February 22, 2006

RE: JLH Labs

FCC ID: TLMSOIL1_ATCB003151 and TLMSOIL2_ATCB003188

Answers to the ATCB comments on the above referenced Application.

For the **TLMSOIL1_ATCB003151 (In-Ground Unit)**
1) Please provide information to support:
> a) Description of system receivers and how they have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and how they shift frequencies in synchronization with the transmitted signals

The receiver input bandwidth is fixed and approx 154 kHz. During reception, this input filter is continually set to target each individual channel as appropriate. An timer is continually running that times each of the frequency hops and, when appropriate, causes the radio to be tuned to the next channel. Regardless of if data is being received, when the receiver is on it is continually being tuned from channel to channel. The frequency order is determined by the pseudo-random hop table.

2) Timing information of the system and how it meets equally on the average requirements. (i.e. are all packets always the same size, does the dwell time ever change?). Please provide detailed information to understand the theory regarding timing to understand compliance. Data shows single pulse, but repetitive pulses shown would exceed 400 msec. Do dwell times change? Are they always constant, etc.?

Dwell times never change they are always constant at 390 ms. The frequency hopping schedule is always consistent regardless of traffic load, data size, frequency or interference. If a packet train were presented to the receiver, the packets would be metered out individually on the channel currently dictated by the current hop schedule and separated by random MAC delays. If a packet is scheduled to begin transmission close to the end of a hop interval (after random MAC delay has occurred), the transmitter will calculate if the transmission will complete before the next frequency change is due. If the transmission will not complete before a hop is scheduled then the packet is randomly delayed again until it will fit. Packets sent are limited to a maximum of 34 bytes so they will never fill a frequency slot.

During actual operation, the data transmitted originates from the sensor units that collect transmit data at regular intervals. A common interval is 5 minutes. After each transmission, a random delay (0-8.75 hop times) is removed from the next transmission interval in order to guarantee that over time all channels are used equally. This prevents any unwanted interaction between transmission intervals, number of channels, and dwell time from causing specific channels to be over utilized. On a macro scale, the timing of each transmission is random and therefore the channel used is random. This same logic holds true when multiple sensors units are considered together.

For the **TLMSOIL2_ATCB003188 (Pedestal Repeater Unit)**

1) Antenna appears removable on this device from photos. Please provide further information to support 15.203 for this device.

The antenna on the Pedestal Repeater Unit is soldered directly onto the circuit board and therefore is considered to be a permanently attached antenna. The user's manual cautions the end user that unauthorized modifications or changes will void the compliance with the regulatory rules and therefore void the authority to use the equipment.

2) Where is information to support:

a) description of system receivers and how they have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and how they shift frequencies in synchronization with the transmitted signals.

The receiver input bandwidth is fixed and approx 154 kHz. During reception, this input filter is continually set to target each individual channel as appropriate. An timer is continually running that times each of the frequency hops and, when appropriate, causes the radio to be tuned to the next channel. Regardless of if data is being received, when the receiver is on it is continually being tuned from channel to channel. The frequency order is determined by the pseudo-random hop table.

b) Timing information of the system and how it meets equally on the average requirements. (i.e. are all packets always the same size, does the dwell time ever change?) . Please provide detailed information to understand the theory regarding timing to understand compliance. Data shows single pulse, but repetitive pulses shown would exceed 400 msec. Do dwell times change? Are they always constant, etc.?

Dwell times never change they are always constant at 390 ms. The frequency hopping schedule is always consistent regardless of traffic load, data size, frequency or interference. If a packet train were presented to the receiver, the packets would be metered out individually on the channel currently dictated by the current hop schedule and separated by random MAC delays. If a packet is scheduled to begin transmission close to the end of a hop interval (after random MAC delay has occurred), the transmitter will calculate if the transmission will complete before the next frequency change is due. If the transmission will not complete before a hop is scheduled then the packet is randomly delayed again until it will fit. Packets sent are limited to a maximum of 34 bytes so they will never fill a frequency slot.

During actual operation, the data transmitted originates from the sensor units that collect transmit data at regular intervals. A common interval is 5 minutes. After each transmission, a random delay (0-8.75 hop times) is removed from the next transmission interval in order to guarantee that over time all channels are used equally. This prevents any unwanted interaction between transmission intervals, number of channels, and dwell time from causing specific channels to be over utilized. On a macro scale, the timing of each transmission is random and therefore the channel used is random. This same logic holds true when multiple sensors units are considered together.