



This document describes how works the 915MHz RF part of the Repeater/Supervisor system in order to show conformity to part 15-247 of the FCC rules.

The following items are detailed:

- System description
- Timing

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1. OUTPUT POWER AND CHANNEL SEPARATION OF A RADIOFREQUENCY DEVICE

The operating mode doesn't influence the output power and the channel spacing. There is only one transmitter which is driven by identical input parameters concerning these two parameters.

Channels spacing:	500 kHz
Output power (max):	500mW

A pseudo randomly ordered list of hopping frequencies (50 channels) is defined:

1, 15, 17, 4, 10, 6, 2, 11, 13, 18, 7, 12, 3, 9, 14, 5, 8, 16, 19,
20, 24, 37, 32, 30, 36, 21, 25, 31, 34, 22, 27, 35, 28, 26, 23,
33, 29, 38, 39, 43, 46, 42, 40, 47, 41, 45, 49, 50, 48, 44

2. FREQUENCY RANGE OF A RADIOFREQUENCY DEVICE

Hereby we declare that the maximum frequency of this device is:

902,75 MHz - 927,25 MHz

This is according the Core Specification (+ critical errata) for devices which will be operated in the USA.

This was checked during the Qualification tests.

Other frequency ranges (e.g. for Spain, France, Japan) which are allowed according the Core Specification are not supported by this device.

3. SYSTEM DESCRIPTION

The Repeater/Supervisor has two different and functioning modes:

- Supervisor mode connected to a PC through a wired serial link
- Supervisor mode connected to a PC through a radio frequency link

3.1. SUPERVISOR MODE CONNECTED TO A PC THROUGH A WIRED SERIAL LINK

The system consists of a master with one or more slave (1 to 200 slaves).

The master name is "Repeater/Supervisor".

There are two types of slave devices, named "GPS-COM" or "CSP-COM"

The function of the Repeater/Supervisor device (master) is to communicate with slave devices (GPS-COM or CSP-COM) to exchange data synchronously through a radio

frequency link and to send data received from the slave to the PC through the wired serial link.

When the Repeater/Supervisor device is powered on it is set on the idle state (no RX, no TX).

When the Repeater/Supervisor device receives a start command (from its wired serial link) sent by user, it starts sending a packet of synchronisation data on all channels according to the hopping frequencies table in order to synchronize the slaves.

It is important to notice that the time between master power on and reception of a start command is a random time and is not predictable.

When a slave receives synchronisation data from Repeater/Supervisor, it jumps synchronously with the master on the following channel according to the hopping frequencies table. It is synchronized with the Repeater/Supervisor.

When synchronized, Repeater/Supervisor and slaves can exchange data.

Repeater/Supervisor continues to send synchronisation data.

When Repeater/Supervisor receives data from a slave it transmits this data to the PC through the wired serial link.

The system stays on a channel during 165ms (time slot). This time slot consists of three parts:

1. Calibration channel (no TX, no RX)
2. Repeater/Supervisor data (**including synchronisation data**) transmission, slaves are in reception state (no TX). Only one frame is sent by the Repeater/Supervisor during this period.
3. Slave data transmission (**only one slave is transmitting during a time slot**), Repeater/Supervisor is in reception state (no TX). Only one frame is sent by the slave during this period.

Timing:	1- Calibration:	45ms
	2- Repeater/Supervisor transmission:	60ms (dwell time = 17,3ms max.)
	3- Slave transmission:	60ms
	Time slot:	165ms

Co-ordination of the hopping sequence to avoid simultaneous occupancy by multiple transmitters:

When synchronised with the Repeater/Supervisor, each slave has a specific number (1 to 200). That allows each slave to send data during a specific time slot depending on this number.

3.2. SUPERVISOR MODE CONNECTED TO A PC THROUGH A RADIO FREQUENCY LINK

This mode is identical to the previous mode, with the difference that a second RF module is used to transmit data to the PC on a radio frequency link instead of the wired serial link.

The second RF module is synchronised with the first RF module that is used to communicate with slaves GPS-COM or CSP-COM. The two RF modules jump synchronously on the following channel according to the same hopping frequencies table but with a fixed offset ($15 > \text{offset} > 5$).

This prevents the two RF modules to transmit data at the same time on the same channel.

The system stays on a channel during 165ms (time slot). This time slot consists on three parts:

1. Calibration channel (no TX, no RX)
2. Repeater/Supervisor data transmission to the slave through first RF module on channel X. Repeater/Supervisor data transmission to the PC through second RF module on channel Y ($X \neq Y$). **Transmissions on channel X and Y occurs in parallel.** Only one frame is sent by the Repeater/supervisor on channel X during this period and only one frame is sent in parallel by the Repeater/supervisor on channel Y during this period
4. Slave data transmission (**only one slave is transmitting during a time slot**), Repeater/Supervisor is in reception state (no TX). Only one frame is sent by the slave during this period.

Timing:	1- Calibration:	45ms
	2- Repeater/Supervisor transmission on each channel: 60ms (dwell time = 17,3ms max.)	
	3- Slave transmission:	60ms
	Time slot:	165ms

4. RECEIVER INPUT BANDWITH

The input bandwidth of the receiver is 40 kHz.

5. SYSTEM RECEIVER HOPPING CAPABILITY

There is only one hopping sequence. The Repeater/Supervisor and the slave follow this sequence. Both devices shift between Rx and Tx time slot according to the clock of the Repeater/Supervisor.

There isn't repeating of a packet. Data are sent independently of the frequency.

6. DWELL TIME

Repeater/Supervisor dwell time = 17,3ms max each 165ms.

7. EQUAL HOPPING FREQUENCY USE

During each time slot, Repeater/Supervisor is sending only frames. Next transmission event starts on the next time slot.

8. CHANNEL SEPARATION

The nominal channel spacing of the device is 500 kHz.

This was checked during the Qualification tests.