IEEE P802.11  
Wireless LANs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Link level Simulation Assumption Updates to Evaluation Methodology | | | | |
| Date: September 15, 2015 | | | | |
| Authors and Contributors | | | | |
| Name | Company | Address | Phone | Email |
| Kome Oteri | InterDigital | 9710 Scranton Road,  San Diego, CA, 92121 | 858 210 4826 | Kome.oteri at interdigital.com |
| Rui Yang | InterDigital |  |  |  |
| Xiaofei Wang | InterDigtial |  |  |  |
| Robert Olesen | InterDigital |  |  |  |
| Daewon Lee | Newracom |  |  |  |
| Minho Cheong | Newracom |  |  |  |

# Abstract

This document describes updates to the evaluation methodology document [1] that clarify link level simulation assumptions for TGax. The assumptions are updated from the TGac functional requirements and evaluation methodology document [2].

**Revision History**

|  |  |  |
| --- | --- | --- |
| **Date** | **Version** | **Description of changes** |
| 09/15/2015 | 0.1 | Document created to capture motion for straw poll agreement in 11/15-1056r1 [3] |
|  |  |  |

.

# PER Simulation Description

# *text omitted*PHY Link Level Simulator Assumptions

**PHY channel model**

Channel models defined in 802.11ax channel model document [4] shall be used.

**PHY impairments**

PHY impairments are updated from ones described in 802.11ac functional requirements and evaluation methodology document [2].

*Note: parameters placed within curly brackets are TBD for TGax.*

Table 1: PHY impairments

|  |  |  |  |
| --- | --- | --- | --- |
| **Number** | **Name** | **Definition** | **Comments** |
| IM1 | PA non-linearity | Simulation should be run at an oversampling rate of at least 2x.  To perform convolution of the 2x oversampled transmit waveform with the channel, the channel may be resampled by rounding each channel tap time value to the nearest integer multiple of a sample interval of the oversampled transmit waveform.  Use RAPP power amplifier model as specified in document 00/294 with p = 3. Calculate backoff as the output power backoff from full saturation:  PA Backoff = ­10 log10(Average TX Power/Psat).  Total TX power shall be limited to no more than {17 dBm}.  Disclose: (a) EIRP and how it was calculated, (b) PA Backoff, and (c) Psat per PA.  Note: the intent of this IM is to allow different proposals to choose different output power operating points.  Note: the value {Psat = 25dBm} is recommended. | Unchanged from 802.11ac |
| IM2 | Carrier frequency offset | Single-user simulations for all comparisons except Offset Compensation shall be run using a fixed carrier frequency offset of {–13.675 ppm} at the receiver, relative to the transmitter. The symbol clock shall have the same relative offset as the carrier frequency offset. Simulations shall include timing acquisition on a per-packet basis.  Downlink multi-user simulations for all comparisons except offset compensation shall be run using a fixed carrier frequency offset selected from the array [*N(1) ,N(2),……,N(16)* ], relative to the transmitter, where *N(j)* corresponds to the frequency offset of the *j*-th client and is randomly chosen from {[-20,20] ppm} with a uniform distribution.  Uplink multi-user simulations for all comparisons except offset compensation shall be run using a fixed carrier frequency offset selected from the array [*N(1) ,N(2),……,N(16)* ], relative to the receiver, where *N(j)* corresponds to the frequency offset of the *j*-th client and is randomly chosen from {[-2,2] KHz} with a uniform distribution. | Unchanged from 802.11ac |
| IM3 | Phase noise | The phase noise will be specified with a pole-zero model.    {PSD(0) = -100 dBc/Hz}  {pole frequency *fp* = 250 kHz}  {zero frequency *fz* = 7905.7 kHz}  Note, this model results in PSD(infinity) = {-130 dBc/Hz}  Note, this impairment is modeled at both transmitter and receiver. | Unchanged from 802.11ac |
| IM4 | Noise figure | Input referred total noise figure from antenna to output of the A/D will be {10dB}. | Unchanged from 802.11ac |
| IM5 | Antenna Configuration | The TGn antenna configuration at both ends of the radio link shall be a uniform linear array of isotropic antennas with separation of one-half wavelength, with an antenna coupling coefficient of zero.  The TGac antennas can be assumed to either be all vertically polarized or a mix of vertical and horizontal polarizations or dual polarization at ±45 degree, as specified in the TGac channel model addendum document [5]  In TGax, an outdoor channel model is added. The outdoor channel models for AP to STA, STAs to AP, and STA to STA are implemented by choosing different height of antennas [4]. | Mix of vertically and horizontally polarized antennas or dual polarization at ±45 degree is also considered for TGax devices.  Added information from TGax channel model document on antennas for outdoor channel |
| IM6 | Fluoroscent Light Effects | The fluoroscent light effects specifed in the TGac Channel model shall not be considered for the simulation scenarios. | Unchanged from 802.11ac |
| UM7 | Timing | Uplink Multi-user simulations shall be run using a fixed timing offset selected from the array [*N(1) ,N(2),……,N(16*) ], where *N(j)* corresponds to the time offset of the *j*-th client transmission with respect to a common time reference and is randomly chosen from {[-100,100] ns}  with a uniform distribution | Unchanged from 802.11ac |

**Comparison criteria**

1. PER vs. SNR curves
2. all MCS’s
3. Simulate all of channel models
4. Simulation may include:
5. updated PHY impairments
6. timing acquisition on a per-packet basis
7. preamble detection on a per-packet basis

# PHY System Simulation Detailed Description

*Text omitted*

## References for Simulation Assumptions

1. **11-14-0571-10-00ax-evaluation-methodology**
2. **11-09-0451-16-00ac-tgac-functional-requirements-and-evaluation-methodology**
3. **11-15-1056-01-00ax-clarifying-link-level-simulator-assumptions**
4. **11-14-0882-04-00ax-tgax-channel-model-document**
5. **11-09-0308-05812-00ac-tgac-channel-model-addendum-document**

# Motion

Do you agree to modify the Evaluation Methodology document IEEE 802.11-15/571r9 as provided in IEEE 802.11-15/01176r0?

Y:

N:

A: