

TECHNICAL DESCRIPTION OF SPREAD SPECTRUM SYSTEM

The Bluetooth standard describes a frequency hopping spread spectrum system (FHSS). The frequency hopping sequence is governed by one unit known as the master in any group of units communicating together. The group is known as a piconet, and all units other than the master are known as slaves. The master determines the pseudo random hopping sequence and slave devices follow this sequence. As the master unit generates the hopping sequence internally and without reference to any external information, there is no co-ordination with any other Bluetooth or other FHSS systems to avoid simultaneous occupancy of hopping channels. Bluetooth uses re-transmission, interleaving and coding techniques to mitigate against lost transmissions when simultaneous occupancy of a channel cause loss of data. The pseudo random hopping sequence is initialised at the start of a new connection between master and slave to a random frequency (hopping channel), and the hopping sequence is generated such that an equal time is spent in each of 79 channels throughout the duration of the connection. A detailed description of the frequency bands, frequency-hopping system, and modulation scheme are included in reference D, type Operational Description, file BT_Spec_extracts.pdf which contains extracts from Bluetooth Core Specification 1.0B. Measurements to confirm the FHSS operation are contained in reference I (FCC exhibit type Test Report, which contains a test report by Cetecom ICT services.

During the normal connection state in the Bluetooth protocol as described above, the operation meets the description of a FHSS system under 15.247(a)(1) as the number of hopping frequencies is greater than 75. However, in two specific modes (inquiry and page) of the Bluetooth protocol, 32 frequencies only are used. These two modes are used for short periods only to search for and connect to other devices in range. However during these

modes fixed access codes are used in the header part of the transmitted packet, and other devices which are available for connection (in modes inquiry scan and page scan) search for these codes using correlation techniques. Therefore, during inquiry and page modes the system operation can be viewed as part Direct Sequence Spread Spectrum (DSSS) and part FHSS (as hopping is still occurring over 32 hops). These modes meet the description of a Hybrid system under 15.247(f). To qualify as a hybrid system additional DSSS and FHSS measurements for inquiry and page modes are presented in the test report.

Minimum processing gain for the combined DSSS and FHSS operation measurements are described in the test report.

To support both DS and FH operation spurious emissions measurements, conducted under 15.247(c) and radiated as required under parts 15.205(a) and 15.209(a) are included in the emissions test report.

The antenna supplied with the unit is a short monopole of 1/4 wavelength with a nominal gain of 0 dBi. The antenna is an integral part of the sleeve.

The peak power of the BC01 transceiver is approximately 0 dBm, and the maximum EIRP is approximately 0 dBm.