IEEE P802.11
Wireless LANs

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| Discussion of comments submitted during the SENS PAR WG ballot |
| Date: 2020-07-10 |
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Abstract

A discussion of each comment submitted during the WG11 electronic ballot for the SENS PAR, conducted from March 30th, 2020 to April 14th, 2020, is presented. Changes to the PAR are recommended when deemed appropriate.

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| Comment 1 | In 5.2.b. Scope of the project, there is "Next Generation 60 GHz (NG60)." This should be EDMG instead to align with DMG. |

**Note:** The PHY clause defined by TGay (Clause 28 in IEEE P802.11ay/D5.0) is referred to “Enhanced directional multi-gigabit (EDMG) PHY.”

**Recommendation:** Incorporate the suggested change. Modify the second line of 5.2.b as follows:

“Directional Multi Gigabit (DMG) and ~~Next Generation 60 GHz (NG60)~~ enhanced DMG (EDMG) PHYs to enhance Wireless Local”

Also, modify the second paragraph of 5.2.b as follows:

“This amendment defines modifications to the PHY service interface of the High Throughput (HT), Very High Throughput (VHT), High Efficiency ~~WLAN~~ (HE~~W~~) and Extremely High Throughput (EHT) PHYs.”

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| Comment 2 | Why are the bands between 1 GHz and 7.125 GHz also included while only the DMG and EDMG PHYs which are above 45 GHz are mentioned? This is confusing. If the intention is to also include the PHYs between 1 GHz and 7.125 GHz to modify their service interface as in the next paragraph, then split the part mentioning the target bands into a different sentence and place it in an independent paragraph. |
| Comment 8 | Scope of the project is very confusing. The first paragraph only refers to the DMG and NG60 PHYs while assuming frequency bands between 1 and 7.125 GHz and above 45 GHz. The HT, VHT, HEW and EHT PHYs appear in the second paragraph which should be also in the first paragraph. As in the comment. |

**Discussion:** During the writing of the PAR, SENS SG debated various ways of writing its scope (5.2.b). Its current version, which specifies modifications to the HT, VHT, HEW and EHT PHY service interface in a separate paragraph, was ultimately favoured by the group.

**Recommendation:** No change.

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| Comment 3 | The sentence states that modifications will be made to various PHY services. However, the next sentence states "amendment provides backward compatibility". Therefore, will this amendment provide backward compatability for 11b and 11g devices (e.g. those prior to High Throughput (HT)). For example, a SENS capable device will therefore not be backwards compatabile with an 11g IoT device. I don't think backward compatability is important, it's more the coexistance". |
| Comment 9 | "This amendment provides backward compatibility and coexistence with legacy IEEE 802.11 devices operating in the same band." Maybe I am confused, but I do not understand why backward compatibility is necessary for WLAN Sensing." Clarify, please. |

**Discussion:** The term “backward compatibility” was used to define that no modifications specified in the amendment will prevent legacy stations, as well as stations that do not support WLAN sensing, to decode PPDUs transmitted for WLAN sensing.

**Recommendation:** Add the following sentence to 8.1: (Note: The underlined sentence below can be found in the 11az PAR.)

“Backward compatibility with legacy 802.11 devices implies that devices implementing this amendment shall maintain data communication compatibility.”

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| Comment 4 | Regulatory bodies do not "standardize access to frequency bands". They provide rules for radio operation within frequency bands. Standards Development Organisations (e.g. IEEE) then standardize the access mechanisms that conform to the regulatiry rules. I don't think the purpose of a SENS amendment is to influence regulatory bodies. |
| Comment 14 | Section (scope) is too general and misleading- it says the scope is to define specifications for wireless connectivity. The scope should be to define wireless connectivity for the purpose of coordination, setup, collection, and exchange of sensing information. State the scope more clearly. Suggest saying the "specifications for wireless connectivity for the purpose of coordination, setup, collection, and exchange of sensing information”. |
| Comment 16 | Same comment as in 5.2a; the purpose is too general and doesn't state the purpose of the amendment. The purpose of the standard isn't to provide wireless connectivity, it is to provide wireless connectivity for standardizing operations related to sensing. Suggested text: "provide capabilities using wireless connectivity for the coordination, setup, collection, and exchange of sensing information". |
| Comment 17 | The sentance "This standard also offers regulatory bodies a means of standardizing access to one or more frequency bands for the purpose of local area communication" needs clarification. The purpose is not for LAN communication, it is for standardizing operations related to sensing using wireless LAN communication. Suggested wording: "This standard also offers regulatory bodies a means of standardized access for operations related to sensing using local area network communications in one or more frequency bands. |

**Discussion:** Comments 4, 14, 16, and 17 are on 5.2.a and 5.4, which are sections that are not specific to the WLAN sensing amendment. Instead, both sections apply to the resultant 802.11 standard after incorporating all published amendments. As such, the text found in 5.2.a and 5.4 in the WLAN sensing PAR is the same as in all PARs produced by 802.11 SGs.

**Recommendation:** No change.

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| Comment 5 | Smart home should be plural. |

**Recommendation:** Incorporate the suggested change. Modify the fourth line of 5.5 as follows:

“presence and proximity detection, gesture recognition, wellness monitoring, localization, and smart homes”

Also, modify the third line of 5.6 as follows:

“devices, wireless sensing equipment (including for behavior recognition, vehicular, smart homes, and”

(Note: The response to 5.5 was further modified to address other comments. With such changes, “smart homes” was deleted from 5.5.)

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| Comment 6 | IEEE 802.11-2016 is not referenced in section 5.3. A small inconsistency to rectify. |

**Discussion:** The text provided in 5.3 is in response to the question “Is the completion of this standard dependent upon the completion of another standard? If yes please explain.” Therefore, the amendments listed in 5.3 are those still under development, which is not the case for IEEE 802.11-2016.

**Recommendation:** Incorporate, with modifications, the suggested change. Section 5.3 now reads:

“As defined in 5.2.b, to enhance WLAN sensing, this amendment augments PHY and MAC capabilities defined in the IEEE P802.11ax, IEEE P802.11ay, IEEE P802.11az and IEEE P802.11be amendments and the IEEE P802.11 revision standard.”

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| Comment 7 | "Sensing" is regulatory word. Need to change another word. All "sensing" are changing to "measurement" in the document. |

**Discussion:** In the PAR, when referred to the amendment, the word “sensing” is always preceded by the modifier “WLAN” to result in “WLAN sensing.” “WLAN sensing” is a term already commonly used in the industry to refer to the set of technologies and applications to be addressed by the amendment. It is a distinctive term not yet used in other forums, including regulatory ones. The word “measurement” does not appropriately substitute “sensing” in most places of the PAR.

**Recommendation:** No change.

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| Comment 10 | No definition for the terms: "WLAN sensing", "WLAN sensing operation", "WLAN sensing measurements", "WLAN sensing capabilities". Therefore, it is too vague what the Project attempts to specify. Define the term "WLAN sensing" clearly. |

**Recommendation:** Incorporate the suggested change. The definition of “WLAN sensing” can now be found in 8.1:

“WLAN sensing is the use of PHY and MAC features of IEEE 802.11 stations to obtain channel measurements that characterize the environment in which the stations operate. Measurements obtained with WLAN sensing are used to enable applications such as presence detection and gesture classification, among others. The specification of such applications is beyond the scope of the project.”

The words operation, measurements, and capabilities are used extensively in IEEE 802.11-2016 and are used in the PAR with the same meaning.

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| Comment 11 | Besides the HT, VHT, HEW, EHT also the NGV PHY should be considered for WLAN sensing. Add "Next Generation V2X (NGV)" to the list of PHYs |
| Comment 12 | "Besides the HT, VHT, HEW, EHT also the NGV PHY should be considered for WLAN sensing. The NGV PHY would particularly support the outdoor scenarios." Add "IEEE P802.11bd" to the list of amendments. |

**Discussion:** WLAN sensing has been discussed in various 802.11 groups (WNG SC, SENS TIG, SENS SG) since July 2019. During this time, no presentations were made on the use of NGV PHY for WLAN sensing. Usage models, feasibility, and standards gaps to support NGV-based WLAN sensing are unclear.

**Recommendation:** No change.

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| Comment 13 | It's not sufficiently clear that the text in this PAR allows for extensions and modifications to the standard that account for privacy and security problems that may be discovered during the work with this amendment. Add something like "This amendment enables /.../ \* mechanisms to ensure relevant privacy and security protection for WLAN network operators or users" |

**Discussion:** The text suggested by the commenter is quite broad and most likely entails work that goes beyond the scope of the amendment (WLAN sensing). Privacy and security aspects of 802.11 are currently being considered by other 802.11 groups, such as RCM TIG/ad-hoc.

**Recommendation:** No change.

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| Comment 15 | "STAs to perform one or more of the following: to exchange WLAN sensing capabilities" needs clarification. Do they exchange the actual capability, or are STAs just informing other STAs as to which capabilities they have? “exchange WLAN sensing capabilities a STA is equipped for" or something similar |

**Recommendation:** Modify the fifth line of 5.2.b as follows:

“Stations to perform one or more of the following: to inform other stations of their WLAN sensing capabilities,…”

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| Comment 18 | IS THERE A SIG? |

**Discussion:** Comment is not actionable and beyond the scope of the PAR and ballot.

**Recommendation:** No change.

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| Comment 19 | Unclear why STAs need to exchange information with each other. Provide clarification why any standardization is needed at all. |

**Recommendation:** Modify answer to 5.5 (Need for the Project) as follows:

Measurement capabilities defined in the IEEE P802.11 revision standard and in the amendments identified in 5.3, specified as part of features such as beamforming and fine-timing measurement, do not suitably support WLAN sensing. An amendment with the scope defined in 5.2.b is necessary to enhance reliability and efficiency of WLAN sensing and to allow for interoperability of WLAN sensing functionalities.