

NetSim v9.1 – Wireless LAN 802.11 a / b / g / n / ac and e

- **PHY Layer**
 - Propagation model covers Line-of-sight loss, fading and shadowing
 - BER calculation by looking up BER-SNR tables for different modulation schemes
 - SNR is got by calculating received power based on Tx power plus antenna gains less channel losses per propagation
 - Co-channel interference modelling (SNR Based)
- **MAC Layer**
 - Based on 802.11 standard
 - DCF based channel access using CSMA / CA
 - RTS – CTS operation based on RTS Threshold
 - Rate Adaptation
- **Network Layer**
 - IPv4
- **Transport Layer**
 - UDP, TCP (Old Tahoe, Tahoe, Reno, New Reno)
- **Application Layer**
 - File Transfer Protocol (FTP)
 - Database Application
 - Voice traffic
 - Voice codecs include G.711, G.723, G.729, GSM – FR, GSM EFR
 - CBR service
 - VBR services
 - Silence suppression via deterministic model and DTMC
 - Video Traffic
 - Continuous Normal VBR
 - Continuous State Auto Regressive Markov Model
 - Quantized State Continuous Time Markov Model
 - Simple IPB Composite Model
 - Custom Model: Users can develop custom application model based on
 - Packet size and inter-arrival time available in the following probability distributions: Exponential, Constant
- **802.11 b specific**
 - Frequency Band 2.4GHz, Bandwidth 20MHz, slot time 20 μ s
 - Transmission type: DSSS,
 - SIFS=10, CW min=31, CWMax=1023
 - Modulation techniques: DBPSK, DQPSK, CCK5.5, CCK11
- **802.11 a specific**
 - Frequency Band 5GHz, Bandwidth 20MHz, slot time 9 μ s
 - Radio Technologies: OFDM,
 - SIFS=16, CW min=15, CWMax=1023
- **802.11 g specific**
 - Frequency Band 2.4GHz, Bandwidth 20MHz, slot time 9 μ s
 - Radio Technologies: OFDM,
 - SIFS=10, CW min=15, CWMax=1023
- **802.11 n specific**
 - Frequency Bands 2.4GHz, 5GHz,
 - Frame Aggregation - AMPDU operation
 - Block Ack
 - OFDM MIMO
 - Channel bandwidth of 20MHz, 40MHz. Slot Time 20 μ s
 - NSS – 1 to 4
 - Guard intervals of 400, 800nano sec
 - Transmission type: HT
 - SIFS=10, CW min=15, CWMax=1023
 - Radio Technologies: BPSK, QPSK, 16QAM, 64QAM
- **802.11ac specific**
 - Frequency Bands 2.4 GHz and 5GHz

- Frame Aggregation - AMPDU operation
- Block Ack
- OFDM MIMO
 - Channel Bandwidth of 20,40,80 and 160 MHz, slot time 9 μ s
 - NSS – 1 to 8
- Guard intervals of 400, 800nano sec
- Transmission type: VHT,
- SIFS=16, CW min=15, CWMax=1023
- Radio Technologies: BPSK, QPSK, 16-QAM, 64-QAM and 256 – QAM
- **802.11e specific**
 - Wireless Quality of Service with Access categories: AC_BK, AC_BE, AC_VI, AC_VO

Rate Adaptation

- Off
- Default
- Minstrel Adaptation Algorithm

Protocol source C codes available for user modification

Output Performance Metrics: A variety of network performance is reported including

- Network Statistics
- Link metrics
- WLAN Metrics
- IP metrics, TCP / UDP Metrics etc
- Dynamic metrics (Graphical plot of an attribute over time) is available for application throughputs

Detailed Packet Trace: Users can log details of each packet as it flows in the network.

Detailed Event Trace: Users can log each event of the protocol FSM while execution of the discrete event simulation

Command Line Interface

- CLI mode of running for more concise and powerful means of control
- Facilitates use of automated scripts for running batch simulations
- Model network configurations using XML based configuration files

Packet Animator

- Animates packet flow over wired and wireless links, as well as node movement
- Color variation for data, control and error packets
- Animation settings via play, pause and time-slide

Wireshark Interfacing: pcap files can be recorded at each node which can be opened in Wireshark for protocol analysis

Omitted Features

1. PCF Mode of operation
2. Scanning
3. Association
4. Authentication
5. Power saving mode
6. Beacon
7. PPI header