EEE P802.11
Wireless LANs

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| HEW SG Simulation Scenarios |
| Date: October 8, 2013 |
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# Abstract

This document describes the simulation scenarios for the HEW SG.

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# Revisions

|  |  |  |
| --- | --- | --- |
| **Revision** | **Comments** | **Date** |
| *R0* | Initial draft template | Aug 28th |
| *R1* |  | Sept 15th |
| *R2* | Made it consistent with document 1000r2 | Sept 16th |
| *R3* | Included Scenario 1 from 1081r0 Included Scenario 2 from 722r2Included Scenario 3 and 4 from 1248r0; scenario 3 likely compatible with documents 722 and 1079. Included concept from 1176r0Added ReferencesUpdated co-authors | Oct 4th |
|  |  |  |

# Notes on this version

This document consolidates earlier contributions on scenarios details, from various authors. I had some offline discussion with them, and  with other people that showed interest in this document, which are listed as co-authors.

This document includes:

* scenarios classification based on the harmonization between  proposals in doc #1083r0 and 1000r2 that happened at the September meeting (also supported by the strawpoll)
* tentative inclusion of descriptions for scenarios 1 (from doc. #1081r0), scenario 2 (from doc. #722r2),  scenarios 3 (from doc. #1248 and likely compatible with #722 and #1079), scenario 4 (from doc. #1248), and  concepts from doc #1176; scenario 4a is still TBD. I believe the presence of ‘interfering scenarios’ in each scenario also satisfies the suggestions from #1114r1.

This is just a starting point, with several undefined parts; see also the embedded comments.

# Introduction

This document defines simulation scenarios to be used for

* Evaluation of performance of features proposed in HEW
* Generation of results for simulators calibration purpose.

Each scenario is defined by specifying

* Topology: AP/STAs positions, P2P STAs pair positions, obstructions , layout, propagation model
* Traffic model
	+ STA - AP traffic
	+ P2P traffic (tethering, Soft-APs, TDLS)
	+ ‘Idle’ devices (generating management traffic such as probes/beacons)
* List of PHY, MAC, Management parameters
	+ We may want to fix the value of some parameters to limit the degrees of freedom, and for calibration
	+ Optionally, some STAs may use legacy (11n/ac) operation parameters, if required to prove effectiveness of selected HEW solutions
* An interfering scenario (its performance optionally tracked)
	+ Not managed or managed by a different entity than the one of the main scenario
	+ Defined by its own Topology, Traffic model and parameters

Per each of above items, the scenario description defines a detailed list of parameters and corresponding values.

Values included in curly brackets {} are mandatory and shall be adopted for any simulation.

Values included in square brackets [] are default values and they may be changed for simulations for performance evaluation; in case they are changed, the simulation results shall be accompanied by a list of the parameters and the corresponding values used in the simulation.

# Scenarios summary

This document includes a description for the following scenarios, according to document 11-13/1000r2.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Scenario Name** | **Topology** | **Management** | **Channel Model** | **Homogeneity** | **~Traffic Model** |
| **1** | Residential | A - Apartment bldg. e.g. ~10m x 10m apts in a multi-floor bldg~10s of STAs/AP, P2P pairs | Unmanaged | Indoor | Flat | Home |
| **2** | Enterprise | B - Dense small BSSs with clusterse.g. ~10-20m inter AP distance,  ~100s of STAs/AP, P2P pairs | Managed | Indoor | Flat | Enterprise  |
| **3** | Indoor Small BSS Hotspot | C - Dense small BSSs, uniforme.g. ~10-20m inter AP distance ~100s of STAs/AP, P2P pairs | Mobile  |
| **4** | Outdoor Large BSS Hotspot | D - Large BSSs, uniforme.g. 100-200m inter AP distance ~100s of STAs/AP, P2P pairs | Managed | Outdoor | Flat | Mobile |
| **4a** | Outdoor Large BSS Hotspot+ Residential | D+A | Managed + Unmanaged | Hierarchical | Mobile + Home |

# 1 - Residential Scenario

(From documents 11-13/1081r0**,** 786)

|  |  |
| --- | --- |
| **Parameter** | **Value** |
|  |
| **Topology** |
| Figure 1 - Residential building layout |
| Topology Description | Multi-floor building* 5 floors, 3 m height in each floor
* 2x10 rooms in each floor
* Apartment size:10m x 10m x 3m
 |
| APs location | One AP per apartment, in random location within the apartment |
| STAs location | In each apartment, place N+M STAs in random xy-locations (uniform distribution) at 1.5m above the floor level |
| STAs type | STA1 to STAn: HEWSTAn to STAN: non-HEW |
| Channel Model |  TGn channel model B (11/722)  |
| Penetration Losses | TBD between apartmetsTBD between floors  |
|  |
| **PHY parameters** |
| BW:  | [20MHz BSS at 2.4GHz, 80 MHz BSS at 5GHz] |
| MCS: | [Up to MCS 9, BCC] |
| GI:  | [Long] |
| Data Preamble:  | [2.4GHz, 11n; 5GHz, 11ac] |
| STA TX power  | {17}dBm  |
| AP TX Power  | {23}dBm |
| AP #of TX antennas  | {4} |
| AP #of RX antennas  | {4} |
| STA #of TX antennas | {1, 2}  |
| STA #of RX antennas | {1, 2}  |
|  |
| **MAC parameters** |
| Access protocol parameters:  | [EDCA with default parameters] |
| Primary channels  | [Same primary channel] |
| Aggregation:  | [A-MPDU / max aggregation size / BA window size, No A-MSDU, with immediate BA] |
| Max # of retries  | [Max retries: 4] |
| RTS/CTS  | [Option 1: Off][Option 2: On] |
| Rate adaptation method  | [] |
| Association | STAs in an apartment are associated to the AP in the apartment |

**Traffic model**

|  |
| --- |
| **Traffic model (Per each apartment) - TBD** |
| **#** | **Source/Sink** | **Name** | **Traffic definition** | **Flow specific parameters**  | **AC** |
| **Downlink** |
| D1 | AP/STA1 |  |  | 50Mbps | VI |
| … |  |  |  |  | VI |
| DN | AP/STAN |  |  | 50Mbps | VI |
| **Uplink** |
| U1 | STA1/AP |  |  |  |  |
|  |  |  |  |  |  |
| UN | STAN/AP |  |  |  |  |
| **P2P** |
| P1 | STA1/STA5 | local video streaming (11-13/722) |  | TBD | VI |
|  | More P2P?  |  |  |  |  |
|  **Idle Management** |
| M1 | AP1 | Beacon | TX | TBD |  |
| M2-M | STA2-M | Probe Req |  | TBD |  |

# 2 – Enterprise Scenario

(From the Warless Office scenario in 11/722r2)

|  |  |
| --- | --- |
| **Parameter** | **Value** |
|  |
| **Topology** |
| Figure 2 - BSSs within the building floorFigure 3 - STAs clusters (cubicle) and AP positions within a BSSFigure 4 - STAs within a cluster |
| Topology Description  | Office floor configuration (see Figures 2-3)* 1. 8 offices
	2. 64 cubicles per office
	3. Each cubicle has 4 STAs
 |
| APs location | Each AP is located at the center of the office Installed on the ceiling at (x=10,y=10,z=3) |
| STAs location | Placed randomly in a cubicle (x,y,z=1)STA1: laptopSTA2: monitorSTA3: smartphone or tabletSTA4: Hard diskKeyboard/mouse (TBR) |
| STAs type | HEWNon-HEW? TBD |
| Channel Model | TGn channel model D |
| Penetration Losses | TBD |
|  |
| **PHY parameters** |
| BW:  | [20MHz BSS at 2.4GHz, 80 MHz BSS at 5GHz] |
| MCS: | [Up to MCS 9, BCC] |
| GI:  | [Long] |
| Data Preamble:  | [11ac] |
| STA TX power  | [21dBm] |
| AP TX Power  | [24dBm] |
| P2P STAs TX power | [21dBm] |
| AP #of TX antennas  | {4} |
| AP #of RX antennas  | {4} |
| STA #of TX antennas | {1, 2} |
| STA #of RX antennas | {1, 2} |
| **Paramters for P2P (if different from above)** |
| P2P STAs TX power |  |
|  |
| **MAC parameters** |
| Access protocol parameters:  | [EDCA with default EDCA Parameters set] |
| Primary channels  | Four 80 MHz channels (Ch1, Ch2, Ch3, Ch4) Ch1: BSS1, BSS5Ch2: BSS2, BSS6Ch3: BSS3, BSS7Ch4: BSS4, BSS8 |
| Aggregation:  | [A-MPDU / max aggregation size / BA window size, No A-MSDU, with immediate BA] |
| Max # of retries  | [10] |
| RTS/CTS  | [off] |
| Rate adaptation method  | [Ideal] |
| Association | STAs associate with the AP based on highest RSSI |
| **Paramters for P2P (if different from above)** |
| Primary channels | TBD |

**Traffic model**

|  |
| --- |
| **Traffic model (Per each cubicle)**  |
| **#** | **Source/Sink** | **Name** | **Traffic definition** | **Flow specific parameters**  | **AC** |
| **Downlink** |
| D1 | AP/STA1 | Web browsing, Local file transfer | T1 |  | VI |
| D2 | AP/STA3 | Web browsing, Local file transfer | T3 |  | BE |
| **Uplink** |
| U1 | STA1/AP | Web browsing, Local file transfer |  |  |  |
| U2 | STA3/AP | Web browsing, Local file transfer |  |  |  |
| **P2P** |
| P1 | STA1/STA2 | Lightly compressed video |  |  |  |
| P2 | STA1/STA4 | Hard disk file transfer |  |  |  |
|  **Idle / Management** |
| M1 | AP | Beacon  |  |  |  |
| M2 | STAs | Probes  |  |  |  |

**Interfering scenario**

TBD

# 3 - Indoor Small BSSs Scenario

(From document 1248r0)

This scenario has the objective to capture the issues and be representative of real-world deployments with high density of APs and STAs that are highlighted by the first category of usage models described in [5]:

* In such environments, the infrastructure network (ESS) is planned. For simulation complexity simplifications, a hexagonal BSS layout is considered with a frequency reuse pattern.
* In such environments, the “traffic condition” described in the usage model document mentions:
	+ interference between APs belonging to the same managed ESS due to high density deployment: *this OBSS interference is captured in this scenario*
		- *note that this OBSS interference is touching STAs in high SNR conditions (close to their serving APs, while in outdoor large BSS scenario, the OBSS interference will be touching STAs in low SNR conditions (for from their serving APs)*
	+ Interference with unmanaged networks (P2P links): *this OBSS interference is captured in this scenario by the definition of interfering networks, defined here as random unmanaged short-range P2P links, representative of Soft APs and tethering*
	+ Interference with unmanaged stand-alone APs: *this OBSS interference is currently not captured in this scenario, but in the hierarchical indoor/outdoor scenario*
	+ Interference between APs belonging to different managed ESS due to the presence of multiple operators: *this OBSS interference is currently not captured in this scenario, but in the outdoor large BSS scenario*
* Other important real-world conditions representative of such environments are captured in this scenario, [20]:
	+ Existence of unassociated clients, with regular probe request broadcasts.

Different frequency reuse pattern can be defined (1, 3 and/or more).

Frequency reuse 3 is more realistic in a scenario with such high density of AP and we should use it as the default setting.

it is representative of the majority of planned deployments which apply frequency reuse higher than 1 and where STAs are located closer from their serving APs (good SNR conditions) than from neighboring APs on the same channel.

It is regular

Reuse 1 should however also be considered, to capture the fact that some regions have very low available bandwidth and are forced to apply frequency reuse 1 deployments. (but this reuse 1 case is very difficult seeing the huge overlap between neighboring APs due to high density of APs).

Note that frequency reuse 1 is more suited to scenario 4 either to represent:

 A single operator deployment in a region where available bandwidth is low (the lower density of APs in large outdoor makes it more realistic)

 An overlap between 3 operators, each applying a frequency reuse 3: this is equivalent to a single deployment with reuse 1.

In order to focus this scenario on the issues related to high density, the channel model is considered as a large indoor model (TGn F). *Note that robustness to outdoor channel models, which is also a requirement for some usage models in category 1 (like outdoor stadiums), is captured in the outdoor large BSS scenario.*

It is important to define a proportion (TBD%) of legacy devices in the scenario that won’t implement the proposed solution under evaluationto ensure that the solution will keep its efficiency in real deployments (some solutions may be sensitive to the presence of legacy devices while other won’t).

These legacy devices shall simply keep the baseline default parameters and shall not implement the proposed solution under evaluation. Those devices can be:

* STAs connected to the planned network
* APs and STAs part of the interfering network

|  |  |
| --- | --- |
| **Parameter** | **Value** |
|  |
| **Topology (A)** |
| Figure 5 BSSs layout (partial)BSSBSSBSSBSSBSSBSSBSSBSSBSSBSSBSSBSBSSBSSBSSBSSBSSBSSBSSFigure 6 - Layout of BSSs using hte same channel in case frequency reuse 3 is used |
| Environment description | BSSa are placed in a regular and symmetric grid as in Figure 5.Each BSS in Figure 5 has the following configuration:BSS radius: R meters (7m [#1248] / 12m [Stadium, #722,#1079] TBD)Inter BSS distance (ICD): 2\*h meters h=sqrt(R2-R2/4) |
| APs location | AP is placed at the center of the BSS. |
| STAs location | 30 [#1248] -72 [Stadium, #722,#1079] (TBD) STAs are placed randomly #1248 / in a regular grid (#722,#1079) in a BSS |
| STAs type | {STAs 1 to N: HEW STAs}[STAs N+1 to TBD: non-HEW STAs] |
| Channel Model | Large open space with small BSSs [to be further discussed in the context of the channel model document]  |
| Penetration Losses | None |
|  |
| **PHY parameters** |
| BW:  | {20MHz BSS at 2.4GHz, 80 MHz BSS at 5GHz}  |
| MCS: | {Up to MCS 9, BCC} |
| GI:  | [Long] |
| Data Premble:  | [11ac] |
| STA TX power  | [max 15dBm] (#1248) [max 19dBm] (#1079) |
| AP TX Power  | [max 17dBm] |
| AP #of TX antennas  | {2, 4} |
| AP #of RX antennas  | {2, 4} |
| STA #of TX antennas | {1, 2} |
| STA #of RX antennas | {1, 2} |
|  |
| **MAC parameters** |
| Acess protocol parameters:  | [EDCA with default EDCA Parameters set] |
| Primary channels  | [] |
| Aggregation:  | [A-MPDU / max aggregation size / BA window size, No A-MSDU, with immediate BA] |
| Max # of retries  | [10] |
| RTS/CTS  | [off] |
| Rate adaptation method  | *[]*  |
|  |  |
| Association | [X% of STAs associate with the strongest AP, Y% of STAs associate with the second-strongest AP, and Z% of STAs associate with the third-strongest AP. Detailed distribution to be decided.] |

|  |
| --- |
| **Traffic model (per each BSS) - TBD** |
| **#** | **Source/Sink** | **Name** | **Traffic definition** | **Flow specific paramters**  | **AC** |
| **Dowlink** |
| D1 | AP/STA1 to AP/STA10 | Highly compressed video (streaming) | T2 |  |  |
| D2 | AP/STA11 to AP/STA20 | Web browsing | T4 |  |  |
| D3 | AP/STA21 to AP/STA30 | Local file transfer | T3 |  |  |
| **Uplink** |
| U1 | STA1/AP to STA10/AP | Highly compressed video (streaming) – UL TCP ACKs… |  |  |  |
| U2 | STA11/AP to STA20/AP | Web browsing: – UL TCP ACKs… |  |  |  |
| U3 | STA21/AP to STA30/AP | Local file transfer | T3 |  |  |
| **P2P** |
| P1 | NONE (see interfereing scenarios) |  |  |  |  |
|  **Idle / Management** |
| M1 | AP | Beacon  | TX |  |  |
| M2 | STA36 to STA TBD | Probe Req. | TY |  |  |

## Interfering Scenario for Scenario 3

This scenario introduces and overlay of unmanaged P2P networks on top of Scenario 3.

|  |  |
| --- | --- |
| **Parameter** | **Value** |
|  |
| **Topology** |
| BSSBSSBSSBSSBSSBSSBSSFigure 7 - BSSs layout, with interferging P2P links |
| Topology Description | N Soft AP BSSs randomly placed in the simulation area |
| APs location | Soft APs randomly placed in simulation ares |
| STAs location | Per each Soft AP, one STA placed at 0.5m distance from the Soft AP |
| STAs type | HEW |
| Channel Model | TBD |
| Penetration Losses | None  |
|  |
| **PHY paramters: Same as main scenario****Except for the following ones** |
| STA TX Power | TBD |
|  |
| **MAC parameters: same as main scenario****Except for the following ones** |
| Primary channels | **TBD** |

|  |
| --- |
| **Traffic model for interfering scenario**  |
| **#** | **Source/Sink** | **Name** | **Traffic definition** | **Flow specific paramters**  | **AC** |
| **Dowlink** |
| 1 | P2P 1 to N | Highly compressed video (streaming) | T2 |  |  |
| 2 | P2P N+1 to M | Web browsing | T4 |  |  |
| 3 | P2P M+1 to K | Local file transfer | T3 |  |  |
|  **Idle / Management** |
| M1 | APs | Beacon  | TX |  |  |

# 4 - Outdoor Large BSS Scenario

This scenario has the objective to capture the issues (and be representative of) real-world outdoor deployments with a high separation between APs (BSS edge with low SNR) with high density of STAs that are highlighted by the forth category of usage models described in []:

* In such environments, the infrastructure network (ESS) is planned. For simulation complexity simplifications, an hexagonal BSS layout is considered with a frequency reuse pattern. This frequency reuse pattern is defined and fixed, as part of the parameters that can’t be modified in this scenario. *(Note that BSS channel allocation can be evaluated in simulation scenarios where there are not planned network (ESS), as in the residential one.)*
* In such environments, the “traffic condition” described in the usage model document mentions:
	+ interference between APs belonging to the same managed ESS due to high density deployment: *this OBSS interference is captured in this scenario even if it is low as the distance between APs is high*
	+ Interference with unmanaged networks (P2P links): *this OBSS interference is currently not captured in this scenario,but in the dense hotspot scenario*
	+ Interference with unmanaged stand-alone APs: *this OBSS interference is currently not captured in this scenario, but in the hierarchical indoor/outdoor scenario 3b*
	+ Interference between APs belonging to different managed ESS due to the presence of multiple operators: *this OBSS interference is captured in this scenario, by an overlap of 3 operators, using relatively similar grid but channel selection offset*

Reuse factor, TBD

We should consider an hexagonal deployment using frequency reuse 1.

Such a frequency reuse 1 scenario is representative of:

 A single operator deployment in a region where available bandwidth is low and forces frequency reuse 1 deployments (the lower density of APs in large outdoor makes it more realistic)

 An overlap between 3 operators, each applying a frequency reuse 3: in case of close location of this is equivalent to a single operator deployment with reuse 1.

As the inter-site distance is high, the overlap between neighboring cell is close to minimum sensitivity (low SNR)

* *this enables to capture the issue of outdoor performance in low SNR conditions*
* *this enables to capture the issue of fairness between users spread on the full coverage of each AP*
* *this enables to capture OBSS interference touching STAs in low SNR conditions (far from their serving APs), while in dense hotspot scenario, the OBSS interference is touching STAs in high SNR conditions (close to their serving APs)*

It is important to define a proportion (TBD%) of legacy devices in the scenario that won’t implement the proposed solution under evaluationto ensure that the solution will keep its efficiency in real deployments (some solutions may be sensitive to the presence of legacy devices while other won’t).

These legacy devices shall simply keep the baseline default parameters and shall not implement the proposed solution under evaluation. Those devices can be:

* STAs connected to the planned network
* APs and STAs part of the interfering network

|  |  |
| --- | --- |
| **Parameter** | **Value** |
|  |
| **Topology (A)** |
| Figure 8 – BSSs layout  |
| Environment descryption | Outdoor street deploymentOverlap of 3 operatorsBSS layout configurationDefine a 19 hexagonal grid as in figure 8With ICD = 2\*h meters (130m, TBD) h=sqrt(R2-R2/4)R meters defined as the distance for MCS0 sensitivity |
| APs location | Place APs on the center of each BSS, +/- an offset with TBD standard deviation. |
| STAs location | “50-100” STAs are placed randomly in a BSS.  |
| STAs type | {STAs 1 to N: HEW STAs}{STAs N+1 to TBD: non-HEW STAs} |
| Channel Model | {Outdoor, ITU micro} |
| Penetration Losses | None |
|  |
| **PHY parameters** |
| BW: - | {20MHz BSS at 2.4GHz, 80 MHz BSS at 5GHz}  |
| MCS: | {Up to MCS 9, BCC} |
| GI:  | [long] |
| Data Premble:  | [11ac] |
| STA TX power  | [15dBm] |
| AP TX Power  | [30dBm] |
| AP #of TX antennas  | {2, 4} |
| AP #of RX antennas  | {2, 4} |
| STA #of TX antennas | {1, 2} |
| STA #of RX antennas | {1, 2} |
|  |
| **MAC parameters** |
| Acess protocol parameters:  | [EDCA with default EDCA Parameters set] |
| Primary channels  | {Frequency reuse 1 is considered: all BSSs are using the same 80MHz channel} [all OBSSs on same primary channel] |
| Aggregation:  | [A-MPDU / max aggregation size / BA window size, No A-MSDU, with immediate BA] |
| Max # of retries  | [10] |
| RTS/CTS  | [off] |
| Rate adaptation method  | [realistic rate adaptation, based on ACK statistics for instance]  |
| Association | [Each BSS is made of a drop of one AP at the specific grid point, with associated STAs randomly distributed over the hexagonal zone.Because of the standard deviation of the ICD (the grid with points to place the APs) is not regular, there will be overlaps between neighboring APs and STAs will not always be associated with the closest AP. This is also captures the sticky client issue] |

|  |
| --- |
| **Traffic model (Per each BSS) - TBD** |
| **#** | **Source/Sink** | **Name** | **Traffic definition** | **Flow specific paramters**  | **AC** |
| **Dowlink** |
| D1 | AP/STA1 to AP/STA10 | Highly compressed video (streaming) | T2 |  |  |
| D2 | AP/STA11 to AP/STA20 | Web browsing | T4 |  |  |
| D3 | AP/STA21 to AP/STA25 | Local file transfer | T3 |  |  |
| … | … |  |  |  |  |
| DN | AP/STAN |  |  |  |  |
| **Uplink** |
| U1 | AP/STA1 to AP/STA10 | Highly compressed video (streaming) – UL TCP ACKs… |  |  |  |
| U2 | AP/STA11 to AP/STA20 | Web browsing: – UL TCP ACKs… |  |  |  |
| U3 | STA26/AP to STA30/AP | Local file transfer | T3 |  |  |
| … | … |  |  |  |  |
| UN | STAN/AP |  |  |  |  |
| **P2P** |
| P1 | STA1/AP |  |  |  |  |
| P2 | STA2/AP |  |  |  |  |
| P3 | STA3/AP |  |  |  |  |
| … | … |  |  |  |  |
| PN | STAN/AP |  |  |  |  |
|  **Idle Management** |
| M1 | AP1 | Beacon  | TX |  |  |
| M2 | STA2 | Probe Req. | TY |  |  |
| M3 | STA3 |  |  |  |  |
| … | … |  |  |  |  |
| MN | STAN |  |  |  |  |

# 4a- Outdoor Large BSS + Residential Scenario

**TBD**

Proposal from Ron Porat, to be developed:

“Scenario 4a – here I propose to add to each outdoor cell one or two residential buildings as described in scenario 1. For simplicity let’s assume just one floor with 2x5 rooms.  The main issue to test is interference between indoor and outdoor.

* 1. Indoor user talk to indoor AP and outdoor to outdoor AP.
	2. Some small percent of outdoors users may talk to indoor AP.”

# Annex 1 - Reference traffic profiles [Exmaple template]

**T1 - Local file transfer**

* Add description
* Mandatory settings
	+ E.g. TCP model paramters
* Optional paramters settings that may be specified per traffic flow in the scenario
	+ E.g. Offered rate in Mbps or full buffer

**T2 - Lightly compressed video**

Add description

Mandatory paramters settings

Optional paramters settings

**T3 - Internet streaming video/audio (e.g. Youtube)**

Add description

Mandatory settings

Optional paramters settings

**T4 …**

# Annex 2 - Templates

|  |  |
| --- | --- |
| **Parameter** | **Value** |
|  |
| **Topology** |
| Figures |
| Environment description  |  |
| APs location |  |
| STAs location |  |
| STAs type |  |
| Channel Model |  |
| Penetration Losses |  |
|  |
| **PHY paramters** |
| BW:  |  |
| MCS: |  |
| GI:  |  |
| Data Premble:  |  |
| STA TX power  |  |
| AP TX Power  |  |
| AP #of TX antennas  |  |
| AP #of RX antennas  |  |
| STA #of TX antennas |  |
| STA #of RX antennas |  |
|  |
| **MAC paramters** |
| Access protocol parameters:  |  |
| Primary channels  |  |
| Aggregation:  |  |
| Max # of retries  |  |
| RTS/CTS  |  |
| Rate adaptation method  |  |
| Association |  |

**Traffic model**

|  |
| --- |
| **Traffic model (Per each apartment) - TBD** |
| **#** | **Source/Sink** | **Name** | **Traffic definition** | **Flow specific paramters**  | **AC** |
| **Dowlink** |
| D1 | AP/STA1 | 4k Video | T1 |  | VI |
| D2 | AP/STA2 | Local file transwer | T3 |  | BE |
| D3 | AP/STA3 | … |  |  |  |
| … | … |  |  |  |  |
| DN | AP/STAN |  |  |  |  |
| **Uplink** |
| U1 | STA1/AP |  |  |  |  |
| U2 | STA2/AP |  |  |  |  |
| U3 | STA3/AP |  |  |  |  |
| … | … |  |  |  |  |
| UN | STAN/AP |  |  |  |  |
| **P2P** |
| P1 | STA1/AP |  |  |  |  |
| P2 | STA2/AP |  |  |  |  |
| P3 | STA3/AP |  |  |  |  |
| … | … |  |  |  |  |
| PN | STAN/AP |  |  |  |  |
|  **Idle Management** |
| M1 | AP1 | Beacon  | TX |  |  |
| M2 | STA2 | Probe Req. | TY |  |  |
| M3 | STA3 |  |  |  |  |
| … | … |  |  |  |  |
| MN | STAN |  |  |  |  |

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