IEEE 802.11
Wireless LANs

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| PHY Evaluation Methodology Simulation Calibration |
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Abstract

This document proposes a procedure simulation calibration for the evaluation of PHY proposals in TGbb.

# Introduction

# System model

## 802.11a

The block diagram in Figure XX shows the full system model between the PHY TX and PHY RX.



**Up/Downsampling:**

The baseband signal should be upsampled by 50 to simulate the analogue blocks of the system. For this block an ideal filter should be used.

For the downsampling, a low order (<4) analogue filter shall be modeled. The line below can be used to generate such a filter in matlab:

*[b, a] = butter(4, 0.01);*

**Up/Downconversion:**

The baseband signal shall be upconverted by:

*BW/2 + offset*

The optimal offset should be experimentally determined for each standard. For the system shown above, the optimum offset was 1.5MHz.

# PHY evaluation methodology

## Scenarios

Proposals for PHY contributions shall be evaluated against simulation scenarios described in TGbb doc. 11-18/1423r8 which is based on the TGbb usage model doc. 11-18/1109r5 after selecting the primary usage models. Simulations shall implement the TGbb channel modeling described in doc. 11-18/1582r4. TGbb has made available a number of channel impulse responses that can be downloaded from Mentor in doc. 11-18/1603r1.

Choice of process:

* Simulation scenarios
	+ AWGN
	+ Industrial Wireless
	+ Enterprise
* Parameters to be used
	+ Copy corresponding PHY parameters from doc. 11-18/1423r8 for the relevant simulation environments.
* Analytical front-end model
	+ Convolute the channel filters describing the analogue front-end model defined in doc.11-19/0087r1 with the following Channel Impulse responses:
		- Industrial Wireless Figure 28(g), CIR D7 (all LEDs transmit simultaneously)
			* Go to doc. 11-18-1603r1 \ simulation scenario enterprise \ overall cirs \ Optical CIRs \ D7
		- Enterprise Figure 15(a), CIRs D1 and D2
			* Go to doc. 11-18-1603r1 \ simulation scenario-enterprise conference room \ individual cirs \ Optical cirs \ S1-D1 and S1-D2 and S3-D1 and S3-D2

Simulator calibration:

The following basic PHY shall be simulated for all selected CIRs and presented with the results of a new proposal.

DCO-OFDM using 802.11a frame format. Full buffer with following selected parameters.

20MHz baseband

64 subcarriers

52 occupied,

Convolutional Code from 802.11a

Code Rate ½

MCS = QPSK

To verify the simulation model, the SNR should be measured at the PHY RX, with 0 noise added at the AWGN block. Shot and thermal noise should be added.

If the measured SNR is reasonable (>40dB?), PER vs. SNR at the output of the AWGN block to be measured for at least 100,000 packets.