# IEEE 802.11
## Wireless Access Method and Physical Layer Specification

**Title:** **IR PHY Baseband Template**

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### General Specifications

| Parameter | Value | Comments |
|---|---|---|
| Spectrum Occupancy | DC to 5 MHz | Baseband |
| Data Rate | 1 and 2 Mbps | |
| Wavelength | 850 - 950 nm | |
| Modulation Method | PPM | 16-PPM for 1 Mbps<br>4-PPM for 2 Mbps |
| Number of Channels | 1 | |
| Propagation Mode | Diffuse | Non aimed transceivers |

### Transmitter Specifications

| Parameter | Value | Comments |
|---|---|---|
| Output Peak Power | 2.0 W ± 20% | @900 nm |
| Pulse Format | | See fig. 3 doc:94/96 |
| • tw (pulse width) | 250 ns ± 10 ns | 1 and 2 Mbps |
| • tr (rise time) | 40 ns (max) | 10 to 90% |
| • tf (fall time) | 40 ns (max) | 10 to 90% |
| • tj (jitter) | 10 ns (max) | absolute deviation |
| Emitter Radiation Pattern | TBD | |

### Receiver Specifications

| Parameter | Value | Comments |
|---|---|---|
| Sensitivity (BER=$10^{-9}$) (max) | -47 dBm/cm$^2$ (1 Mbps)<br>-41 dBm/cm$^2$ (2 Mbps) | -10 dBm/cm$^2$ ambient light |
| Minimum Dynamic Range | 30 dB | On the irradiance at the receiver detector |
| Minimum Field of View | 150 | At the physical limit |
| Frame Error Rate (FER) | ≤ 4 ∞ $10^{-5}$ | MAC frame = 512 octets |
| Carrier Sense out to MAC | ≤ 12 µs | After the preamble start |
| TX-RX turnaround time | TBD | |
| RX-TX turnaround time | TBD | |
| IR silence to Carrier Sense deassert | 16 µs | In case of EFD failure |

### Frame Specifications I

| Parameter | Value | Comments |
|---|---|---|
| Preamble | 57 - 73 time slots | See "Frame specs. II" |
| Start of Frame Delimiter | 4 time slots | See "Frame specs. II" |
| Data Rate Field | 3 time slots | See "Frame specs. II" |
| DC Level Adjustment | 32 time slots | See "Frame specs. II" |
| MAC Frame | TBD | Integer number of octets |
| End of Frame Delimiter | 16 time slots | See "Frame specs. II" |

## Frame Specifications II

| Parameter | Format | Comments |
|---|---|---|
| Preamble Format | 010101...0101010 | 1 and 2 Mbps |
| SFD Format | 1001 | 1 and 2 Mbps |
| DC Level Adjustment Field Format | 2 ∞ symbol '8': | 1 Mbps / 16-PPM |
| | 8 ∞ symbol '2': | 2 Mbps / 4-PPM |
| Data Rate Field Format | 000 | 1 Mbps |
| | 001 | 2 Mbps |
| | other formats: | TBD |
| EFD Format | 0000011011011011 | 1 and 2 Mbps |

## PPM Mapping Table

| 4-PPM | 16-PPM | PPM Symbol |
|---|---|---|
| 00 | 00**00** | 1 - 000000000000**0001** |
| 01 | 00**01** | 2 - 000000000000**0010** |
| 10 | 00**10** | 3 - 000000000000**0100** |
| 11 | 00**11** | 4 - 000000000000**1000** |
| | 0100 | 5 - 0000000000010000 |
| | 0101 | 6 - 0000000000100000 |
| | 0110 | 7 - 0000000001000000 |
| | 0111 | 8 - 0000000010000000 |
| | 1000 | 9 - 0000000100000000 |
| | 1001 | 10 - 0000001000000000 |
| | 1010 | 11 - 0000010000000000 |
| | 1011 | 12 - 0000100000000000 |
| | 1100 | 13 - 0001000000000000 |
| | 1101 | 14 - 0010000000000000 |
| | 1110 | 15 - 0100000000000000 |
| | 1111 | 16 - 1000000000000000 |