Date: 22nd December 2004

Gregory Czumak
Quality Manager
PCTEST Engineering Laboratories, Inc.
6660-B Dobbin Road
Columbia, MD 21045

Re: Form 731 Confirmation Number: TC4418 with FCC ID: AZ489F7012.

Dear Mr. Czumak;

Motorola Inc., 8000 West Sunrise Boulevard, Fort Lauderdale, Florida 33322, herein submits its response to your 17thDecember 2004 request for information via correspondence reference number 241217A.IHD

Q1. Please address the following requirements found in Section 15.247(a): (a) Please verify that the hopping sequence is pseudorandom,(b)Please verify that the channels are used equally on average, (c) Please verify that the receiver input bandwidth (either RF or IF) is approximately equal to the bandwidth of the transmitted signal, (d) Please verify that the receiver has the capability to hop in sequence with the transmitted signal.

R1(a): Example of a hopping sequence in data mode is a 79 hopping sequence in data mode: 40, 21, 44, 23, 42, 53, 46, 55, 48, 33, 52, 35, 50, 65, 54, 67, 56, 37, 60, 39, 58, 69, 62, 71, 64, 25, 68, 27, 66, 57, 70, 59, 72, 29, 76, 31, 74, 61, 78, 63, 01, 41, 05, 43, 03, 73, 07, 75, 09, 45, 13, 47, 11, 77, 15, 00, 64, 49, 66, 53, 68, 02, 70, 06, 01, 51, 03, 55, 05, 04 .

1(b): Equally average use of frequencies in data mode and behavior for short transmissions
The generation of the hopping sequence in connection mode depends essentially on two input values:
1. LAP/UAP of the master of the connection
2. Internal master clock
The LAP (lower address part) is the 24 LSB's of the 48 BD_ADDRESS. The BD_ADDRESS is an unambiguous number of every Bluetooth unit. The UAP (upper address part) are the 24 MSB's of the 48 BD_ADDRESS. The internal clock of a Bluetooth unit is derived from a free running clock which is never adjusted and is never turned off. For synchronization with other units only offset are used. It has no relation to the time of the day. Its resolution is at least half the RX/TX slot length of 312.5 µs. The clock has a cycle of about one day (23h30). In most case it is implemented as 28 bit counter. For the deriving of the hopping sequence the entire LAP (24 bits), 4 LSB's (4 bits) (Input 1) and the 27 MSB's of the clock (Input 2) are used. With this input values different mathematical procedures (permutations, additions, XOR-operations) are performed to generate the sequence. This will be done at the beginning of every new transmission. Regarding short transmissions the Bluetooth system has the following behavior: the first connection between the two devices is established, a hopping sequence was generated. For transmitting the wanted data the complete hopping sequence was not used. The connection ended. The second connection will be established. A new hopping sequence is generated.
Due to the fact that the Bluetooth clock has a different value the period between the two transmission is longer (and it cannot be shorter) than the minimum resolution of the clock (312.5 µs). The hopping sequence will always differ from the first one.
1(c) and (d): Receiver input bandwidth and behavior for repeated single or multiple packets

The input bandwidth of the receiver is 1 MHz. In every connection one Bluetooth device is the master and the other one is the slave. The master determines the hopping sequence (see chapter 5). The slave follows this sequence. Both devices shift between RX and TX time slot according to the clock of the master. Additionally the type of connection (e.g. single or multi-slot packet) is set up at the beginning of the connection. The master adapts its hopping frequency and its TX/RX timing according to the packet type of the connection. Also the slave of the connection will use these settings. Repeating of a packet has no influence on the hopping sequence. The hopping sequence generated by the master of the connection will be followed in any case. That means, a repeated packet will not be send on the same frequency, it is send on the next frequency of the hopping sequence.

Q2: Please address Section 15.247(g).

R2: The hands free imager supports Adaptive Frequency Hopping scheme per BT spec. V1.2. This means that the minimum number of hopping frequencies may be 20 (> 15). The maximum number of frequency hops is 79.

Q3: Please address Section 15.247(h).

R3: Co-ordination of the hopping sequence in data mode to avoid simultaneous occupancy by multiple transmitters.
Bluetooth units which want to communicate with other units must be organized in a structure called piconet. This piconet consists maximum of 8 Bluetooth units. One unit is the master the other seven are the slaves. The master co-ordinates frequency occupation in this piconet for all units. As the master hop sequence is derived from its BD address which is unique for every Bluetooth device, additional masters intending to establish new piconets will always use different hop sequences.

Please contact me at (954) 723-5793 if you require any additional information.

Sincerely,
/s/ Mike Ramnath (signed)
Manager, Regulatory Compliance
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