IEEE P802.11
Wireless LANs

TGa PHY Performance Comparison Submission Template

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Introduction

This document organizes the items which need to be delivered by submitters of PHY proposal by February 23, 1998 into a template, in order to facilitate enable apples-to-apples comparison between the performances of different PHYs without digging through data brought in incompatible forms.

The criteria are derived from document 97/96r2 of Nov 97. A new comparison criterion of robustness with respect to phase noise is added (details on how to simulate phase noise are in this document).

General Description

Parameter	Value(s)
Data Rates Supported	list all, specify which are mandatory
Channel Spacing	
Center Frequencies	list for lower, middle and upper U-NII bands
Power Levels	list per channel
Sensitivities	
CCA threshold	
Clock Rate accuracy	
Carrier Frequency accuracy	
Waveform implementation accuracy specification method	
Power Backoff in RF PA	per data rate
Implementation Complexity	gates, MIPS, mW @ given technology etc. as judged appropriate by proposer

Per-Rate Feature Summary

Parameter	Rate A		Rate Z
Data rate			
ECC method			
Interleaving method			
Suggested minimal sensitivity			
Suggested Co-Channel rejection			
Suggested Adjacent Channel rejection			
Suggested Alternate Channel rejection			
Implementation Accuracy			

Performance

If the receiver implementation complexity can be traded for performance, bring data for typical (simpler?) implementation and for extended (possible, but higher end) implementation.

Performance in Noise and Multipath

Attach graphs of PER vs. Eb/N0, for

1) AWGN channel
2) Exponential Profile Rayleigh Fading channel for T_{RMS} = 25 nsec
3) Exponential Profile Rayleigh Fading channel for T_{RMS} = 50 nsec
4) Exponential Profile Rayleigh Fading channel for T_{RMS} = 100 nsec
5) Exponential Profile Rayleigh Fading channel for T_{RMS} = 150 nsec
6) Exponential Profile Rayleigh Fading channel for T_{RMS} = 250 nsec
7) Attach graph of PER vs. T_{RMS} without additive noise, covering a range of 10 nsec to 500 nsec

The carrier frequency shall be offset by the maximum allowed amount (include Tx and Rx sides) according to the proposed text. The PER data will include the intended acquisition procedure performance.

Bring the graphs for each data rate supported by the proposed PHY, for packet lengths of 64 and 1000 bytes.

Per-Rate Performance Summary

If the receiver implementation complexity can be traded for performance, bring data for typical (simpler?) implementation and for extended (possible, but higher end) implementation.

Parameter	Rate A		Rate Z
Eb/No at PER=10%, AWGN, 64b			
Trms at PER=10%, noise free, 64b			
Eb/No @ 20%, with Trms @ 10%, 64b			
Eb/No at PER=10%, AWGN, 1000b			
Trms at PER=10%, noise free, 1000b			
Eb/No @ 20%, with Trms @ 10%, 1000b			
CCI immunity [dB]			
ACI immunity [dB]			
CW jammer immunity [dB]			
Narrowband Gaussian noise immunity [dB]			
Phase noise tolerance, (BW=50 kHz), rad^2 [dBc] at which PER becomes 10%			

Timing and Overhead related parameters

Attach verbal explanation of the assumptions taken for each parameter

Attribute	Suggested Value
aSlotTime	
aCCATime	
aRxTxTurnaroundTime	
aTxPLCPDelay	
aRxTxSwitchTime	
aTxRampOnTime	
aTxRFDelay	
aSIFSTime	
aRxRFDelay	
aRxPLCPDelay	
aMACProcessingDelay	
aTxRampOffTime	
aPreambleLength	
aPLCPHdrLength	
aMPDUDurationFactor	for each mode, if applicable
aAirPropagationTime	
aCWmin	
aCWmax	

Appendix: Phase noise generation for a simulation

The phase noise process to be used for comparison of robustness with respect to it was agreed to be a white Gaussian process filtered with single-pole low pass filter. The rationale for using this model is a typical behaviour of phase-locked microwave oscillators. The model ignores the phase noise contribution of the reference crystal oscillator, which typically affects very low offset frequencies and is easily tracked by carrier tracking loops in the receiver. The corner frequency of the LPF was agreed to be 50 KHz, assuming it is a representative value for a large-step synthesizer.

a) generate initial sample of the process. This takes account for infinite past not being simulated.

$$x_0 = N(0,1)$$

b) Assume simulation time step T_s. Generate next samples of a unity-variance LPF process with an IIR approximation to LPF:

$$x_{k+1} = x_k + \alpha(\beta N(0,1) - x_k)$$
$$\alpha = 2\pi F_c T_S$$
$$\beta^2 = (2/\alpha) - 1$$

c) convert the unity-variance LPF process to phase noise with a chosen φ_{RMS} by computing $\exp(j\varphi_k) = \exp(j\varphi_{RMS} x_k)$. Multiply the complex transmitted signal with the phase noise process.

d) simulate with several values of φ_{RMS}. Search for a value causing PER=10%.