IEEE P802.11  
Wireless LANs

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| TGbb:  Evaluation methodology for MAC proposals | | | | |
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Abstract

This document defines methodologies for the evaluation of MAC proposals in the TGbb.

1. **MAC proposal evaluation methodology**

### Scenarios

Proposals for MAC 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.

The following table summarises the simulation scenarios.

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| --- | --- | --- | --- | --- |
|  | Scenario Name | Topology | Channel Model | Traffic profile  [tentative] |
| 1 | Test compliance to PAR | 1 AP and 1 STA within the coverage of the AP | any | any |
| 2 | Test compliance to PAR | 1 AP and multiple STAs within the coverage of the AP | any | any |
| 3 | Industrial wireless without OBSS | Industrial Robotic work cell  e.g. ~8m x 10m x 7m size  2 STAs/AP, P2P pairs | Indoor- Manufacturing Cell | Industrial |
| 4 | Industrial wireless with OBSS | Industrial Robotic work cell  e.g. ~8m x 10m x 7m size  2 STAs/AP, P2P pairs  multiple APs with overlapping areas | Indoor- Manufacturing Cell | Industrial |
| 5 | Hospital ward with OBSS | Dense small BSSs  e.g. ~8 m × 8 m × 3 m size,  ~1-3m inter AP distance,  4 STAs/light, P2P pairs | Indoor- Office | Enterprise |
| 6 | Enterprise with OBSS | Dense small BSSs  e.g. ~ 6.8 m × 4.7 m × 3 m size  ~1-3m inter AP distance  5 STAs/light, P2P pairs |
| Enterprise |
| 7 | Residential with OBSS | Apartment bldg.  e.g. ~6m x 6m x 3m size,  ~0.5-2 m inter AP distance  5 STAs/light, P2P pairs | Indoor-Home | Home |

### Simulation methodology choice

Proponents of different techniques should provide justification for their proposed simulation methodology used to justify the technique’s gains.

**Examples of choices of simulations:**

* MAC System simulation:
  1. Impact of MAC scheduler – for example OFDMA-based MU operation vs. other MU techniques
  2. Impact of MU RTS/CTS procedure
  3. Impact of parameter settings in MAC scheduler – for example different parameter settings for EDCA in different scenarios
  4. Impact of resource allocation in MAC scheduler – for example multiple RUs allocated to one STA
  5. Impact of OBSS thresholds
* Integrated System simulation:
  1. Performance evaluation of 11bb solution in the environment close to real-world
  2. Impact of crosslayer techniques affecting both PHY and MAC layers in the context of multi-BSS

### Metrics

# The TGbb evaluation methodology defines evaluation of spectrum efficiency improvement in both link level and system level.

1. Per-STA Throughout

Per-STA throughput metrics are used to measure the user experience in the area covered by one or multiple BSSs in different simulation scenarios [[1]](#endnote-1).

Definition – Per-STA throughput is measured at MAC SAP by the number bits (or bytes) of MAC payload successfully transmitted over the given measurement period in the full buffer simulation.

• Per-STA throughput at 5 percentile of throughput CDF curve measures the minimum throughput performance of stations at the cell edge.

• Per-STA throughput at 50 percentile of CDF curve measures the average throughput of stations in all participating BSS in the simulation.

• Per-STA throughput at 95 percentile of CDF curve measures the top performance of stations at the cell center of BSS.

Per-STA throughout for DL and UL are measured separately.

1. Per-BSS Throughput

Per-BSS throughput is used to evaluate BSS capacity in the various simulation scenarios described in i. This metric directly relates to the aggregated Per-STA throughputs in BSS and can be used to compare different deployment densities and heterogeneous deployments.

Definition – Per-BSS throughput is the aggregated Per-STA throughput among all the associated stations in a BSS.

Per-BSS throughout could be measured by aggregating Per-STA throughputs of all the stations in a BSS, or derived from Per-STA throughput times the number of associated stations in a BSS.

Per-BSS throughout for DL and UL are measured or calculated separately.

1. Packet Loss

The packet loss metric is used to evaluate the system robustness especially in scenarios that require high reliability (e.g. Industrial wireless). This metric reflects an aspect of system performance different from throughput and transmission latency.

Definition – The packet loss is defined as the number of MAC packet not delivered at all or not delivered in time to the receiver over the total number of offered MAC payloads.

The packet loss means that the MAC packet could not be decoded by the receiver due to the interference or low RSSI, or the MAC packet could not be delivered at the receiver in time for QoS flow due to traffic congestion.

1. Transmission Latency

The metric of transmission latency is used to measure the time delay of medium acquisition in channel access mechanism. The transmission latency is used to evaluate an aspect of MAC performance in various QoS transmissions.

Definition – The transmission latency is measured from the time that MAC receives a packet till the time that PHY starts transmitting.

The transmission latency may include the time delay of

• Backoff time

• AIFS

• Other system parameters

If there are any questions, please use the TGbb email reflector.

1. **References**

1. Oliver, "11-18-1423-07-00bb-tgbb-simulation-scenarios.docx," [Online]. [↑](#endnote-ref-1)