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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

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FEDERAL COMMUNICATIONS COMMISSION
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In the Matter of	)	
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Petition for Rule Making of SAVI Technology, Inc.; Amendment of Part 15 to Permit Broader Data Transmission Capabilities	)	**RM-10051**

To: The Commission

COMMENTS OF ARRL, THE NATIONAL ASSOCIATION FOR AMATEUR RADIO IN RESPONSE TO PETITION FOR RULE MAKING

ARRL, The National Association For Amateur Radio ("ARRL", also known as the American Radio Relay League, Incorporated), by counsel and pursuant to Section 1.405(a) of the Commission's Rules [47 C.F.R. §1.405(a)] hereby respectfully submits its comments in response to the Petition for Rule Making (the Petition) filed on or about November 22, 2000 by SAVI Technology, Inc. (SAVI). The Petition was placed on Public Notice January 30, 2001 by the Commission (Report No. 2462). These comments are therefore timely filed. The Petition seeks changes in the Commission's Part 15 rules governing unlicensed, periodic, intentional radiators so as to permit increased duty cycles and permitted field strengths for radio frequency identification (RFID) systems. In response to the requested changes, ARRL states as follows:

1. This petition is another in a long series of rulemaking petitions in which the Commission is asked by manufacturers of unlicensed Radio Frequency (RF) devices to liberalize the rules regarding permitted field strengths for such devices, in bands allocated to the Amateur Service. The instant Petition follows the classic format whereby the petitioner: (1) touts the alleged utility to consumers of the technology used on an unlicensed basis; (2) asserts that the

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Commission's Part 15 regulations are insufficiently liberal to accommodate the universe of possible features of the technology; (3) makes no reference to the interference potential to licensed radio services in the band of choice (which band was typically selected by the manufacturer *ab initio* without reference to interference potential to licensed services, or the performance of the device in the presence of licensed radio services); and then (4) requests the rule change without technical justification therefor. ARRL suggests that this petition, like its progenitors, is unsupported by interference studies, and therefore contains insufficient reasons in support of the action requested to justify the institution of a rulemaking proceeding. Accordingly, it should be dismissed pursuant to Section 1.407 of the Commission's Rules.

2. As ARRL has noted numerous times in the past, the Commission has jurisdictional limitations on its ability to liberalize Part 15 regulations. Unlicensed Part 15 devices have no allocation status, internationally or domestically. These devices are permitted on an "at-sufferance" basis: they must not cause interference to licensed radio services, and they must tolerate interference received from licensed radio services in the same bands. The Communications Act of 1934 is devoid of any authority to allow unlicensed devices with substantial interference potential; such devices must be licensed. The only authority granted to the Commission to permit unlicensed transmitting devices under the Act is with respect to radio control and citizen's radio service facilities, 47 U.S.C. §307(e)[1]. The Act also permits the

[1] The Telecommunications Act of 1996, Pub. L. 104-104, 110 Stat. 56, Feb. 8, 1996, amended Section 307(e) of the Communications Act of 1934 to add to those services which may by FCC rule operate without individual licenses the aviation radio service for aircraft stations operated on domestic flights when such aircraft are not otherwise required to carry a radio station; and the maritime radio service for ship stations navigated on domestic voyages when such ships are not otherwise required to carry a radio station.

Commission to regulate the interference potential of RF devices by "reasonable regulation", 47 U.S.C. §302. This the Commission has done by permitting operation of such devices in bands allocated, on a primary basis, to one or more licensed radio services, but only where the operation of the unlicensed devices has been determined to be unlikely to cause interference to the licensed radio services. In this case, SAVI has made no showing that unlicensed RFID devices at the requested higher field strength levels and radically increased duty cycles proposed could be operated on an itinerant basis without undue risk of harmful interference to the Amateur Service. Neither has the Petitioner shown any reason why the extremely high field strengths of 110,000 microvolts per meter measured at 3 meters is required to communicate over paths of 100 meters.

3. In order to invoke Communications Act jurisdiction to amend the Part 15 rules as requested by SAVI, the Commission must make a specific finding that the SAVI devices under the proposed new rules would not cause interference to licensed radio services. SAVI has configured the operation of its RFID tag transmitters in the 420-450 MHz band (specifically centered at 433.9 MHz)[2] and proposes to operate them at field strengths of 110,000 uV/m, with duty cycles up to two minutes at a time, and only a ten-second silent period between transmissions. The current Section 15.231(e) provisions for periodic radiators, however, permit

[2] The choice of frequencies for these devices is obvious. SAVI chose 433.9 MHz because it is an Industrial, Scientific and Medical devices band in Europe. However, the appropriateness of the deployment of these devices in Europe is completely irrelevant to the propriety of use of high-powered unlicensed devices in the United States. Neither is the availability of inexpensive components a reasonable basis for choosing a band such as 420-450 MHz. If SAVI wants to operate its devices with greater flexibility, it should consider the 902-928 MHz band. The frequency band chosen by SAVI was obviously done without interference avoidance in mind. It is among the worst choices SAVI could have made from that perspective.

field strengths of less than 5,000 uV/m at that frequency (measured at 3 meters), with duty cycles of less than one second, assuming a silent period between transmissions of at least 30 times the duration of the transmission.

4. Thus, in order to justify the requested rule change, SAVI would have to affirmatively demonstrate to the Commission, and the Commission would have to affirmatively determine, that the proposed change in the rules for RFID tags, allowing a 30 dB increase in field strength, accompanied by a radical increase in duty cycle of these periodic radiators, would not result in interference to existing services. Furthermore, with respect to control transmissions, SAVI states at page 5 of its Petition that periodic transmissions for control purposes (which under present Section 15.231(a)(3) are limited to not more than one second per hour), should be restricted only by a ten percent duty cycle requirement with no periodic transmission restriction. SAVI asserts that the modified rules "would allow for full 128 kilobyte data transmission without increasing the possibility of additional interference since the range of 100 meters would be maintained as would the overall power and field strength limitations."

5. In any case, the premises of the Petition are flawed. First of all, ARRL strongly disagrees with SAVI's suggestion that field strengths of 110,000 uV/m for these devices would limit the range of SAVI's transmissions to 100 meters. Signals of that magnitude would provide reasonable communications at ranges well in excess of 1 kM, even with insensitive receivers and low-gain antennas. The potential for interference to sensitive amateur radio receivers, which in the 433 MHz band utilize very high gain antennas, is extreme. The entire method by which SAVI determined that a signal level of 110,000 uV/m is permitted is a serious misinterpretation of the language of Section 15.35(c). That section stipulates that the maximum amount of time

over which a pulse train can be averaged is 0.1 seconds. If this averaging is applied to a 120-second transmission, or a 0.1 second pulse within any transmission, the resultant averaging is a factor of 100 percent, meaning that no averaging is applied at all under those circumstances. Because these devices transmit data, SAVI also incorrectly starts with the table in Section 15.231(e); but that error is moot anyway because averaging cannot be applied to a pulse train whose length is greater than or e qual to 0.1 seconds in any case.

6. At page 5 of the Petition, SAVI contends that its control polling is limited to one second per hour. This is true only to the extent that SAVI wishes to utilize the field strengths permitted in the Section 15.231(b) table. However, Section 15.231 stipulates that:

> (e) Intentional radiators may operate at a periodic rate exceeding that specified in paragraph (a) and may be employed for any type of operation, including operation prohibited in paragraph (a), provided that the intentional radiator complies with the provisions of paragraphs (b) through (d) of this Section, except that the field strength table in paragraph (a) is replaced by ...[a replacement table]

The replacement table would permit a field strength of 4,398.7 uV/m at 433.92 MHz. This should be adequate for communication out to approximately 300 meters if a reasonably sensitive receiver is employed. The limitation claimed by SAVI, therefore, is reasonably addressed by present Section 15.231 rules.

7. SAVI's premise that the current rules would require 30 minutes of clock time to download 128 kilobytes of data is incorrect. The provisions of Section 15.231(c) stipulate that the bandwidth shall not exceed 0.25% of the operating frequency. At 433.92 MHz, the permitted bandwidth would be greater than 1 MHz.

8. The proposed rules attached to the Petition do not track the contentions in the Petition. The rules would completely eliminate the averaging issues discussed relative to Section 15.35,

and would simply permit commercial and industrial devices to transmit up to 120 seconds continuously, and to emit RF energy during that entire period at levels up to 110,000 uV/m. This is many orders of magnitude greater than what is currently permitted. Signal levels of that order could be heard for kilometers, or more, with even low-gain antennas. Existing periodic emitters function reasonably well within the existing provisions of Section 15.231(a) and 15.231(e); there is no demonstration in the Petition that 120 seconds of transmission, with but a 10-second off-time,[3] at 110,000 uV/m measured at 3 meters is necessary or appropriate. The existing provisions of Section 15.231 serve adequately for a communications range of 100 meters. If SAVI cannot use modulation and encoding techniques that would allow them to get data throughput they need to communicate 128 kilobytes of data in a reasonable time, they should manufacture equipment under the several other sections of Part 15 that do not have the limits the Commission intended for periodic radiators, which were configured to limit interference.

9. In a broader sense, the Commission is presently without empirical data concerning ambient noise levels in bands used by Part 15 devices. It therefore is unable to determine, much less predict, whether the permitted field strengths for Part 15 devices are adequate, overly limited, or overly liberal. Limited anecdotal study by ARRL technical staff of noise levels from unlicensed devices in certain metropolitan areas indicate that man-made RF noise is substantially increasing. ARRL has offered to contribute by participation of volunteers in a planned study of noise levels proposed by the Commission's Technological Advisory Council (TAC). The TAC

[3] The ten-second off-time was discussed in the Petition, but not included in the proposed rules attached thereto.

formed a Noise Subcommittee, which has reported to the Commission that:

> Based on the trends in new wireless devices and systems, the subcommittee concluded that the noise environment may degrade significantly in the near future and therefore it warrants significant additional focus at this time.[4]

The TAC stated that "we could potentially be entering a period of rapid degradation of the noise environment" and that this degradation "could impact the reliability of current systems and the viability of future communications systems."[5] Premised on these forecasts, the Commission must be extremely careful in evaluating rulemaking petitions proposing substantial departures from present Part 15 rules. It must make evaluations of those proposals based on technical compatibility studies. Absent such in the instant petition, it can only be concluded that the Petition is incomplete and fails to justify the relief requested, and it must therefore be denied.

10. The Amateur Service makes extensive use of the 420-450 MHz band. There are approximately 6,300 FM voice repeaters in the United States in the band, and at least that number of fixed control and auxiliary point-to-point links there as well. The locations and frequencies are not published by the licensees or the volunteer coordinators. The 420-450 MHz band has experienced significant growth in recent years. Amateur radio operation in the 420-450 MHz band is not based on fixed transmitter operation. Amateur transmitter locations and signal paths are unpredictable in that band. It is extremely popular among radio Amateurs, and there are many thousands of Amateur stations which utilize extremely sensitive receivers for weak-signal transmissions at 432-433 MHz. Because RFID tags are itinerant and mobile, there is

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[4] TAC Noise Subcommittee, Proposal for Noise Environmental Assessment, at 2 (November 24, 1999). See also www.jacksons.net/tac/FCC.

[5] TAC Noise Subcommittee Status (Nov. 30, 1999), available at www.jacksons.net/tac.

absolutely no chance whatsoever that interference between Amateur stations and RFID tags could be mitigated once the devices are deployed. The interference potential of these devices is thus completely unpredictable, and cannot be remedied easily. While there is some flexibility in amateur operation such that interfering signals compliant with the periodic rates permitted by the current Section 15.231 rules can be tolerated without harmful interference, the field strengths and duty cycles proposed by SAVI are completely unreasonable and would undoubtedly seriously disrupt Amateur communications in one of the most popular of the Amateur Service allocations.

Therefore, the foregoing considered, ARRL, the National Association for Amateur Radio, respectfully requests that this Petition be immediately denied or dismissed, pursuant to Section 1.407 of the Commission's Rules.

Respectfully submitted,

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March 1, 2001

CERTIFICATE OF SERVICE

I, Christopher D. Imlay, do hereby certify under penalty of perjury, that I did cause to be mailed, first class postage prepaid, a copy of the **COMMENTS OF ARRL, THE NATIONAL ASSOCIATION FOR AMATEUR RADIO IN RESPONSE TO PETITION FOR RULE MAKING** to the offices of the following, this First Day of March, 2001:

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