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Date: 28.09.2015

RE: FREQUENCY HOPPING DECLARATION  
FCC ID: 2AAVWADTS552F-01

To Whom It May Concern:

Bluetooth devices operate in the unlicensed 2.4 GHz ISM (Industrial Scientific Medical) band. A frequency hopping transceiver is used to combat interference and fading. The BT system operates in the 2.4 GHz ISM band at 2400-2483.5 MHz. The BT system uses 79 RF channels. These RF channels have centre frequencies

$2402 + k * 1 \text{ MHz}$ , where  $k = 0, \dots, 78$ .

Regulatory Range RF Channels  
2.400-2.4835 GHz  $f=2402+k*1 \text{ MHz}$ ,  $k=0, \dots, 78$

Bluetooth devices operate in the unlicensed 2.4 GHz ISM (Industrial Scientific Medical) band. A frequency hop transceiver is applied to combat interference and fading. Two modulation modes are defined. A mandatory mode, called Basic Rate, uses a shaped, binary FM modulation to minimize transceiver complexity. An optional mode, called Enhanced Data Rate, uses PSK modulation and has two variants:  $\pi/4$ -DQPSK and 8DPSK. The symbol rate for all modulation modes is 1 Ms/s. The gross air data rate is 1 Mbps for Basic Rate, 2 Mbps for Enhanced Data Rate using  $\pi/4$ -DQPSK and 3 Mbps for Enhanced Data Rate using 8DPSK. For full duplex transmission, a Time Division Duplex (TDD) scheme is used in both modes. The Bluetooth specification defines the requirements for a Bluetooth radio for the Basic Rate and Enhanced Data Rate modes

#### **BASIC RATE Modulation Characteristics**

The Modulation is GFSK (Gaussian Frequency Shift Keying) with a bandwidth bit period product  $BT=0.5$ . The Modulation index shall be between 0.28 and 0.35. A binary one shall be represented by a positive frequency deviation, and a binary zero shall be represented by a negative frequency deviation. The symbol timing shall be less than  $\pm 20 \text{ ppm}$

#### **ENHANCED DATA RATE**

A key characteristic of the Enhanced Data Rate mode is that the modulation mode is changed within the packet. The access code and packet header, as defined in the Baseband Specification, are transmitted with the Basic Rate 1 Mbps GFSK modulation mode, whereas the subsequent synchronization sequence, payload, and trailer sequence are transmitted using the Enhanced Data Rate PSK modulation mode.

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**Modulation Characteristics**

During access code and packet header transmission the Basic Rate GFSK modulation mode shall be used. During the transmission of the synchronization sequence, payload, and trailer sequence a PSK type of modulation with a data rate of 2 Mbps or optionally 3 Mbps shall be used. The following subsections specify the PSK modulation for this transmission.

The PSK modulation format defined for the 2 Mbps transmission shall be  $\pi/4$  rotated differential encoded quaternary phase shift keying ( $\pi/4$ -DQPSK). The PSK modulation format defined for the 3 Mbps transmission shall be differential encoded 8-ary phase shift keying (8DPSK). The modulation shall employ square-root raised cosine pulse shaping to generate the equivalent lowpass information-bearing signal  $v(t)$ . The output of the transmitter shall be a bandpass signal



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