# BRAN#11 PHY Decisions & Issues to Resolved with 802.11

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## Outline

- Decisions on Baseband Parameters
- Decisions on Carrier Spacing

## Decisions on baseband Parameters-1

- FFT size:
  - 64 points
- The number of used sub-carriers:
  - 48
- The guard interval:
  - 800 ns
- Sub-carrier modulation:
  - BPSK, QPSK, 16QAM, possibly 8PSK and optionally 64 QAM
- Demodulation in sub-carriers:
  - Coherent





## Decisions on baseband Parameters-2

- FEC:
  - A mandatory convolutional mother code with constraint length 7 and rate ½
  - Required code rates ½, ¾ obtained by puncturing
  - Code rate 2/3 will possibly be needed.
  - Code rates 1/3 or ¼ might be needed to provide more protection for short control PDUs.
  - The code rates shall be selected in such a way that each PDU should be mapped into an integer multiple of OFDM symbols current assumption on data PDU size: 54 bytes.
  - Optional coding schemes might be added to the specification later (not in the first stage).

## Decisions on baseband Parameters-3

- Interleaving:
  - Not decide yet, if the interleaving is to be done OFDM symbol wise or PDU wise.
  - More investigation are needed. To be discussed and maybe decided at the interim meeting of the PHY TS Rapporteur Group on December 11.
- Oscillator accuracy:
  - +/- 20 ppm
- Spectral shaping:
  - Same approach as IEEE 802.11
    - No time windowing specification
    - constellation accuracy test specifications in combination with spectral mask





## Decisions on baseband Parameters-4

- Training sequence:
  - Three different preambles needed, due to the centralised DLC protocol applied to HIPERLAN/2
    - One for the beginning of MAC frame could have the same structure as the first part of the training sequence proposed for IEEE 802.11
      - AGC symbol(s), the symbols for coarse frequency and timing estimation and the long symbol for fine frequency offset and channel estimation.
      - no need for the training part SIGNAL, because the signalling of PHY mode will be performed in other part of the protocol.
    - One for each downlink burst and one for each uplink burst could have the same structure as the long symbol T1 in IEEE 802.11 proposal.
    - Not clear:
      - symbols for coarse frequency offset estimation and timing are needed for downlink and uplink bursts
      - AGC symbol(s) in uplink bursts needed if power control is used in uplink.

## Decisions on baseband Parameters-5

- Phase tracking:
  - A phase tracking scheme is needed due to coherent demodulation.
  - No need for pilot symbols to perform phase tracking
    - Assessment based on initial results of some members of the PHY TS Rapporteur Group
  - But more results needed to make a final decision (to be discussed at the PHY TS interim meeting in December)
    - a pilot symbol aided scheme versus a decision directed one





## Decisions on Carrier Spacing-1

- 150 MHz bandwidth currently available in Europe for HIPERLAN
  - in the range 5.15 – 5.3 GHz
  - less than –33 dBm/100kHz emitted spurious power outside this band is allowed below
    - Assuming a transmit power of 200 mW, a 35 dB attenuation necessary at both edges of the HIPERLAN frequency band.
    - Simulation results show that the spacing of the outmost channels from the band's edges have to be in the order of 22 MHz.
    - nonlinear model for a class AB power amplifier with an out put backoff of 5.5 dB.

## Decisions on Carrier Spacing-2

- the number of radio channels achieved by an 18 MHz channel spacing is equal to that achieved by a channel spacing of 20 MHz.
  - six radio channels could be obtained in current HIPERLAN band
  - distance of the outmost channel from each band edge is 25 MHz
  - relaxed requirements on the PA backoff.
  - with HIPERLAN/2 PA models, the outmost channels in UNII band need even more distance from the band edges if practical PA backoff values used.
  - with 20 MHz channel spacing, 8 radio channels for the 200 MHz band starting at 5.15 GHz (lower and middle U-NII bands) achievable.
  - in addition enough spacing for the outmost channels from the band edges available





## Decisions on Carrier Spacing-3

- No decision on the sampling rate which determines the bit rate supported in a radio channel.
- Two different alternatives
  - a rate of 20 Msamples/s
    - results in a reduced adjacent channel interference (ACI)
    - might be translated in an increased overall system capacity.
  - a higher sampling rate (e.g. 22 Msamples/s)
    - increased instantaneous bit rate in one radio channel
    - but also increased ACI that might be translated in degradation of the overall system throughput
    - some mixed frequency products making the RF implementation more complex
- Decide on all issues in the PHY interim meeting in December 11