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RE: JLH Labs

FCC ID: TLMSOIL1 and TLMSOIL2

Maximum theoretical duty cycle.

As stated, the receiver dwell time is 390 ms. Every 390 ms, the receiver moves on to the next channel. It is possible to return to the first channel only after 19.5 s. All data transmitted is broken into packets and slotted into each of the channels.

If the transmitter were presented with an infinite stream of data it would:

Starting from a new channel change, the transmitter would wait 50 ms prior to initiating a transmission to account for clock skew between transmitter and receiver. Additionally, a transmission will not start within 50 ms of end of the channel for the same reason. After 50 ms, it would initiate a maximum transmission of 14 ms (11 ms expected). It would then wait for an acknowledgement for at least 8 ms (assuming it arrived quickly – 14 ms for no-ack). Then it would wait a random MAC delay. This delay has a fixed component of 63 bytes times and a random component of 0 to 127 byte times. Thus the minimum theoretical delay is $63 / 19200 * 8$ s. or 26 ms. This MAC delay is included to insure other transmitters in the system have a chance to detect and idle channel and transmit their data. Thus if a transmitter were to transmit at its maximum rate, maximum length transmission (14 ms), then wait the minimum ACK time (8 ms) and the minimum MAC delay (26 ms) the transmissions would start 48 ms apart, or at t=50, 98, 156, 194, 242, 290, 338. This would result in 7 transmissions on a single channel. A channel can be visited twice in 20 seconds so the maximum transmission on a single channel in 20 seconds would be 14. This would equate to 196 ms of activity. Additionally, it is not theoretically possible the random number generator used to create the MAC delay would return 0 14 times in a row. The expected MAC delay would be 52 ms and reduce the occupancy to 10 packets per 20 seconds on any one channel.

The worst case channel occupancy of the repeater is the same as the sensor unit. If data was buffered prior to a channel change and then transmitted at a maximum rate, the occupancy would be the same as that of the sensor unit.