IEEE 802.11
Wireless Access Method and Physical Specification

Title: **Summary of DS/GFSK High Speed 2.4 GHz PHY**

Date: November 10, 1997

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Review of DS/GFSK Proposal

DS/GFSK addresses key requirements

- Interoperability with both FH and DS
  - Hopping and non hopping modes, hopping based on FH PHY sequences
- Interference immunity in ISM band
  - GFSK is most bandwidth efficient of binary modulations (1.1 * chip rate)
  - Hopping over 8 channels in 5 Mbps mode, 4 in 10 Mbps mode
- Multipath robustness
  - Good capture effect of FSK + DS spreading
- Good sensitivity performance
  - 5 Mbps mode same as 1 Mbps FH, 10 Mbps 3 dB worse
- Low speed preamble for interoperability, high speed for throughput
  - Both possible with fast acquisition of GFSK
- Low cost and need for architectural options
  - Constant amplitude, more efficient power amplifier

High Speed PHY Proposal

A succinct summary of the proposed high speed DS PHY is as follows:

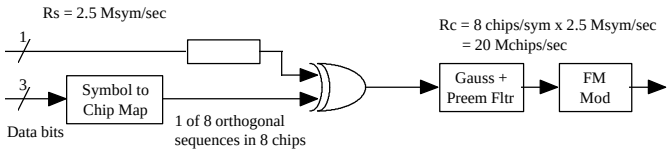
- DS spreading: 4 bits/symbol and 8 chips/symbol bi-orthogonal Walsh codes
- Modulation: Binary GFSK with deviation h=0.7; 1.5 dB preemphasis
- Data rates: 1.25 Msym/sec (5 Mbps) and 2.5 Msym/sec (10 Mbps)
- Chipping rates: 10 Mcps and 20 Mcps
- Bandwidths: 11 MHz and 22 MHz
- Channelization: 8 channels w/10 MHz spacing, 4 channels with 20 MHz spacing

DS Spreading Format

The DS spreading formats used by Harris and Micrilor uses simple yet effective bi-orthogonal Walsh codes

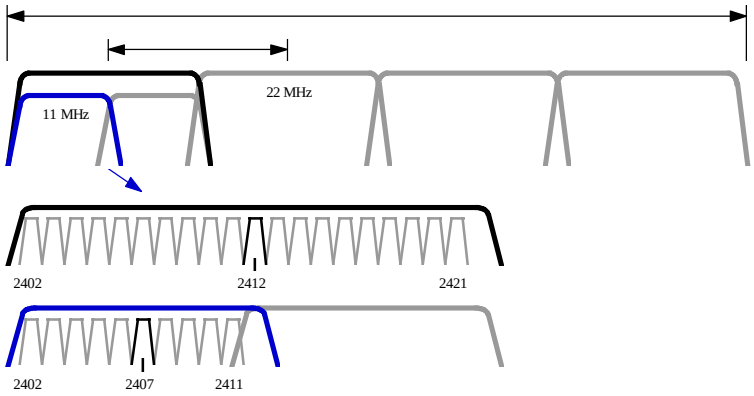
The 8 chips per symbol used by Harris is more bandwidth efficient which is crucial to satisfy the interference fighting channelization mentioned earlier

The 4 bits/8 chips per symbol used at 1.25 (or 1.375) Msps and at 2.5 Msps would produce 5 and 10 Mbps at a chipping rate 10 and 20 Mcps



Hopping and interoperability with 1&2 Mbps FH PHY

The hopping can be synchronized to interoperate with the 1 and 2 Mbps FH PHY



Interoperability with FH PHY

Interoperability preamble using FH 1 Mbps with rate switch sync period

HS preamble mode for max throughput and operation in HS capable units only environments

- HS preamble is -16 µs including time for diversity selection

In either mode, CCA on all 1 MHz channels in wideband channel possible at reduced sensitivity

Full sensitivity on 1 MHz channel associated on with digital implementations

Low cost, many architectural options

An FSK system has been the lowest cost due to the simplicity, inherent robustness, and use of nonlinear components.

There are many options and design optimizations which will allow manufacturers to optimize for various applications and price/performance tradeoffs.

Digital implementation with parallel demod, subband tuning for 1 MHz channel requires only additional gates in ASIC

1 MHz SAW for full selectivity performance 1/2 Mbps only mode, tune synthesizer to channel

Existing DS RF and IF chip sets may also be used

Intellectual property - Walsh codes and binary GFSK on wireless is probably not patentable any more.