



Wireless Data Radio Usage of the FCC “MURS” Channels

By Mike Gladkowski

Raveon Technologies Corp

Abstract

In the fall of 2000 the FCC of the United States created a new license free VHF Citizen Band Radio Service. This new service is commonly referred to as the Multi-Use Radio Service or MURS. The FCC defines MURS as a private, two-way, short-distance voice or data communications service for personal or business activities of the general public. This paper reviews the FCC regulations governing MURS, and highlights some of the advantages and drawbacks of using products designed for this service. Raveon is the first to design a high-speed wireless modem for these MURS channels.

Contents

Abstract	1
Contents	1
Introduction	2
FCC MURS Rules Summary	2
Permissible Communications	2
Channel Use	2
Hardware Restrictions	2
Operating Restrictions	3
MURS Advantages	3

Introduction

The FCC created MURS as an unlicensed, Part 95 service, to eliminate the licensing requirement and to permit personal as well as business communications on these channels. The MURS band consists of 5 channels between 151.82 and 154.6 MHz with a maximum transmitted power of 2W. MURS radios can be supplied in mobile, handheld and base station configurations, and may be used for voice and/or data applications.

FCC MURS Rules Summary

Permissible Communications

MURS radios may transmit voice or data signals (47 CFR 95.1307).

MURS frequencies may be used for remote control and telemetering functions (47 CFR 95.1307).

You may operate a MURS radio anywhere the FCC permits CB operation (47 CFR 95.1303) and (47 CFR 95.405).

Channel Use

No license is required for this service and an entity is authorized to operate a MURS transmitter if it is not a representative of a foreign government, and if it cooperates in the selection and use of channels in order to reduce interference to others (47 CFR 95.1301) and (47 CFR 95.1309).

A user or product must monitor the channel before transmitting, and must and at all times and on all MURS channels, give priority to emergency messages (47 CFR 95.1307.d).

Hardware Restrictions

MURS radios must be manufactured to meet, and must be operated to comply with the technical standards found in Part 95 (47 CFR 95.635). MURS radios must be certificated (FCC approved) in accordance with FCC rules.

MURS transmitters must maintain a frequency stability of 5ppm (47 CFR 95.632).

The Maximum permissible Transmitter Power Output (TPO) is 2 watts (47 CFR 95.635) however, there is no limit on antenna gain (47 CFR 95.639) so the Effective Radiated Power (ERP) of the transmitter can be increased.

The five MURS authorized frequencies (47 CFR 95.632) and associated channel emission bandwidths (47 CFR 95.633) are:

- 151.820 MHz (11.25 KHz bandwidth)
- 151.880 MHz (11.25 KHz bandwidth)
- 151.940 MHz (11.25 KHz bandwidth)
- 154.570 MHz (20 KHz bandwidth)
- 154.600 MHz (20 KHz bandwidth)

Products must be type approved for FCC Part 95 for use in the MURS channels. Products approved for only Part 22 or 90 are not permitted.

NOTE: Most VHF and UHF radio channels, there is no minimum data rate vs. channel bandwidth so using slower data rates may be used to increase receiver sensitivity.

Operating Restrictions

MURS radios may not be used as a repeater (47 CFR 95.1311).

(The Raveon MURS radios are not intended for use as a repeater and has no built in repeat function.)

Antenna height is limited to 20 feet above a structure or 60 feet above the ground whichever is greater (47 CFR 1315).

MURS radios must not be connected to a “booster” or power amplifier. The rules limit the Transmitter Output Power (TPO) to 2 Watts (47 CFR 95.1311).

MURS radios are prohibited from connecting to the public switched telephone network (47 CFR 95.1313).

MURS radios may not be operated in the continuous carrier transmit mode (47 CFR 95.631.j).

(The Raveon MURS radio is not intended for use in the continuous carrier transmit mode. The radio is equipped with a Time-out timer, which limits the duration of the transmitted signal. The timer is user programmable up to one minute.)

You must share the channel with others (47 CFR 95.1309.a), and you must monitor before transmitting (47 CFR 95.1307.d).

(The Raveon MURS radio is equipped with the ability to “listen before transmitting”.)

MURS Advantages

License free operation (47 CFR 95.1301) offers communication performance that up until now was limited to those willing to jump through the hoops to obtain an FCC license. The following table compares the communication range of various unlicensed radio services, assuming full FCC power output, omni-directional antennas, and typical receivers.

Range Comparison

Radio technology	Link Margin	Approximate Range
MURS	140 - 150dB	1-10 miles 
915MHz ISM, non spread	90 – 115dB	100ft – 1 mile 
2.4GHz spread-spectrum	100 - 120dB	200ft – .25 miles 
915 ISM, spread-spectrum	100-130	300ft – 1 mile 

Properly designed MURS radios have 20-50dB more “Link Margin” than other competitive technologies. Because in the real-world, RF signals drop-off about 10-20dB for every doubling of the distance, an extra 20-50dB gives dramatically better range over ISM band products.

There is no minimum data rate vs. channel bandwidth. Products may use slower data rates to increase receiver sensitivity.

MURS radios can be connected to external antennas with no limit on antenna gain (47 CFR 1315).

Increased outdoor range performance over UHF, ISM, and higher frequency radios.

At the present time there has been little promotion with regards to MURS products. There are almost no MURS data radio products for FCC Part 95 operation. As a result the VHF band may be much clearer than other license free bands.

Data may be transmitted on the VHF MURS channels, and the MURS channels may be used for business and commercial applications. This type of use is not allowed by the FCC in the unlicensed UHF channels or on the 27MHz CB radio channels.

For More Information, Contact:

Raveon Technologies Corporation

2780 La Mirada Drive
Suite C
Vista, CA 92081

Phone: 1-760-727-8004

Fax: 1-760-598-8004

Email: sales@raveontech.com