IEEE 802.11 DSSS PHY

Characteristics:
- 2.4 GHz ISM band (FCC 15.247)
- 1 and 2 Mbit/s datarate (DBPSK and DQPSK modulation)
- > 10 dB processing gain
- spreading sequence 11 chip Barker sequence

Operating frequency range
- 2.4 to 2.4835 GHz
- 11 overlapping channels with centerfrequencies from 2412 MHz to 2462 MHz with 5 MHz spacing
Spreading sequence

- Each symbol is spreaded with 11 chip Barker sequence
- \(+1, -1, +1, +1, -1, +1, +1, -1, -1, -1\)
- chipping rate 11 MHz
- Chipping rate of 11 MHz over 1 MHz symbols gives a processing gain of theoretical 10.4 dB

Datarates and Modulation

- 1 Mbit/s Differential Binary Phase Shift Keying
- 2 Mbit/s Differential Quadrature Phase Shift Keying
- Symbol rate is 1 MHz.
Encoding tables

<table>
<thead>
<tr>
<th>Bit Input</th>
<th>Phase Change (+jo)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>π</td>
</tr>
</tbody>
</table>

Table 1, 1 Mb/s DBPSK Encoding Table

<table>
<thead>
<tr>
<th>Dibit pattern (d0,d1)</th>
<th>Phase Change (+jo)</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>0</td>
</tr>
<tr>
<td>01</td>
<td>π/2</td>
</tr>
<tr>
<td>11</td>
<td>π</td>
</tr>
<tr>
<td>10</td>
<td>3π/2 (-π/2)</td>
</tr>
</tbody>
</table>

Table 2, 2 Mb/s DGPSK Encoding Table

Scrambler

- All bits are being scrambled with:

Scrambler Polynomial; G(z)=Z^7 + Z^4 + 1
Transmit Power level

- The maximum allowable output power is 1000mW according to FCC 15.247
Spurious Emissions

- The DSSS PHY shall conform with in-band and out of band spurious emissions as set by regulatory bodies
- For USA: refer to FCC 15.247, FCC 15.205 and FCC 15.209

Antenna Gain

- Not defined in standard, but should be conform FCC 15.247
Carrier suppression

- Carrier suppression shall be at least 15 dB below the peak \( \frac{\sin(x)}{x} \) power spectrum