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October 11, 2011

**FILED/ACCEPTED**

**BY HAND DELIVERY**

Marlene H. Dortch  
445 12<sup>th</sup> Street, S.W.  
Room TW-A325  
Washington, DC 20554

**OCT 11 2011**

Federal Communications Commission  
Office of the Secretary

**Re: Petition for Rulemaking by Lockheed Martin Corporation regarding  
Amendment of Part 15 to Enable More Flexible RFID Use in the 433 MHz  
Band**

Dear Ms. Dortch:

Attached please find a petition for rulemaking by Lockheed Martin Corporation. This petition is being filed with the Secretary pursuant to 47 C.F.R. §1.401. Please contact Giselle Creeser at 703-413-6983 with any questions.

Respectfully submitted,

A handwritten signature in cursive script that reads "Jennifer A. Warren".

Jennifer A. Warren

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**Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, D.C. 20554**

In the Matter of

Petition for Rulemaking of Lockheed Martin Corp.; Amendment of Part 15 to Enable More Flexible RFID Use in the 433 MHz Band

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**FILED/ACCEPTED**

**OCT 11 2011**

Federal Communications Commission  
Office of the Secretary

**PETITION FOR RULEMAKING OF LOCKHEED MARTIN CORPORATION**

Pursuant to 47 C.F.R. § 1.401, Lockheed Martin Corporation (“Lockheed Martin”) respectfully requests that the Federal Communications Commission (“Commission” or “FCC”) amend Part 15 of the Commission’s rules for radio frequency identification (“RFID”) systems operating in the 433 MHz band. In this Petition for Rulemaking, Lockheed Martin proposes simplifications of the existing FCC rules that govern RFID operations in the 433 MHz band. By updating its rules, the Commission can promote the growth of the U.S. RFID industry and enable new, more advanced RFID applications while maintaining sufficient safeguards for incumbent uses in the 433 MHz band, including operation of critical radar systems used by the Department of Defense. In addition, similar rules have been implemented for operation of RFID devices in Europe. Making the proposed rule changes would therefore also allow U.S. companies to achieve economies of scale and improve competitiveness internationally.

**I. Introduction.**

Lockheed Martin researches, designs, develops, manufactures, and integrates advanced technology systems, products, and services in a broad range of areas, for both federal and non-federal users. Savi Technology (Savi), a wholly owned subsidiary of Lockheed Martin, delivers

RFID hardware and software solutions that help organizations track and better manage physical objects such as supplies, equipment, and cargo that are central to operational success. Leading organizations in the global defense, civilian federal agency and natural resources markets use Savi RFID technology to locate physical assets in real time, monitor and control the condition of those assets, and analyze collected data. Lockheed Martin also manufactures a range of airborne and ground radar systems that operate in this spectrum and that are used by the U.S. Department of Defense and others to meet critical missions.

Lockheed Martin's role as a manufacturer of both RFID devices and radar systems in the 433 MHz band ensures that the rules proposed in this petition will maintain an environment that supports greater capabilities in RFID applications and solutions while always protecting vital radar operations. Lockheed Martin has a strong interest in ensuring that RFID use does not adversely impact radar technologies and their mission effectiveness.

Savi currently offers a range of RFID solutions certified under the Commission's existing rules. However, the continuing evolution of the RFID industry and the associated development of more sophisticated protocols have led to applications that simply were not contemplated when the Commission's existing rules were adopted. Moreover, several commercial RFID manufacturers' and users' organizations have worked towards developing standardized industry protocols, across different jurisdictions, that will enable applications that will outpace current FCC rules.<sup>1</sup> Indeed, many European jurisdictions already have implemented flexible rules to enable the next generation of RFID technologies in this band. The proposed rule changes set forth in this Petition will promote growth of the U.S. RFID industry and improve the

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<sup>1</sup> These include efforts underway at the American National Standards Institute, [www.ansi.org](http://www.ansi.org); Dash-7 Alliance, [www.dash7.org](http://www.dash7.org); and EPC-Global, [www.epcglobalinc.org](http://www.epcglobalinc.org).

international competitiveness of U.S. manufacturers by allowing manufacturers and users to fully capture the benefits of these emerging applications and protocols, all while continuing to protect vital incumbent uses of the 433 MHz band.

## **II. Evolving Uses of RFID Technologies in the 433 MHz Band Require Rule Updates.**

We agree with the Commission that its forward-looking efforts to provide additional flexibility for unlicensed devices have generally led to the “introduction and explosive growth” of several important technologies, including RFID.<sup>2</sup> RFID technologies already constitute a multi-billion dollar market, and are expected to continue to grow.<sup>3</sup> Existing applications include supply chain management, asset tracking, and real-time inventory.<sup>4</sup> The 433 MHz band is a critical home for these devices.

Currently, RFID devices in the 433 MHz band are certified under 47 C.F.R. §§ 15.231 and 15.240. Section 15.231, originally adopted in 1989, was developed for short range unlicensed consumer devices in the 70-470 MHz range. This rule was intended for devices with intermittent manual operations, *e.g.* garage door openers, or short duration automatic operations, *e.g.* home security systems. In order to avoid harmful interference by similar devices the rule contemplated complex transmission timing requirements that provided for short continuous wave transmission times and a long silent period to allow other devices to transmit during that period.

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<sup>2</sup> Fostering Innovation and Investment in the Wireless Communications Market, *Notice of Inquiry*, 24 FCC Rcd. 11322, 11327 (2009).

<sup>3</sup> See Ex Parte Letter of Craig Mundie, Chief Research & Strategy Officer, Microsoft Corp., to Julius Genachowski, Chairman, FCC, GN Docket No. 09-51 (filed Sept. 21, 2009); see attached Richard Thanki, *The Economic Value Generated by Current and Future Allocations of Unlicensed Spectrum* at 7, 34 (Sept. 08, 2009) (“Thanki Report”).

<sup>4</sup> Thanki Report at 23, 32.

The Commission last updated its rules seven years ago, in 2004, when the FCC adopted Section 15.240 to accommodate commercial asset tracking in 433.5-434.5 MHz band.<sup>5</sup> Section 15.240 is based, in part, on recommendations that Savi made to the Commission in its 2000 Petition for Rule Making.<sup>6</sup> The rule enables devices to increase maximum transmission duration in the 433.5-434.5 MHz band, which allows data as well as control signals to be transmitted. In addition, Section 15.240 enables longer file transfer than allowed under Section 15.231. As a direct result of the FCC's efforts in making these rule changes, RFID solutions have developed in the 433 MHz band that create improvements in logistics and supply chain efficiency.

**III. By Updating its Rules the FCC Will Support New Investment, Enable Innovative New RFID Applications, and Improve U.S. Competitiveness.**

The adoption of Section 15.240 was an important first step in enabling the next generation of commercial RFID applications. But RFID technology continues to evolve. As a result, the existing rules present challenges for innovators developing new solutions to meet the growing demand for object tracking.

For example, while RFID devices can be certified under Sections 15.231 and 15.240 today, operations under Section 15.240 are restricted to applications involving commercial shipping containers, while the requirements of Section 15.231(e) effectively preclude useful bidirectional communications.<sup>7</sup> As a result, Savi has been unable to fully respond to customers seeking RFID solutions in a number of promising areas, including medical equipment monitoring, public transportation route mapping, and vehicle security and fleet management.

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<sup>5</sup> Review of Part 15 and Other Parts of the Commission's Rules, *Third Report and Order*. 19

The rule changes requested by Lockheed Martin would enable investment and development of commercial RFID applications in these growth areas – and many others.

By adopting the proposed rule changes, the FCC can enable a new generation of low power 433 MHz devices that will have measurable advantages in overall performance and a wider range of applications than devices that are allowed under the current rules. Adoption of the rule changes will enable more robust asset tracking capabilities, which are already heavily used in various fields including pharmaceutical, manufacturing, and U.S. government applications, as well as emerging wireless applications such as traffic and utility monitoring. The proposed rule also will reduce latency times for the initiation of transmissions, allow for asynchronous two-way communications between devices, and enable use of a second or third channel for duplex operation, negotiation of encryption modes, or other supervisory functions.

These proposed changes are critical for supporting modern, robust communications protocols, such as IEEE 802.15.4, that will enable important efficiency and security improvements and result in innovative new solutions.<sup>8</sup> For example, the existing RFID rules were created before the wide adoption of modern contention management methods to avoid harmful interference, such as the “listen before talk” (“LBT”) technology currently used by Wi-Fi devices. As a result, the existing rules rely on the use of long silent periods for devices, which is less spectrally efficient than what current technology permits and limits the scope of potential RFID operations that would implement bidirectional communications between devices. Long quiet times also create latency that can result in assets moving out of range before communications are complete, thus undermining the value of the use of RFID systems.

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<sup>8</sup> See IEEE 802.15 WPAN™ Task Group 4 (TG4), <http://www.ieee802.org/15/pub/TG4.html>.

In contrast, modern protocols can enable RFID systems that support bidirectional communications and efficient contention management methods such as LBT. Such systems would have several distinct advantages over existing RFID technologies, including accommodating features such as (1) encryption, mutual authentication, and other communications protocols to keep systems secure and reliable; (2) the ability to transmit at higher power without causing harmful interference, resulting in broader coverage at lower cost; (3) longer transmission periods to allow larger data file transfers such as detailed container tag manifest lists and sensor logs; and (4) implementation of industrial automation and control systems, which are not possible without automatic bidirectional exchange of commands.

Significantly, many European jurisdictions already have adopted flexible rules that enable device manufacturers to implement these types of features today. Indeed, the European Research Council (“ERC”) recently updated its recommendation on use of Short Range Devices, such as RFID devices, which identifies the operating parameters most commonly accepted by the European Conference of Postal and Telecommunications Administration (“CEPT”) countries.<sup>9</sup> The recommendation contains several of the operating parameters proposed by Lockheed Martin in this Petition, including power levels and LBT functionality.

Lockheed Martin’s proposed rule changes therefore would allow U.S. manufacturers to develop RFID operations under rules similar to those currently in place in Europe, enabling the U.S. RFID industry to compete more effectively in the global marketplace and ensuring that U.S. RFID users enjoy the benefits of a wider range of innovative RFID technologies on a more cost effective basis as soon as they are developed.

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<sup>9</sup> See generally European Conference of Postal and Telecommunications Administrations, CEPT Recommendation ERC/REC 70-03, <http://www.erodocdb.dk/docs/doc98/official/pdf/rec7003e.pdf> (last updated 22 August 2011).

#### **IV. Proposed Changes to The FCC's Rules.**

Appendix A to this petition includes a full recitation of the rule changes proposed by Lockheed Martin. The following is a list of the most important proposed rules.

- Permitting a limited increase of the usable bandwidth range from 433.5-434.5 MHz to 433.05-434.79 MHz. Frequency agility and the dynamic reassignment of frequencies are now critical in managing contention among transmitters. This change accounts for the need for multiple channels in future operations, which will allow for more robust links and reduced interference among devices. To ensure coexistence, the proposal limits power spectral density and the total power within the total band.
- Introducing a Listen Before Talk (LBT) protocol that requires a device to sense the radio environment before it starts transmission. This technique is used to ensure that a free radio channel is available before transmissions are initiated, thereby providing a more effective and efficient contention management scheme through Collision Avoidance. LBT will also reduce the potential for interference between RFID devices and all other in-band users.
- Adopting a new timing rule that allows a maximum duration of transmission of 10 seconds for a single device and a minimum silent period of 1 second.
- Allowing bi-directional communications between two devices for a maximum period of 10 seconds after which both devices must commence a silent period of at least 1 second.
- Allowing an EIRP of 1 mW Peak and a total maximum EIRP across the entire band of 3 mW Peak. Similarly, for the field strength at 3 meters, adopting a level of 57,700 uV/m Peak with a resolution bandwidth of 100 kHz. The averaging requirements specified in 47 C.F.R. § 15.35 do not apply.
- Retaining the spurious emission level contained in 47 C.F.R. §15.209.
- Retaining the existing exclusion zone of 40 km around five Federal Government radar sites.

Additionally, while the proposal includes additional measures to reduce the potential for harmful interference between users in the band – and also retains existing protections for critical radar operations – it removes two restrictions that burden RFID operations with no offsetting benefit.

First, the proposed rule would not require end user registration of 433 MHz RFID devices with the Commission. In the years since the Commission adopted this requirement, there have been no reports of interference experienced by other users of the band. Indeed, no entity has even submitted a registration to the Commission since this rule was passed. Successful operations over the past several years have confirmed that this requirement is unnecessary, and should be removed.

Second, the proposed rule removes the restriction in Section 15.240—but not in Section 15.231—that limits RFID operations to shipping container applications in commercial and industrial areas. As described above, commercial and government use of RFID technologies and applications have uses beyond shipping container tracking, such as general asset tracking and monitoring in enterprise facilities and real-time-location sensing. There is significant demand for new RFID solutions in environments that do not involve shipping containers. Making this rule change will enable the development and deployment of flexible, innovative RFID applications in the 433 MHz band without the need to certify devices under multiple rules, and there is no evidence that such use creates additional interference concerns.

#### **V. Conclusion.**

The rule changes proposed in this Petition will allow RFID innovators to invest in and deliver more robust and reliable technologies and services. These changes also will allow U.S. manufacturers to produce systems that are more compatible with international standards, thus enhancing U.S. manufacturers' ability to compete in the international marketplace. Finally, a single comprehensive rule governing RFID operations at 433 MHz will streamline FCC requirements while increasing regulatory certainty, enabling RFID solution providers to continue

to develop and deploy innovative systems. For these reasons, Lockheed Martin respectfully requests that the Commission amend Section 15 of its rules as proposed above.

Respectfully submitted,

*/s/ Giselle Creeser*

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October 11, 2011

## Appendix A: Proposed Rule Change

### 15.XXX Operation in the band 433.050–434.790 MHz.

(a) Operation under the provisions of this section is restricted to devices that use radio frequency energy to identify, locate, monitor and track commercial assets. Two-way operation is permitted to allow interrogation, reception, and exchange of data to and from devices. Devices operated pursuant to the provisions of this section shall not be used for voice communications.

(b) The field strength of any emissions radiated within the specified frequency band shall not exceed 57,700 microvolts per meter measured at a distance of 3 meters with a resolution bandwidth of 100 kHz. The emission limit in this paragraph is based on measurement instrumentation employing a peak detector. The averaging methods of §15.35 may not be applied to field strength measurements in this rule. A silent period of 1 second minimum duration must be initiated every 10 seconds or less to allow access by other devices. After any silent period of 1 second or more, a Listen-Before-Talk period of one millisecond must precede the next transmission.

(c) Devices that have not transmitted for one second or greater shall employ a Listen-Before-Talk (LBT) feature so as not to initiate a transmission when other services are attempting to transmit in this band. A listen period is required before any transmission following a silent period of 1 second or greater. The minimum duration of the listen period is 1 millisecond, during which the device shall measure received signal strength of any external transmissions and compare the value with the threshold given by Table 1. The received signal strength shall be measured within the device's nominal receiver bandwidth.

Nominal Receiver bandwidth	LBT Threshold
100 kHz	-80 dBm
200 kHz	-77 dBm
500 kHz	-73 dBm

Table 1

The LBT threshold defined in Table 1 assumes antenna gain of 0 dBi. If the device uses an antenna of different gain, the correction offset must then be applied to above specified thresholds.

If no external transmissions are detected at or above the levels specified in Table 1 during the LBT period, the device's next transmission must follow within 5 milliseconds. If another transmission is detected at or above the levels specified in Table 1 during the LBT period, the device must inhibit its transmission and insert a 1 second delay before its next attempt to

transmit. Every subsequent attempt by the device to transmit shall employ the LBT feature described in this paragraph.

(d) When two devices are engaged in bidirectional communication session, the initiating transmitter must employ the LBT feature described in paragraph (c), and the responding device may omit the LBT requirement for low-latency acknowledgment of packet receipt. Communications between the two devices may continue without employing the LBT feature for a total of 10 seconds combined. Every subsequent communication session by devices engaged in bidirectional communications must be preceded by a silent period of at least one second and employ the LBT feature described in paragraph (c).

(e) The bandwidth may be divided into channels which may transmit sequentially or simultaneously, provided that the total EIRP across the full bandwidth does not exceed 3 milliwatts. The power spectral density shall not exceed 1 milliwatt (0 dBm) when averaged over any 200 kHz interval within the band from 433.050 MHz to 434.790 MHz. Channels may be aggregated to permit higher data rate modulation methods.

(f) The field strength of emissions radiated on any frequency outside of the specified band shall not exceed the general radiated emission limits in §15.209.

(g) In the case of radio frequency powered tags designed to operate with a device authorized under this section, the tag may be approved with the device or be considered as a separate device subject to its own authorization. Powered tags approved with a device under a single application shall be labeled with the same identification number as the device.

(h) To prevent interference to Federal Government radar systems, operation under the provisions of this section is not permitted within 40 kilometers of the following locations:

<b>DoD Radar Site</b>	<b>Latitude</b>	<b>Longitude</b>
Beale Air Force Base	39°08'10" N	121°21'04" W
Cape Cod Air Force Station	41°45'07" N	070°32'17" W
Clear Air Force Station	64°55'16" N	143°05'02" W
Cavalier Air Force Station	48°43'12" N	097°54'00" W
Eglin Air Force Base	30°43'12" N	086°12'36" W

(i) As a condition of the grant, the grantee of an equipment authorization for a device operating under the provisions of this section shall provide information to the user concerning compliance with the operational restrictions in paragraph (h) of this section.