

**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)	

Comments of Vayyar Imaging Ltd.

Naftali Chayat
Chief Technical Officer,
Vayyar Imaging Ltd.

naftali.chayat@vayyar.com

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Introduction

Vayyar would like to express its support for Robert Bosch LCC's request to review the ultra-wideband (UWB) rules. Vayyar develops and supplies 3D imaging sensors that operate under FCC Part 15, Subpart F (the ultra-wideband rules) as well as sensors operating in millimeterwave bands. Vayyar's sensors include, among others, Walabot DIY™ product for in-wall imaging and Walabot Home™ product for in-home monitoring, such as detecting falls in bathrooms. Vayyar's primary interest is in Parts 15.517 (indoor systems) and 15.519 (handheld systems) that can be marketed to the general public.

The comments below address several topics related to current technologies used in UWB systems and the potential uses of such systems.

Removing bias towards communication systems

We believe that nowadays sensor applications of UWB technology are at least as important and commonplace as UWB data communication systems. However, the clause 15.519(a)(1) implies data-oriented system architecture ("information", "to an associated receiver", "acknowledgement"):

"A UWB device operating under the provisions of this section shall transmit only when it is sending information to an associated receiver. The UWB intentional radiator shall cease transmission within 10 seconds unless it receives an acknowledgement from the associated receiver that its transmission is being received. An acknowledgment of reception must continue to be received by the UWB intentional radiator at least every 10 seconds or the UWB device must cease transmitting."

In sensors the transmitter and the receiver are in most cases collocated in the device and whenever the device transmits, it configures the receiver to await the reflected signals, the provisions of 15.519(a)(1) do not make sense in this context, and we believe that part 15.519(a)(1) should be cancelled.

Relaxing or removing the prohibition on fixed outdoor installation

We believe that there is an important range of outdoor applications in which at least one component of the UWB system is fixed. Examples are RTLS systems, security systems, safety systems for robotic lawnmowers, and more. Therefore, we recommend reviewing the prohibition expressed in 15.519(a)(2). We recommend removing it in its entirety, or at allowing fixed outdoor installation up to a predefined height above ground, for example 3 meters. Moreover, the term "hand-held" is defined as "(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." This definition limits the part 15.519 to objects carried by humans, while many applications involve non-human objects – a car, a lawnmower, an RTLS-tracked object, a security or safety system. We recommend addressing these applications by adding a "generic UWB device" category defined as "(n) *Generic UWB device*. As used in this subpart, a generic UWB device is a device that can be operated either indoors or outdoors." The technical limits for a generic UWB device would be same as for a handheld device. Alternative course of action is to replace the "hand-held" category with "generic UWB device" category.

Accommodation of swept and stepped frequency sensors in the rules

We support amendments to the rules that facilitate the use of swept and stepped frequency systems. For most cases, these systems achieve higher sensitivity than pulsed systems using sampled receives, as

pulsed systems require multiple pulses in order to characterize the reflected signals over a range of delays. Current rules contain several elements that imply bias towards pulsed systems:

- a) The definition 15.503(d) “*Ultra-wideband (UWB) transmitter*. An intentional radiator that, **at any point in time**, 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.” assumes pulsed radiation. The term “at any point in time” is ambiguous in itself, since narrowing the observation interval to sufficiently short interval (e.g. 1 nanosecond) will result in arbitrarily large bandwidth (e.g. 1 GHz or more). However, taking more conventional interpretation of observation interval, such as microsecond scale, will exclude most swept/stepped frequency systems. In order to resolve this deficiency, we agree with a recommendation of Robert Bosch LLC to align the observation interval with the interval used for measuring average power. Therefore, we recommend replacing the phrase “at any point in time” with a phrase “based on RMS average measurement”.
- b) The peak power scaling rule during measurements, 15.521(g), “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.” hinges on the power being observed by a detector when the pulse width is substantially less than 20 nanoseconds. However, swept frequency systems typically exhibit a different behavior – above a given RBW (typically in the few MHz range) the measured peak power becomes constant. To account for the true effect of the UWB transmitter on a hypothetical 50 MHz bandwidth victim receiver, we recommend changing in 15.521(f) the sentence “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” to “If RBW is greater than 3 MHz or if the measured EIRP scales with RBW differently than $20 \log (RBW/50)$, 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”.

Summary

We support the intent of the petition of Robert Bosch LLC to update the UWB rules according with the currently used UWB technologies and corresponding applications. We support majority of the proposed text changes to Subpart F and propose alternative text amendments to address some of the issues.

Respectfully,

Naftali Chayat

CTO, Vayyar Imaging Ltd.