IEEE P802.11

Wireless Access Methods and Physical Layer Specifications

TITLE: **Proposal For The Specification Of: The FH Transmitter Spectrum Mask For 1Mb/sec 2GFSK and 2Mb/sec 4GFSK FH PHYs**

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ABSTRACT

This paper is a follow up to the recommendations for the wording for the transmitter modulation mask for the FH PHYs. It is intended as assistance for the editors and to help to define the measurement conditions.

1. INTRODUCTION

This sole intent of the transmit spectrum mask is to stop the FH transmitters interfering with other systems at different frequencies. This requires the measurement of PEAK power in the spectrum mask, not time averaged. It was agreed in the last FH meeting that the transmitter should be tested dynamically, i.e. keyed on and off as the transmitter on/off transients could be significant. Transmitter transients, if not controlled will reduce the maximum number of users in a given area.

2. THE TEXT

Here is the proposed text plus explanation shown in italics within square brackets *[erter]*.

[*Our intent from previous discussions is that we wish the emissions from transmitters in adjacent channels to be -40dBc for +/-2 channels away and <-60dBc for >+/-2 channels away, which was closed at a previous meeting. The numbers are for the peak power we would see in a 1MHz bandwidth, i.e. the power seen in an FH receiver. This is to accommodate the AM transients and the modulation mask. There are two issues, one how we measure it and secondly what is the transmitter doing when it is measured as the length of the data packet and repetition frequency of sending the packets all makes a difference. I propose that*]

Transmitter should pass this SPECTRUM mask test (test method to be determined) if it switched between transmit and then receive, on a single frequency. The duty cycle between Tx and Rx is nominally 50% and the transmit packet length is nominally 400usec.

[*The packet length is nominally 400usec as the minimum packet length is likely to be of the order of 48bytes. This is pretty much the worse case so is the design target. Note we need to keep it transmitting on a single frequency.. For the measurement technique there are a number of issues:*

Resolution bandwidth of the spectrum analyser/measuring device
Detector type used
Average or maximum values

For the resolution bandwidth, this needs to be sufficiently high to capture the energy, but not too wide e.g. 1MHz as the filter skirts in the analyser will detect the power in the adjacent channel. A suitable compromise resolution bandwidth is 100kHz. The adjacent channel power is the sum of the powers measured in the 100kHz resolution bandwidth. This can be done automatically on most modern spectrum analysers. This adjacent channel power is compared to the peak power measured in the 1MHz wanted band measured using the same technique.

The detector type is critical. A sampling detector will average the measurement in a particular time window. therefore with a 100kHz resolution bandwidth, we will average over of the order of 10usec and miss any AM transients. Therefore we need to use a peak detector. When collecting the data, is a time average or maximum hold used. Maximum hold is the obvious choice as the receiver we are trying to protect with this specification will see the peak power and not worry about the average. Note average power is difficult as the transmitter is off half the time and the AM transient have a duration of say 1usec in 400usec. So the proposed measurement wording is:]

The adjacent channel power is sum of the power measured in a 1MHz band, shall be as a function of channel offset N from the assigned transmitter channel M below the transmitter power by:

N=M+/-2	**-40dB**
N>M+/-2	**-60dB**

The transmitter power in the sum of the power in a 1MHz channel centred on the transmitter centre frequency. The adjacent channel power and the transmitter power for this section of the specification shall be measured with a resolution bandwidth of 100kHz, with a peak detector and the measurement device set to maximum hold.

Within the frequency band of 2.4GHz to 2.4835GHz. three failures are permitted, providing they a <-50dBc.

[Note the specification is in dBc, this means the higher powered transmitters are relatively more likely to interfere with other systems]