

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

In the Matter of)	
)	
Amendment to the Commission's Rules)	RM10051
To Permit Broader Data Transmission)	
Capabilities)	

REPLY COMMENTS OF FRED C. JENSEN
AMATEUR RADIO LICENSEE K6DGW

I wish to submit the following reply comments in opposition to the petition of SAVI Technologies (SAVI) to amend the Commission's rules to permit significantly increased field strengths and dramatically lengthened duty cycles for their Radio Frequency ID devices operating on or close to 433.920 Mhz. I submit these comments as a concerned citizen, and a licensed user of the amateur radio allocation at 420 – 450 Mhz ("70cm"), and without legal counsel or advice.

- 1) **Background:** I have been continuously licensed as an amateur radio operator since 1953, and except for a period from mid 1964 through the end of 1967 when, as an officer in the US Air Force, I was stationed in Vietnam and surrounding countries. I am currently active on the 70cm band, both for amateur satellite work, and as a member of the Sierra Radio Association and Cactus Intertie, Inc., a system of 150+ linked amateur remote and repeater stations stretching from northern California across the southwest to eastern Texas. In the mid-90's, while employed by Science Applications International Corporation (SAIC) as Chief Engineer of one of their divisions, I was assigned to work with SAVI Technologies and their equipment in support of a proposal they were making to the US Department of Defense. During this assignment, I had occasion to work with and on their equipment, to observe it's performance, and to gain intimate familiarity with its various applications.
- 2) **The Amateur Allocation at 70cm:** Along with the 2 meter (144 – 148 Mhz) amateur allocation, 70 cm is one of the most crowded and heavily used allocations available to amateurs. In addition to weak signal research and Earth-Moon-Earth propagation modes prevalent near the lower end of the allocation, a portion of this band is used internationally for up and down links to amateur satellites, of which there are now over a dozen active spacecraft in orbit. A major portion of the band is cooperatively used for narrow band FM channelized operation, repeater and remote stations, and point-to-point auxiliary stations linking these repeaters. Virtually all of the fixed stations in this application are located on mountain tops or large towers and employ highly sensitive receivers. In many, more urban areas, all available channels have been cooperatively coordinated. Usage is so high in the So. California area that the amateur users there have recently shifted their systems to 20 Khz channels to more effectively utilize the spectrum.
- 3) **Defects in the SAVI Petition:** The original petition presents SAVI's case for increased field strengths (110,000 uv/m, measured at 3 meters), and dramatically lengthened duty cycles. It seeks to do so through a series of manipulations of the rules, changes in the specified limits, and how their devices are categorized under the rules, however the end result is the same – significantly higher field strengths and dramatically lengthened duty cycles. I believe that the SAVI petition is defective (or otherwise untruthful or incomplete) for the following reasons:
 - a) Except for the phrase, "minimal interference impact on existing systems," [page 2 in their introductory comments], nowhere in the petition does SAVI address the potential for interference to a licensed service in the frequency range they have chosen for their equipment. In fact, nowhere does SAVI even acknowledge that there is a licensed service in that frequency range. As an intentional radiator under Part 15 of the Commission's rules, they have an obligation to address all potential interference that could result from their devices, and to mitigate it. Once deployed under the requested rules, mitigation of actual interference will be essentially impossible. They have presented no data supporting their assertion of "minimal interference impact on existing systems."

- b) The petition briefly mentions one application of the interrogator/tag combination (a gate or portal where material passes into and out of a yard or warehouse on trucks or other vehicles). The communication distance in this application is very small, and in fact, this application demands a very low powered interrogator to assure that only the tag on the entering/exiting vehicle responds to the polls. Higher field strengths have the potential for incorrectly triggering additional tags on material stored near the gate or portal. Thus, for this application, increased field strength is unnecessary, and the requests in the petition would be moot. The real reason for the petition (the fixed, warehouse/yard system) is only obliquely alluded to.
- c) The petition presents no evidence that the changes requested in the Commission's rules would not impact licensed users within the frequency range used by the SAVI equipment, although that is a prime requirement for any intentional radiator under Part 15.
- 4) **The SAVI Devices Are Not Stable:** My employer's role on the SAVI team involved installation planning and execution, and thus, while we had two interrogators and several tags in our offices and laboratory in Sacramento, we were treating them as off-the-shelf devices. However, I often used my 70cm handheld transceiver to listen to the devices to ascertain exactly when the interrogators and tags transmitted. I found that the nominal frequency of 433.920 Mhz was highly variable and generally proportional to the ambient temperature, varying by as much as 15 Khz. (Our interrogators were located inside, subject only to the normal variations in temperature found in an office environment over a seven day week) Given that SAVI interrogators are often installed outside and subject to significant temperature variations, this instability increases the potential for interference to licensed services, particularly when those services rely on high accuracy, very narrow band channels.
- 5) **Spurious Emissions:** One of the interrogators I worked with exhibited a spurious emission on 440.569 Mhz, which coincidentally happened to be within 6 Khz of the mobile receive frequency for a licensed and coordinated amateur repeater in my home community (K6ARR – 440.575 Mhz). This spurious emission was clearly audible on my handheld receiver from the parking lot of our facility and I thus noticed it upon arrival for work one day. Upon investigation with a spectrum analyzer, I found two additional spurious emissions within the 420 – 450 Mhz amateur allocation from this interrogator. (The second interrogator exhibited two different spurious emissions within the amateur allocation, and I did not analyze any of the tags). These spurious emissions, even if they are within the current field strength limits imposed by Part 15, clearly increase the potential for interference to licensed services. Increasing the permissible field strength of the devices on their fundamental frequency would proportionally increase the field strength of these emissions, of course.
- 6) **Interference Potential for Systems of SAVI Devices:** The SAVI devices are useless unless deployed in systems of many interrogators and tags. While I fully understand that the Commission's Part 15 rules apply strictly to each individual device, it is important to realize the collective effects of these devices when deployed in such a system. In its petition, SAVI refers to the application of its devices at a seaport. Consider a hypothetical such deployment at the intermodal Port of Oakland, in the San Francisco Bay area. The port occupies many acres of area, necessitating many networked interrogators, and many more tags. It is surrounded by hills, some less than four miles distant, and home to a number of licensed and coordinated stations. Far from being "itinerant devices," and thus posing only an occasional interference threat, this very common application of the SAVI devices would pose a continuous and stationary interference threat which is not addressed at all in the SAVI petition.
- 7) **Comments of Velant, Oracle, and United Parcel Service:** Each of these comments voice support for the SAVI petition, based upon its business value to them. Velant, Oracle, and UPS are for-profit businesses who hope to benefit financially from the changes the SAVI petition requests. None of them address or mention the potential for interference to licensed services in this frequency range that the benefits would require. In fact, it seems doubtful that any of them are even aware of the requirements of Part 15 or the impact of the SAVI petition on licensed users.
- 8) **Comments of The Massachusetts Institute of Technology:** It is unclear to me whether Professor Cynthia Barnhart is speaking for herself or on behalf of MIT, however her comments suggest that the SAVI petition seeks only modifications to the Part 15 restrictions on duty cycle with no change in authorized field intensity. In fact, the SAVI petition seeks increases to both duty cycle and authorized field strength. Further, Professor Barnhart suggests that increasing the duty cycle limits without changing the field strength would have no interference impact, which is clearly untrue. Indeed, the Commission clearly recognized in its crafting of the

current Part 15 rules, that, while any unlicensed emissions could have an interference impact, such impact could be mitigated significantly by restricting the emissions to very short bursts with very much longer quiet periods.

- 9) **Comments of the ARRL:** As a licensed amateur radio operator, I have maintained membership in the ARRL for many years, and I fully support their response to the SAVI petition. In paragraph 2 of that response, however, the ARRL states, “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.” I believe that the ARRL may have been unaware that a primary (perhaps the primary) application for the SAVI devices is in non-itinerant, fixed settings (e.g. a seaport, or warehouse/yard), with a dramatically increased potential for continuing interference.
- 10) **Conclusion:** Based on the fact that the SAVI petition does not address interference threats, despite their devices operating under Part 15 with a strict non-interference requirement, I urge the Commission to reject the petition in its entirety. Once deployment of higher power, longer duty cycle devices takes place, mitigation of interference impacts will be all but impossible. Thus, in the absence of SAVI demonstrating in advance their ability to comply with the non-interference requirements of Part 15, the Commission must act preemptively. While the changes they seek may be good for their (and perhaps others’) businesses, they are not good for the licensed service occupying the frequency that SAVI chose. That frequency was their choice -- no one forced them to choose a frequency within a band used for weak signal communications by a licensed service. Clearly, there are a variety of much better choices they could have made.

Sincerely,

Fred C. Jensen
K6DGW
670 Old Airport Road
Auburn, CA 95603
TEL: 530.885.8251