Fletcher, Heald & Hildreth, P.L.C.
1300 North 17th Street 11th floor
Arlington VA 22209
703-812-0400 (voice)
703-812-0486 (fax)

MITCHELL LAZARUS
703-812-0440
LAZARUS@FHHLAW.COM

July 30, 2008

Ms. Marlene H. Dortch, Secretary
Federal Communications Commission
445 12th Street SW
Washington DC 20554

Re: WP Docket No. 08-63, *ReconRobotics Inc., Request for Waiver Ex Parte Communication*

Dear Ms. Dortch:

On behalf of ReconRobotics, Inc., pursuant to Section 1.1206(b)(1) of the Commission's Rules, I am electronically filing this written *ex parte* communication in the above-referenced docket.

ReconRobotics, Inc. prepared the attached document at the request of the Department of Defense, and today submitted it to the Department's officials.

In the interest of full transparency, we are also providing a copy to the Commission.

Please do not hesitate to contact me with any questions.

Respectfully submitted,

Mitchell Lazarus
Counsel for ReconRobotics, Inc.

cc:	Julius Knapp	Ira Keltz	Roger Noel	Erika Olsen
	Ronald Repasi	Alan Stillwell	Scot Stone	Tim Peterson
	Bruce Romano	Geraldine Matise	Derek Poarch	Joseph Casey
	Mark Settle	Jim Schlichting	Kenneth Moran	David Furth

RECONROBOTICS INC

SPECTRUM ANALYSIS FOR THE "RECON SCOUT" ROBOT DEVICE

SUMMARY

The following explains why ReconRobotics's FCC waiver request specifies 430-448 MHz, and why other frequencies are unsuitable.

INTRODUCTION

ReconRobotics manufactures the Recon Scout®: a small, remote-controlled, maneuverable surveillance robot for emergency use by state and local law enforcement and firefighting agencies, and by infrastructure security personnel in areas too hazardous for human entry. The Recon Scout can provide an operator located a safe distance away with video and audio, along with infrared, biological, chemical, heat, radiation, or other needed data. The device is small and strong enough to be thrown, dropped, or launched into hazardous areas.

SPECTRUM ISSUES

The Recon Scout delivers video to the operator over a 6 MHz analog TV channel.

A military version uses part of the 420-450 MHz radiolocation band. Performance is excellent. ReconRobotics has attempted to adapt the device to Part 15 frequencies for non-Federal use, but without success. The Part 15 bands that permit relatively high power -- 902-928 MHz, 2.4 GHz, and 5.8 GHz -- do not propagate adequately through building materials. (See details below.) After extensive testing, the company has reluctantly concluded that a workable unit for non-Federal first responders must use frequencies below about 500 MHz.

Most emergencies that need a Recon Scout require only one unit. Occasional situations may need two, or even three. To accommodate these, ReconRobotics seeks the use of three 6 MHz channels, preferably contiguous.

FCC PROCEEDING

ReconRobotics has applied for an FCC waiver to certify and license the Recon Scout at 430-448 MHz.[1] The analog power level of 1/4 Watt average (1 Watt peak) is orders of magnitude below that of amateur and radiolocation devices currently in the band.

The waiver request seeks *licensed* operation only. Eligibility will be limited to local law enforcement and firefighting agencies, and security personnel in critical infrastructure industries, limited to use in areas that are hazardous for human entry (such as those contaminated by nuclear, chemical, or other environmental toxins).

Suitable rules will enable the FCC, in collaboration with NTIA, to declare certain areas ineligible for licensing, in the event that is necessary to protect specific Federal facilities.

---

[1] This band plan avoids 422-430 MHz, to prevent interference to private land mobile operations in certain Great Lakes Cities, and 448-450 MHz, to protect Federal wind profile radars.

More than thirty first responders filed in support of an FCC waiver. The only opposition came from amateur radio licensees, who have secondary status in the 420-450 MHz band.

WHY NOT PART 15?

The FCC has previously approved a throwable analog surveillance device in the 2.4 GHz Part 15 band, and is considering another in the 902-928 MHz band.[2] Unlike the Recon Scout, these are non-maneuverable and transmit from wherever they land. The signal from these devices may have to traverse one building wall at most. The Recon Scout, in contrast, travels under remote control with an in-building operating range of 30 meters. The unit can be (and often is) steered deep into a structure and down flights of stairs. Its signal typically must pass through several walls to reach the operator outside.

Building penetration drops as frequency increases. ReconRobotics has found through testing that penetration at frequencies higher than about 500 MHz is not adequate for successful operation. To function in the 902-928 MHz Part 15 band (not to mention 2.4 GHz), the device would need much more power to punch through building walls, and hence bigger batteries. That in turn would require beefing up the shock absorption and external housing, adding yet more size and weight, and resulting in a device too big to throw.[3]

One commenter in the FCC proceeding suggests that ReconRobotics picked the 420-450 MHz band to avoid the cost of reengineering the military version. We wish that were true. The costs of prosecuting the FCC waiver -- especially the loss of revenue during its pendency -- far exceed the costs of re-engineering. ReconRobotics would much prefer to use 2.4 GHz, file a me-too request on the *Remington Arms* waiver, and get the product to market quickly.

SPECTRUM OPTIONS

The table below summarizes the U.S. spectrum allocation table over the range 50-806 MHz.

The "Remarks" column and accompanying notes explain why most bands are unsuitable for the Recon Scout. Many bands are ruled out because of safety-critical applications, ubiquitous consumer receivers (as in the FM and TV bands), or as being too narrow to accommodate video bandwidth. We have also indicated some of the Federal and mixed-use bands that are closed to Part 15 operation, presumably at NTIA's request.[4] These bands are generally sensitive to interference, and so may not be appropriate for the Recon Scout.

The results of this elimination process show that 430-448 MHz is unique in its suitability for this application.

---

[2] *Remington Arms Company*, 20 FCC Rcd 18724 (2005) (2.4 GHz band); *Octatron, Inc. and Chang Industry, Inc.*, Request for Waiver, ET Docket No. 05-356 (filed Nov. 28, 2005) (902-928 MHz).

[3] *Details*: The existing robot weighs 0.54 kg and fits in a bounding volume of 1050 cm^3. Use of the 902-928 MHz band would cut the received field strength by approximately 6 dB, requiring an increase in transmitter power by a factor of 4. The needed battery would increase the total weight by 44% and the overall volume by 108%. The 2.4 GHz version is much worse: 15 dB loss of signal strength, 30-fold increase in transmitter power, triple the weight, and five times the volume.

[4] *See* 47 C.F.R. Sec. 15.205.

Spectrum Considerations for the Recon Scout Device

Frequency (MHz)	Federal	Non-Federal	Remarks
BELOW 50 MHz			**See note a**
50-54		AMATEUR	Insufficient radio bandwidth
54-72		BROADCASTING (TV)	Ubiquitous consumer receivers
72-73		FIXED/MOBILE	Insufficient radio bandwidth
73-74.6	RADIO ASTRONOMY		
74.6-74.8	FIXED/MOBILE		
74.8-75.2	AERONAUTICAL RADIONAVIGATION		
75.2-75.4	FIXED/MOBILE		
75.4-76		FIXED/MOBILE	
76-88		BROADCASTING (TV)	Ubiquitous consumer receivers
88-108		BROADCASTING (FM)	
108-137	AERONAUTICAL (VARIOUS)		Safety-critical applications (aeronautical communication, aeronautical navigation, air traffic control, satellite downlinks, etc.) -- *Part 15 prohibited in most of band*
137-138	SPACE OPERATION/SPACE RESEARCH/ METEOROLOGICAL-SATELLITE/MOBILE-SATELLITE (VARIOUS)		Insufficient radio bandwidth
138-144	FIXED/MOBILE		Safety-critical applications (air traffic control, search and rescue, robotic handling of explosives, etc.)
144-148		AMATEUR	Insufficient radio bandwidth
148-150.05	MOBILE-SATELLITE/ RADIONAVIGATION-SATELLITE		Insufficient radio bandwidth
150.05-174	FIXED/MOBILE/ (VARIOUS)		Safety-critical applications -- **See note b**
174-216		BROADCASTING (TV)	Ubiquitous consumer receivers
216-222	FIXED/MOBILE (VARIOUS)		Ubiquitous two-way land and maritime radios -- highly congested
222-225	Radiolocation	AMATEUR	Insufficient radio bandwidth
225-328.6	FIXED/MOBILE		Safety-critical applications -- **See note c**
328.6-335.4	AERONAUTICAL RADIONAVIGATION		Safety-critical applications (aircraft Instrument Landing System) -- *Part 15 prohibited*
335.4-399.9	FIXED/MOBILE		**See note d**
399.9-406	SATELLITE/SPACE OPERATION/SPACE RESEARCH/ MOBILE-SATELLITE (VARIOUS)		Insufficient radio bandwidth; *Part 15 prohibited*
406-406.1	MOBILE-SATELLITE		Insufficient radio bandwidth; *Part 15 prohibited*
406.1-410	FIXED/MOBILE/RADIO ASTRONOMY	RADIO ASTRONOMY	Radio astronomy; *Part 15 prohibited*
410-420	FIXED/MOBILE/SPACE RESEARCH		**See note d**
420-422	RADIOLOCATION	Amateur/ Radiolocation	Insufficient radio bandwidth
422-430	RADIOLOCATION	Land Mobile; Amateur/ Radiolocation	Ubiquitous two-way land radios in northern cities
430-448	RADIOLOCATION	Amateur/ Radiolocation	***ReconRobotics requests use of 430-448 MHz***
448-450	WIND PROFILE RADARS	Amateur/ Radiolocation	Insufficient radio bandwidth
450-470		FIXED/LAND MOBILE (VARIOUS)	Ubiquitous two-way radios -- extremely congested
470-698		BROADCASTING	Ubiquitous consumer receivers
698-806		FIXED/MOBILE	Ubiquitous consumer receivers (after DTV transition)
ABOVE 806 MHz			**See note e**

Notes to Table:

a. The wavelength at 50 MHz is 6 meters. At lower frequencies, an antenna sized to be suitable for the Recon Scout is so short (as a fraction of wavelength) as to be highly inefficient. The device would require increased power, which raises battery size, and hence the size of the housing and shock-absorbing material, resulting in a unit too big and heavy to be thrown.

b. The 150.05-174 MHz band houses law enforcement, fire protection, public safety, military, distress beacons, marine safety, weather and emergency radio, and other safety-critical applications. Sub-bands with non-critical applications offer insufficient radio bandwidth. Part 15 prohibited in portions of band.

c. The 225-328.6 MHz band is used by military aircraft, military satellite downlinks, tactical and training communications, rocket test and telemetry, position location networks, Presidential communications, Space Shuttle and space-walk communications, and radio astronomy (at 322-328.6 MHz). Part 15 prohibited in portions of band.

d. We are unable to ascertain detailed Federal use of the 335.4-399.9 and 410-420 MHz bands. ReconRobotics would consider operation in these bands, if available.

e. Building penetration at frequencies much above 500 MHz is inadequate to support ReconRobotics's application. See explanation in text, above.