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12 July 1999

To whom this may concern

FCC ID: IMRWLPCE24H

Re: Questions on processing gain, EA94181 Corr. Ref. Number 8361

1. For 1 and 2 Mbp/s DQPSK modulation using a fixed spreading sequence the symbol rate is 1 MSymbol/s. The symbol length is 11 chips. Each chip duration is 1/11 uS. A symbol duration is 1 uS.

   The chip/symbol rate is 11.

   The theoretical process gain is 10*LOG(11) = 10 dB.

2. For 5.5 and 11 Mbp/s CCK where the spreading sequence is a function of the transmitted data, the symbol rate is 8/11 MSymbol/s. The symbol length is 8 chips. Each chip duration is 1/11 uS. A symbol duration is 8/11 uS.

   The chip/symbol rate is 8.

   The theoretical process gain is 10*LOG(8) = 9 dB. Due to the fact that only 256 code sequences out of the 65536 code sequences that are available are used, there is coding gain. Therefore the processing gain of a CCK system consists of spreading gain and coding gain together. As such a CCK system does meet the FCC requirement for a process gain of minimal 10 dB.

   See below our reply that we've sent to the FCC last time for the previous certification, this answer

   Explanation:

   The Lucent High Speed modulation is compliant to draft standard extension IEEE 802.11b for 5.5 and 11 MBit/s signaling rates. For this modulation technique the Symbol length is 8 Chips (1 Symbol duration equals 8/11 uS). However, the 8 Chips are not a fixed spreading sequence as is the case for the 1 and 2 MBit/s modulation technique. These 8 Chips, applied in a QPSK modulation, use 256 unique patterns out of the 65536 different possible patterns, whereby each pattern represents a specific data sequence (4 or 8 bits). Thus this type of modulation introduces Coding Gain, since only 256 patterns are used out of 65536 possible combinations.

   Therefore it can be concluded that the system employs Coding Gain in addition to Spreading Gain.

   The Processing Gain of the system is taken as the combined result of Coding and Spreading Gain, so a Processing Gain of 10 dB can be met with 8 Chips per Symbol.

   Lucent has shown by a CW jammer margin test, that a SIR of 10 dB can be met, while meeting the system specified BER. It is our understanding that this is compliant with the FCC ruling.

   Therefore the Revision B test report shows that the Lucent product, operating at 1, 2, 5.5 and 11 Mbit/s meets a Processing Gain of at least 10 dB, under the conditions as specified by the FCC.