWB to be measured and compared to regulatory limits.²¹ Thereafter, the Petition implies that ETSI EN 303 883 is a completed

¹⁹ *Id.*

²⁰ The current version of ETSI EN 303 883, ETSI EN 303 883 V.1.1.1 (2016-07), *Short Range Devices (SRD) Using Ultra Wide Band (UWB); Measurement Techniques*, https://www.etsi.org/deliver/etsi_en/303800_303899/303883/01.01.01_30/en_303883v010101v.pdf (last visited Aug. 19, 2019).

²¹ *See Petition* at 30-31.

standard simply waiting for the FCC to adopt for implementation in the United States.²² Bosch misrepresents both the status and utility of ETSI EN 303 883.

First, the current version of EN 303 883 (V1.1.1) will eventually be replaced by a new standard with two distinct parts, EN 303 883-1 and EN 303 883-2, both of which are under consideration by ETSI working groups. In the interim, revised documents related to the new EN 303 883 standard are not publicly available, and there is no certainty that the European Commission will accept the current set of draft documents. Moreover, even the most optimistic projections do not anticipate publication of the new standard for at least another full calendar year.

Second, proposed draft versions of EN 303 883 have proven deeply controversial from an interference protection standpoint. Specifically, the current draft of EN 303 833-1 allows a *de facto* transmission limit of -30 dBm/MHz for frequencies 1000 MHz to 40000 MHz. Such a transmission limit would represent a real-world co-channel interference threat to sensitive services with signals at or below the noise floor, including GNSS and GPS signals.

Third, neither the current nor proposed EN 303 883 is an equipment “standard” that facilitates harmonization between FCC service rules and other jurisdictions. With the exception of the aforementioned default transmission limit of -30dBm/MHz, EN 303 883 establishes little more than a methodology for measuring UWB emissions. Any UWB device tested under either

²² See *Petition* at 33, fn 25 (“It is notable that ETSI has prepared a specific measurement plan to measure all kinds of UWB signals in an accurate manner”); see also *Petition* at 42-43 (“If the combined device is regulated by some other transmit or receive requirements, or uses a display or contains other digital circuits, the emissions from these components could be higher than the UWB emissions and for compliance testing it is not possible to differentiate between or to separate the emissions. To address this, ETSI developed a test procedure to permit a means to differentiate between the emissions”); *Petition* at 43 (“The same problem exists in Subsection (g) addressing peak measurement resolution bandwidth. ETSI EN 303 883 proposes a signal dependent solution to avoid errors in evaluating the peak power level. The calculation called for by Subsection (g) is correct for pulsed based systems but it could lead to problems for other kinds of UWB signals”).

version of EN 303 883 must still be built and adhere to another standard published elsewhere. Accordingly, EN 303 883 by itself does not address the substantive concerns raised by NTIA and others regarding a relaxation of UWB device minimum transmission bandwidth.

Similarly, the Petition recommends that the Commission explore the “more flexible method of distinguishing” between UWB through-wall imaging systems (*i.e.*, devices to detect physical objects behind a wall) and wall imaging systems (*i.e.*, devices intended to detect physical objects inside a wall) provided in ETSI EN 302 065-4.²³ European Union officials, however, “recalled” ETSI 302 065-4 for revision with respect to test procedures related to performance criteria, RX-requirements and fixed limits.²⁴ A draft of the standard was not available on the ETSI website at the time of this writing. Further, publication of an updated standard is not expected until 2021.²⁵ Interested parties have no opportunity to evaluate the standard because it is undergoing revision and unavailable for review in the interim. Accordingly, EN 302 065-4 has no utility as a reference in a Commission rulemaking proceeding.

Not only does the Petition fail to acknowledge that the ETSI rules are incomplete, it does not consider the bases underlying now questionable European UWB standards. Effective June 2017, European UWB standards fall under the EU Radio Equipment Directive (“RED”) as modified pursuant to European Commission Mandate/536 (“M/536”).²⁶ The RED is for determining whether equipment entering the European market performs as it is designed to

²³ See *Petition* at fn. 34.

²⁴ See Exhibit 2, Figure 1 (providing the current status of EN 302 065-4).

²⁵ See Exhibit 2, Figure 2 (providing dates for EN 302 065-4 milestones).

²⁶ See EU Radio Equipment Directive (RED/2014/53/EU) in force since June 2017. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32014L0053>.

perform, and is not supposed to take into consideration whether this performance impacts other services and systems performing as they are designed to perform. In other words, the entire EN/RED argument fails to prove anything with regard to protection of other services and systems – including the radionavigation-satellite service in which GPS and other GNSS receivers operate.

These and other shortcomings make it important that the FCC maintains its own course, which better balances the interests of all involved parties.²⁷ “Harmonization” in this context is not a meaningful foundation for policy change.

(E) *According to the Petition: There is a “well-established and acknowledged need to revisit the UWB rules.”*²⁸

The Petition offers no support for this statement. GPSIA disagrees. There is no such consensus among stakeholders that would support an FCC decision to revisit the UWB rules.

IV. THE PROPOSED UWB RULES ARE TECHNICALLY INDEFENSIBLE

The proposed rules unwind fundamental interference protections incorporated into the UWB rules that would radically change the way UWB devices are certified and operated. The Petition fails to address the potential for widespread harmful interference throughout bands that support sensitive spectrum uses, including safety-of-life services. For example, Bosch proposes changes to Sections 15.503(d) of the FCC’s rules that would allow UWB devices that do not employ pulse modulation to measure their minimum transmission bandwidth with “hopped,

²⁷ The FCC also sought comment as recently as 2013 on improvements to receiver performance. See *Office of Engineering and Technology Invites Comments on Technological Advisory Council (TAC) White Paper and Recommendations for Improving Receiver Performance*, Public Notice, ET Docket No. 13-101 (rel. Apr. 22, 2013). The consensus view shared in these comments was that FCC receiver standards (to the extent Congress empowers the FCC to create such standards) were less desirable than voluntary industry standards.

²⁸ *Petition* at 2.

stepped or gating functions active.”²⁹ Earlier attempts to relax or eliminate minimum transmission bandwidth requirements akin to what the Petition proposes, however, were not adopted by the Commission given significant objection by various stakeholders, including the National Telecommunications and Information Administration (“NTIA”), which raised strong concerns that relaxing such limits for UWB transmitters risks harmful interference to sensitive spectrum uses in restricted bands.³⁰

A. THE PETITION ATTEMPTS TO UNWIND FUNDAMENTAL INTERFERENCE PROTECTIONS CAREFULLY DEVELOPED FOR DIFFERENT CLASSES OF UWB DEVICES

The Petition “suggests” changes to Sections 15.503(e) and 15.503(j) of the Commission’s rules that would make the definition of a UWB more “generic” to “permit a wider range of useful industrial and commercial products which have negligible interference potential.”³¹ What the Petition actually proposes is a complete evisceration of the technical and operational protections put in place to ensure that UWB devices do not create harmful interference to other spectrum uses, while providing no material basis to support the assertion that the resulting changes would create only “negligible” interference. Most concerning, under the proposed rules, out-of-band emission (“OOBE”) levels from certain classes of UWB would increase by up to a staggering 29 dB in critical safety-of-life frequency bands, which is certainly not “negligible.” Given the dramatic increases in OOBE in critical safety-of-life bands, and the lack of any technical analysis supporting the assertion that such operations will not create harmful interference, rules that would facilitate the *en masse* introduction of more “generic” UWB devices as proposed by the Petition do not merit further consideration by the Commission.

²⁹ See *Petition Appendix* at 45; see also *Petition* at 26-33.

³⁰ NTIA Comments, ET Docket No. 98-153, at iv, 4-5 (filed January 1, 2004).

³¹ *Petition* at 33-35.

When the FCC approved UWB devices, it expressly implemented meaningful interference protections because it appreciated the potential such systems had for creating harmful interference. The Commission’s 2002 Order approving UWB service rules made clear the need for tight technical and operational limits to ensure that the “benefits” do not become “outweighed if UWB devices were to cause interference to licensed services and other important radio operations.”³²

For example, the adopted rules require that ground penetrating radar (“GPR”) devices “must operate only when directed at the ground and in contact with, or in close proximity (*e.g.*, 1 meter) to, the ground for the purpose of detecting or obtaining the images of buried objects . . .” The rule requires that these devices be tested at their operational height “ . . . to ensure that any emissions due to leakage or to reflections can be detected.”³³ The operation of GPR devices was also restricted to a narrow class of end user that included only “law enforcement, fire and rescue organizations, scientific research institutions, commercial mining companies, and construction companies.”³⁴ Moreover, to protect sensitive spectrum uses operating below 2 GHz, GPR devices and other imaging class UWBs must meet the following OOB limits in Table 1:

Frequency in MHz ³⁵	EIRP in dBm
960-1610	-65.3
1610-1990	-53.3
Above 1990	-51.3

³² 2002 UWB Order, 17 FCC Rcd at 7437, para. 4.

³³ *Id.* at 7454, para. 47.

³⁴ *Id.* at 7437, para. 5.

³⁵ *Id.* at 7455, para. 50.

Separate interference protection requirements were imposed on UWB vehicular radar devices, which the Commission determined would be “oriented towards the general consumer marketplace,” and likely become “one of the largest potential outdoor uses of UWB technology.”³⁶ Accordingly, the rules require that vehicular radar UWBs operate with a center frequency above 24.075 GHz, employ directional antennas or other methods to attenuate emissions 38 degrees or higher above the horizontal plane in the 23.6-24.0 GHz band by at least 25 dB below the general Part 15 limits.³⁷ Further, to ensure that its emissions do not present a greater interference threat vis-à-vis other Part 15 devices, a UWB vehicular radar device must meet the following OOB limits in Table 2:

Frequency in MHz ³⁸	EIRP in dBm
960-1610	-75.3
1610-22,000	-61.3
22,000-29,000	-41.3
29,000-31,000	-51.3
Above 31,000	-61.3

The rules proposed by the Petition upend these protections. Most significantly, the proposed rules would create a generic class of Material Sensing Device (“MSD”) under an amended Section 15.503(e) that broadly encompasses “ground penetrating radar systems, medical imaging systems, wall imaging systems and through-wall imaging systems and,

³⁶ *Id.* at 7359, 7501, paras. 62, 194.

³⁷ *See id.* at 7359-60, paras. 63-64.

³⁸ *Id.* at 7359, para. 63.

surveillance systems., industrial monitoring systems and radiodetermination systems for the purpose of detection of objects in free space or within or beyond obstacles; or for the determination of the position, velocity and/or other characteristics of an object, or the obtaining of information relating to these parameters.”³⁹ MSDs resembling other classes of UWBs, including vehicular radar devices, would be subject to far more relaxed operating parameters under Sections 15.510 and 15.511 of the Commission’s rules. For example, an MSD intended for use as a radiodetermination system for the purpose of detecting objects in free space and determining the position and velocity is a effectively a vehicular radar device. Except that under Bosch’s proposed rules, it does not operate with a center frequency above 24 GHz, use directional antennas with downtilt, or restrict its OOB into the 960-1610 MHz band to -75.3 dBm of EIRP. The proposed rules circumvent these interference protections, which the Commission purposefully adopted expressly because vehicular radar might eventually become widespread and employ horizontal antennas that do not radiate into the ground or a solid surface like other UWBs.

³⁹ *Petition* at 45.

Among other consequences, permitting vehicular radar to operate under the “generic” MSD rules proposed by the Petition would lead to a dramatic increase in OOB levels into bands critical for safety-of-life bands as identified in below in Table 3:

Frequency in MHz	EIRP in dBm			
	15.510 (d) equipment operating with fC and fM between 1990 MHz and 10600 MHz	15.511 surveillance systems	15.515 vehicular radar	Bosch Petition effective power increase for vehicular radar category
960-1610	-46.3	-53.3	-75.3	29
1610-1990	-41.3	-65.3	-61.3	20
1990-3100	-41.3	-51.3	-61.3	20
3100-10600	-41.3	-53.3	-61.3	20
Above 10600	-51.3	-41.3	-61.3	20
1164-1240	-56.3	-63.3	-85.3	29
1559-1610	-56.3	-63.3	-85.3	29

This dramatic increase in OOB levels into protected bands by itself should cause the Commission to promptly halt further consideration of the proposed rules. But it also represents only the tip of the figurative iceberg with respect to the harm that would be inflicted if such a proposal were actually adopted.

V. CONCLUSION

The petition fails to demonstrate that the FCC rules are not working in the manner in which they were designed to work or that circumstances for either UWB or incumbent protected services have changed to the point where 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,

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Dated: August 19, 2019

Exhibit 1

**Redline Commission's Current UWB Rules to
Petition's Proposed Rules**

APPENDIX

The following rule sections are amended to read as follows:

1. Section 15.31 Measurement standards.

(c) Except as otherwise indicated in § 15.256, and except for devices regulated by Subpart F of this Part, for swept frequency equipment, measurements shall be made with the frequency sweep stopped at those frequencies chosen for the measurements to be reported.

2. Section 15.503 Definitions.

(a) UWB bandwidth. For the purpose of this subpart, the UWB bandwidth is the frequency band bounded by the points that are 10 dB below the highest radiated emission, as based on the complete transmission system including the antenna. The upper boundary is designated f_H and the lower boundary is designated f_L . The frequency at which the highest radiated emission occurs is designated f_M .

(b) Center frequency. The center frequency, f_C , equals $(f_H + f_L)/2$.

(c) Fractional bandwidth. The fractional bandwidth equals $2(f_H - f_L) / (f_H + f_L)$.

(d) Ultra-wideband (UWB) transmitter. An intentional radiator that, at any point in time during normal operation and in all operating modes of the device, has a fractional bandwidth equal to or greater than 0.20 or has a UWB bandwidth equal to or greater than 500 MHz, regardless of the fractional bandwidth. UWB bandwidth is to be determined for non-impulse UWB transmitters by permitting measurements to be made with any hopped, stepped or gating functions active.

(e) ~~Imaging system.~~ Material Sensing Devices. A general category consisting of ground penetrating radar systems, medical imaging systems, wall ~~imaging systems~~ and through-wall imaging systems ~~and~~ surveillance systems, industrial monitoring systems and radiodetermination systems for the purpose of detection of objects in free space or within or beyond obstacles; or for the determination of the position, velocity and/or other characteristics of an object, or the obtaining of information relating to these parameters. As used in this subpart, ~~imaging systems.~~ Material Sensing Devices do not include systems designed to detect the location of tags, or systems used to transfer voice or data information.

(f) Ground penetrating radar (GPR) system. A field disturbance sensor that is designed to operate only when in contact with, or within one meter of, the ground for the purpose of detecting or obtaining the images of buried objects or determining the physical properties within the ground. The energy from the GPR is intentionally directed down into the ground for this purpose.

(g) Medical imaging system. A field disturbance sensor that is designed to detect the location or movement of objects within the body of a person or animal.

(h) Wall imaging system. A field disturbance sensor that is designed to detect the location of objects contained within a “wall” or within fixed infrastructure; to determine the physical properties within the “wall.” ~~The “wall” is a concrete structure, or within the side of a bridge, fixed infrastructure; or to evaluate the wall integrity of or otherwise evaluate or analyze building materials.~~ Industrial or commercial applications of a mine or another physical structure that is dense enough and thick enough to absorb the majority of the signal transmitted by the wall imaging system. ~~This category of equipment does~~ systems do not include products such as “stud locators” that are designed to locate objects behind gypsum, plaster or similar walls that are not capable of absorbing the transmitted signal detection, location or movement of persons located beyond the materials being evaluated.

(i) Through-wall imaging system. A field disturbance sensor that is designed to detect the location or movement of persons or objects that are located in areas on the other side of an opaque structure such as a wall or a ceiling. ~~This category of equipment may include products such as “stud locators” that are designed to locate objects behind gypsum, plaster or similar walls that are not thick enough or dense enough to absorb the transmitted signal.~~

(j) Surveillance system. A field disturbance sensor used to establish a stationary RF perimeter field that is used for security purposes to detect the intrusion of persons or objects, or for the determination of the position, velocity and/or other characteristics of an object, or the obtaining of information relating to these parameters. Location and tracking systems are included, as are material sensing devices.

(k) EIRP. Equivalent isotropically radiated power, i.e., the product of the power supplied to the antenna and the antenna gain in a given direction relative to an isotropic antenna. The EIRP, in terms of dBm, can be converted to a field strength, in dBuV/m at 3 meters, by adding 95.2. As used in this subpart, EIRP refers to the highest signal strength measured in any direction and at any frequency from the UWB device, as tested in accordance with the procedures specified in § 15.31(a) and 15.523 of this chapter.

(l) Law enforcement, fire and emergency rescue organizations. As used in this subpart, this refers to those parties eligible to obtain a license from the FCC under the eligibility requirements specified in § 90.20(a)(1) of this chapter.

(m) Hand held. As used in this subpart, a hand held device is a portable device, such as a lap top computer or a PDA, that is primarily hand held while being operated ~~and that does not employ a fixed infrastructure.~~

3. Section 15.507 Marketing of UWB equipment.

In some cases, the operation of UWB devices is limited to specific parties, e.g., law enforcement, fire and rescue organizations operating under the auspices of a state or local government, or construction, security or industrial professionals. The marketing of UWB devices must be directed solely to parties eligible to operate the equipment. The responsible party, as defined in § 2.909 of this chapter, is responsible for ensuring that the equipment is marketed only to eligible parties. Marketing of the equipment in any other manner may be considered grounds for revocation of the grant of certification issued for the equipment.

4. Section 15.509 Technical requirements for ground penetrating radars and material sensing systems.

(a) The UWB bandwidth of a material sensing system operating under the provisions of this section must be below 10.6 GHz.

(b) Operation under the provisions of this section is limited to GPRs and ~~wall-imaging~~ systems operated for purposes associated with law enforcement, ~~fire fighting~~firefighting, emergency rescue, scientific research, commercial mining, security, industrial or construction-

~~(1) applications, land surveying, plumbing and other commercial and professional endeavors.~~ Parties operating this equipment must be eligible for licensing under the provisions of part 90 of this chapter.

~~(2) The operation of imaging systems under this section requires coordination, as detailed in § 15.525.~~

(c) A GPR that is designed to be operated while being hand held, and a ~~wall-imaging~~material sensing system shall contain a manually operated switch that causes the transmitter to cease operation within 10 seconds of being released by the operator. In lieu of a switch located on the imaging system, it is permissible to operate ~~an-imaging~~material sensing system by remote control provided the imaging~~material sensing~~ system ceases transmission within 10 seconds of the remote switch being released by the operator.

(d) The radiated emissions at or below 960 MHz from a device operating under the provisions of this section shall not exceed the emission levels in § 15.209. The radiated emissions above 960 MHz from a device operating under the provisions of this section shall not exceed the following average limits when measured using a resolution bandwidth of 1 MHz:

Frequency in MHz EIRP in dBm

960-1610	-65.3
1610-1990	-53.3
1990-3100	-51.3
3100-10600	-41.3
Above 10600	-51.3

(e) In addition to the radiated emission limits specified in the table in paragraph (d) of this section, UWB transmitters operating under the provisions of this section shall not exceed the following average limits when measured using a resolution bandwidth of no less than 1 kHz:

Frequency in MHz EIRP in dBm

1164-1240	-75.3
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(f) For UWB devices where the frequency at which the highest radiated emission occurs, f_M , is above 960 MHz, there is a limit on the peak level of the emissions contained within a 50 MHz bandwidth centered on f_M . That limit is 0 dBm EIRP. It is acceptable to employ a different resolution bandwidth, and a correspondingly different peak emission limit, following the procedures described in § 15.521.

5. Section 15.510 Technical requirements for Material Sensing Systems operated by Law Enforcement, Fire and Emergency Rescue Organizations or by Construction or Industrial Professionals.

(a) The UWB bandwidth of ~~an imaginga material sensing~~ system operating under the provisions of this section must be below 960 MHz or the center frequency, f_C , and the frequency at which the highest radiated emission occurs, f_M , must be contained between 1990 MHz and 10600 MHz.

(b) Operation under the provisions of this section is limited to ~~through-wall imaging~~ material sensing systems operated by law enforcement, fire and emergency rescue ~~or firefighting organizations~~ that are under the authority of a local or state government; or by construction or industrial professionals.

(c) For ~~through-wall imaging~~ Material Sensing systems operating with the UWB bandwidth below 960 MHz:

(1) Parties operating this equipment must be eligible for licensing under the provisions of part 90 of this chapter.

(2) The operation of these ~~imaging~~ systems requires coordination, as detailed in § 15.525.

(3) The ~~imaging~~ system shall contain a manually operated switch that causes the transmitter to cease operation within 10 seconds of being released by the operator. In lieu of a switch located on the imaging system, it is permissible to operate an imaging system by remote control provided the imaging system ceases transmission within 10 seconds of the remote switch being released by the operator.

(4) The radiated emissions at or below 960 MHz shall not exceed the emission levels in § 15.209. The radiated emissions above 960 MHz shall not exceed the following average limits when measured using a resolution bandwidth of 1 MHz:

Frequency in MHz EIRP in dBm

960-1610	-65.3
1610-1990	-53.3
Above 1990	-51.3

(5) In addition to the radiated emission limits specified in the table in paragraph (c)(4) of this section, emissions from these ~~imaging systems~~ Material Sensing Systems shall not exceed the following average limits when measured using a resolution bandwidth of no less than 1 kHz:

Frequency in MHz EIRP in dBm

1164-1240 -75.3

1559-1610 -75.3

(d) For equipment operating with fC and fM between 1990 MHz and 10600 MHz:

~~(1) Parties operating this equipment must hold a license issued by the Federal Communications Commission to operate a transmitter in the Public Safety Radio Pool under part 90 of this chapter. The license may be held by the organization for which the UWB operator works on a paid or volunteer basis~~

(1) The radiated emissions at or below 960 MHz shall not exceed the emission levels in § 15.209 of this chapter. The radiated emissions above 960 MHz shall not exceed the following average limits when measured using a resolution bandwidth of 1 MHz: Frequency in MHz EIRP in dBm

<u>960-1610</u>	<u>-46.3</u>
<u>1610-10600</u>	<u>-41.3</u>
<u>Above 10600</u>	<u>-51.3</u>

(4) In addition to the radiated emission limits specified in the paragraph (d)(3) of this section, emissions from these ~~imaging~~ systems shall not exceed the following average limits when measured using a resolution bandwidth of no less than 1 kHz:

Frequency in MHz EIRP in dBm

1164-1240 -56.3

1559-1610 -56.3

(5) There is a limit on the peak level of the emissions contained within a 50 MHz bandwidth centered on the frequency at which the highest radiated emission occurs, fM. That limit is 0 dBm EIRP. It is acceptable to employ a different resolution bandwidth, and a correspondingly different peak emission limit, following the procedures ~~described in § 15.521.~~

described in § 15.521.

(e) ~~Through-wall imaging systems~~ Material Sensing Systems operating under the provisions of this section shall bear the following or similar statement in a conspicuous location on the device: “Operation of this device is restricted to law enforcement, emergency rescue and firefighter personnel. ~~Operation by any other party is a violation of 47 U.S.C. 301 and could subject the operator to serious legal penalties, and construction and industrial professionals.~~”

6. Section 15.511 Technical requirements for surveillance, material sensing and industrial monitoring systems.

(a) The UWB bandwidth of an imaging system operating under the provisions of this section must be contained between 1990 MHz and 10,600 MHz. UWB material sensing, surveillance and industrial monitoring systems may be operated outdoors in fixed or mobile configurations for purposes including monitoring of wireless charging systems and location tracking.

~~(b) Operation under the provisions of this section is limited to fixed surveillance systems operated by law enforcement, fire or emergency rescue organizations or by manufacturers licensees, petroleum licensees or power licensees as defined in § 90.7 of this chapter.~~

~~(1) Parties operating under the provisions of this section must be eligible for licensing under the provisions of part 90 of this chapter.~~

~~(2) The operation of imaging systems under this section requires coordination, as detailed in § 15.525.~~

(b) UWB Surveillance, material sensing and industrial monitoring systems for outdoor operation must be installed by persons professionally engaged in security or other industries or businesses.

(c) The radiated emissions at or below 960 MHz from a device operating under the provisions of this section shall not exceed the emission levels in § 15.209. The radiated emissions above 960 MHz from a device operating under the provisions of this section shall not exceed the following average limits when measured using a resolution bandwidth of 1 MHz:

Frequency in MHz EIRP in dBm

960-1610	-53.3
1610-1990	-51.3
1990-10600	-41.3
Above 10600	-51.3

(d) In addition to the radiated emission limits specified in the table in paragraph (c) of this section, UWB transmitters operating under the provisions of this section shall not exceed the following average limits when measured using a resolution bandwidth of no less than 1 kHz:

Frequency in MHz EIRP in dBm

1164-1240 -63.3

1559-1610 -63.3

(e) There is a limit on the peak level of the emissions contained within a 50 MHz bandwidth centered on the frequency at which the highest radiated emission occurs, fM. That limit is 0 dBm EIRP. It is acceptable to employ a different resolution bandwidth, and a correspondingly different peak emission limit, following the procedures described in § 15.521.

7. Section 15.521 Technical requirements applicable to all UWB devices.

(a) UWB devices may not be employed for the operation of toys. Operation onboard an aircraft, a ship or a satellite is prohibited but operation on or within terrestrial vehicles, including automobiles, is permitted. Fixed, outdoor UWB devices for security or other purposes is permitted, subject to the limitations specified in this subpart.

(b) Manufacturers and users are reminded of the provisions of §§ 15.203 and 15.204.

(c) Emissions from digital circuitry used to enable the operation of the UWB transmitter shall comply with the limits in § 15.209, rather than the limits specified in this subpart, provided it can be clearly demonstrated that those emissions from the UWB device are due solely to emissions from digital circuitry contained within the transmitter and that the emissions are not intended to be radiated from the transmitter's antenna. Emissions from associated digital devices, as defined in § 15.3(k), e.g., emissions from digital circuitry used to control additional functions or capabilities other than the UWB transmission, are subject to the limits contained in Subpart B of this part.

(d) Within the tables in §§§§ 15.509, 15.511, 15.513, 15.515, 15.517, and 15.519, the tighter emission limit applies at the band edges. Radiated emission levels at and below 960 MHz are based on measurements employing a CISPR quasi-peak detector. Radiated emission levels above 960 MHz are based on RMS average measurements over a 1 MHz resolution

bandwidth. The RMS average measurement is based on the use of a spectrum analyzer with a resolution bandwidth of 1 MHz, an RMS detector, and a 1 millisecond or less averaging time. Unless otherwise stated, if pulse gating is employed where the transmitter is quiescent for intervals that are long compared to the nominal pulse repetition interval, measurements shall be made with the pulse train gated on. Alternative measurement procedures may be considered by the Commission.

(e) The frequency at which the highest radiated emission occurs, fM, must be contained within the UWB bandwidth.

~~(f) Imaging systems may be employed only for the type of information exchange described in their specific definitions contained in § 15.503. The detection of tags or the transfer of data or voice information is not permitted under the standards for imaging systems.~~

(f) When a peak measurement is required, it is acceptable to use a resolution bandwidth other than the 50 MHz specified in this subpart. This resolution bandwidth shall not be lower than 1

MHz or greater than 50 MHz, and the measurement shall be centered on the frequency at which the highest radiated emission occurs, f_M . If a resolution bandwidth other than 50 MHz is employed, the peak EIRP limit shall be $20 \log (RBW/50)$ dBm where RBW is the resolution bandwidth in megahertz that is employed. This may be converted to a peak field strength level at 3 meters using $E(\text{dBuV/m}) = P(\text{dBm EIRP}) + 95.2$. If RBW is greater than 3 MHz, the application for certification filed with the Commission must contain a detailed description of the test procedure, calibration of the test setup, and the instrumentation employed in the testing.

(h) The highest frequency employed in § 15.33 to determine the frequency range over which radiated measurements are made shall be based on the center frequency, f_C , unless a higher frequency is generated within the UWB device. For measuring emission levels, the spectrum shall be investigated from the lowest frequency generated in the UWB transmitter, without going below 9 kHz, up to the frequency range shown in § 15.33(a) or up to $f_C + 3/(\text{pulse width in seconds})$, whichever is higher. There is no requirement to measure emissions beyond 40 GHz provided f_C is less than 10 GHz; beyond 100 GHz if f_C is at or above 10 GHz and below 30 GHz; or beyond 200 GHz if f_C is at or above 30 GHz.

(i) The prohibition in § 2.201(f) and 15.5(d) of this chapter against Class B (damped wave) emissions does not apply to UWB devices operating under this subpart.

(j) Responsible parties are reminded of the other standards and requirements cross referenced in § 15.505, such as a limit on emissions conducted onto the AC power lines.

Exhibit 2

ETSI 302 065-4 Detail Report

Figure 1. Current Status

Work Programme						
2019-06-16						Version 2.3.3
Simple Search Advanced Search Pre-Defined Reports Help						
Details of 'REN/ERM-TGUWB-150-4-1' Work Item						
	Work Item Reference	ETSI Doc. Number	STF	Technical Body In Charge	Standard Not Ready For Download	
	REN/ERM-TGUWB-150-4-1	EN 302 065-4-1		ERM TGUWB		
	Current Status <small>(Click to View Full Schedule)</small>	Latest Version	Cover Date	Standstill	Creation Date	
	Start of work (2010-09-03)			View Standstill Information	2018-06-21	
	Rapporteur	Technical Officer		Harmonized Standard		
	Michael Mahler	Igor Minaev		Yes		
Title						
	Short Range Devices (SRD) using Ultra Wide Band technology (UWB); Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU; Part 4-1: Material Sensing devices for building material analysis below 10.6 GHz BMA					
Scope and Field of Application						
	This work item to amend the former version of EN 302 065-4 V1.1.1 is targeted to address the request of the EU desk officer. This includes a detailed description of the wanted performance requirement, RX-requirements and fixed limits for all requirements based on a clear test procedure. Therefore, this EN will cover devices for handheld "building material analysis (BMA) working within the frequency 2.2 to 8GHz. The operation modes will include the wanted performance requirements for object determination inside the building material and building material characterization (e.g. moisture) Equipment covered by the present document operates in accordance with EC DEC on UWB and ECC/DEC(07)01 and its amendments. A first collection of open points which shall be considered (in addition) are uploaded as: ERMTGUWB(17)040003 and TGUWB(17)040007					
Supporting Organizations						
	ROBERT BOSCH GmbH, Ubisense Ltd, ZES BVBA, DecaWave Ltd, Novelda AS					
	Keywords	Projects	Clusters	Frequencies	Mandates	Directives
	Harmonised standard SRD UWB		Better Living with ICT Connecting Things Home & Office Wireless Systems	UWB (2.2 GHz to 8.5 GHz)	M/536	2014/53/EU
Official Journal						
Remarks						
	2018-07-27 MAHLER WI proposed to WG ERM TGUWB, see contribution ERM(18)65b032 2018-06-21 MAHLER WI accepted by WG ERM TGUWB, see contribution ERMTGUWB(18)045025 2018-06-21 MAHLER WI proposed to WG ERM TGUWB, see contribution ERMTGUWB(18)045025					
<< Previous Standard		Displaying Item 2 of 14 ...			Next Standard >>	
Back to Work Items Summary List						
Any comments or problems with this application? Please let us know...						

Figure 2. Work Item Schedule

2019-08-16		Work Programme				Version 2.3.3	
Simple Search Advanced Search Pre-Defined Reports Help							
Details of 'REN/ERM-TGUWB-150-4-1' Work Item Schedule							
Code	Status	Milestone	Action	Action Nb	Target	Achieved	Version
0	Creation of WI by WG/TB	Creation of WI by WG/TB			2018-06-21	2018-06-21	
0 ga	WI accepted by WG	WI accepted by WG				2018-06-21	
0 gp	WI proposed to WG	WI proposed to WG				2018-07-27	
0 a	TB adoption of WI	TB adoption of WI			2018-07-27	2018-09-03	
0 E	EC informed of mandated WI	EC informed of mandated WI			2018-10-01	2018-09-21	
0 Er	EC mandate confirmed	EC mandate confirmed			2018-10-26	2018-11-07	
1	Start of work	Start of work			2018-07-27	2018-09-03	
2	Early draft	Early draft			2019-05-07		
4	Stable draft	Stable draft			2019-05-31		
5 V	Draft sent to EC for assessment	Draft sent to EC for assessment			2019-06-01		
5 Vr	EC Assessment Received	EC Assessment Received			2019-07-06		
6	Final draft for approval	Final draft for approval			2019-09-06		
7	WG approval	WG approval			2019-09-27		
8	TB approval	TB approval			2019-10-25		
8 A	Draft receipt by ETSI Secretariat	Draft receipt by ETSI Secretariat			2019-11-08		
8 V	EC Assessment before AP Requested	EC Assessment before AP Requested			2019-11-09		
8 Vr	EC Assessment before AP Received	EC Assessment before AP Received			2019-12-14		
9 B	Start of EN Approval Procedure	Start of EN Approval Procedure	AP		2019-12-14		
9 C	End of EN Approval Procedure	End of EN Approval Procedure			2020-03-14		
9 D	Start of TB review after AP comments	Start of TB review after AP comments			2020-03-14		
9 DaA	Start of TB approval process	Start of TB approval process			2020-05-09		
9 DaB	End of TB approval process	End of TB approval process			2020-06-06		
9 V	EC Assessment before WNV Requested	EC Assessment before WNV Requested			2020-06-07		
9 Vr	EC Assessment before WNV Received	EC Assessment before WNV Received			2020-07-12		
9 Da	TB approval after review of AP comments	TB approval after review of AP comments			2020-07-12		
9 E	Draft receipt by ETSI Secretariat	Draft receipt by ETSI Secretariat			2020-07-19		
10 F	Start of Vote	Start of Vote	V		2020-08-02		
10 G	End of Vote	End of Vote			2020-10-01		
11	Vote result determination (adopted)	Vote result determination (adopted)			2020-10-01		
12	Publication	Publication	PU		2020-10-15		1.1.1
12 V	Delivery to the EC	Delivery to the EC			2020-11-05		
12 W	Citation in the OJ	Citation in the OJ			2021-01-28		
12 WW	No more cited in the OJ	No more cited in the OJ					



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Certificate of Service

I, J. David Grossman, certify that I have on this 19th day of August, 2019, pursuant to 47 CFR § 1.405, caused a copy of the foregoing **Opposition to Petition for Rulemaking of Robert Bosch LLC** was 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 19th day of August, 2019 at Washington, DC.

/s/ J. David Grossman

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