IEEE P802.11
Wireless LANs

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| 802.11 SENS SG Draft Proposed PAR |
| Date: 2019-11-08 |
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Abstract

This submission includes the IEEE 802.11 Sensing Study Group Project Authorization Request (PAR).

# PAR

**P802.11**

**Submitter Email: ddash@quantenna.com**
**Type of Project:** Amendment to IEEE Standard 802.11
**PAR Request Date:** TBD
**PAR Approval Date:
PAR Expiration Date:
Status:** PAR for an amendment to an existing IEEE Standard

**1.1 Project Number:** P802.11bf
**1.2 Type of Document:** Standard
**1.3 Life Cycle:** Full Use

**2.1 Title:** Standard for Information technology--Telecommunications and information exchange between systems Local and metropolitan area networks--Specific requirements Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications-- Amendment: Enhancements for Sensing

**3.1 Working Group:** Wireless LAN Working Group (C/LM/WG802.11)
**Contact Information for Working Group Chair**

**Name: Dorothy Stanley**
**Email Address:** dstanley1389@gmail.com
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**Contact Information for Working Group Vice-Chair Name:** Jon Rosdahl
**Email Address:** jrosdahl@ieee.org
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**3.2 Sponsoring Society and Committee:** IEEE Computer Society/LAN/MAN Standards Committee (C/LM)
**Contact Information for Sponsor Chair**

**Name:** Paul Nikolich
**Email Address:** p.nikolich@ieee.org
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**Contact Information for Standards Representative Name:** James Gilb
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**4.1 Type of Ballot:** Individual
**4.2 Expected Date of submission of draft to the IEEE-SA for Initial Sponsor Ballot:**TBD
**4.3 Projected Completion Date for Submittal to RevCom:**TBD

**5.1 Approximate number of people expected to be actively involved in the development of this project:** 100

**5.2.a. Scope of the complete standard:** The scope of this standard is to define one medium access control (MAC) and several physical layer (PHY) specifications for wireless connectivity for fixed, portable, and moving stations (STAs) within a local area.

**5.2.b. Scope of the project:**

This amendment defines modifications to both the IEEE 802.11 Medium Access Control layer (MAC) and Physical Layers (PHY) for Wi-Fi sensing in 2.4GHz, 5 GHz, and 6GHz bands as defined in IEEE Std 802.11™-2016 (including the HT, VHT, DMG sections and the on-going development for 802.11ax, 802.11ay, 802.11az, and 802.11be); and, optionally, in the 60 GHz frequency band (57 GHz to 71 GHz).

This amendment defines at least one mode which adds sensing features that include: option to exchange capabilities and sensing feature support, enable airtime efficient protocols to monitor CSI, enable scheduled unsolicited sounding and enable TX adaptation freeze and/or indication. This amendment shall provide interoperability, coexistence, and backward compatibility with legacy IEEE 802.11 devices and intends to reuse existing Wi-Fi capabilities and statistics as much as possible. This amendment also ensures backward compatibility for sensing features so that existing or legacy devices can provide some base level of WiFi sensing support.
 **5.3 Is the completion of this standard dependent upon the completion of another standard: NO**

 **5.4 Purpose:** The purpose of this standard is to provide wireless connectivity for fixed, portable, and moving stations within a local area. This standard also offers regulatory bodies a means of standardizing access to one or more frequency bands for the purpose of local area communication. The Purpose of this amendment is to enable Wi-Fi enabled stations to efficiently support Wi-Fi sensing capabilities with minimal disruption to ongoing traffic and staying compatible to existing Wi-Fi implementations.

**5.5 Need for the Project:**

Wi-Fi channel state information (CSI)-based behaviour recognition applications continue its growth and their implementations have become feasible for providing services in many domains such as security, automation, healthcare and localization [1-6].

Current IEEE 802.11 compatible implicit and explicit sounding and CSI extraction methods have enabled the growth of the above-mentioned innovative applications. However, enhancements in protocol and sounding etc. can vastly improve the performance of algorithms relying on Wi-Fi sensing and help in developing new applications that are not feasible with existing standards.

During the past decade, IEEE 802.11 technology has improved, from IEEE Std 80211a™-2009, to IEEE Std 802.11n™-2009, IEEE Std 802.11ac™-2013 and the ongoing IEEE P802.11ax™ amendment, with supported throughput increasing from 54 Mbps to close to 10 Gbps, as well as higher reliability and improved range. To address future needs for CSI-based technology and provide 802.11-based future-proof technology for sensing applications, the definition of new sensing mechanisms based on new and existing, proven IEEE 802.11 WLAN PHY/MAC technologies, are needed.

 **5.6 Stakeholders for the Standard:**Manufacturers and users of semiconductors, personal computers, consumer electronic devices, home networking equipment, mobile devices, sensing-based behavior recognition application vendors, home/vehicular automation and home security equipment/component vendors and service providers.

**Intellectual Property:
6.1.a. Is the Sponsor aware of any copyright permissions needed for this project?: No**

**6.1.b. Is the Sponsor aware of possible registration activity related to this project?:** No

**If yes please explain:**

* 1. **Are there other standards or projects with a similar scope?:** No

**7.2 Joint Development**
**Is it the intent to develop this document jointly with another organization?:** No

**8.1 Additional Explanatory Notes (Item Number and Explanation)**

**References:**

[1] 11-19-1164r0 – Tony Han – Wi-Fi sensing.

[2] 11-19-1293r0 – Claudio da Silva – Wi-Fi sensing: Usages, requirements, technical feasibility and standard gaps.

[3] 11-19-1769r1 – Debashis Dash – CSI-based Wi-Fi sensing: results and standardization challenges.

[4] 11-19-1803r0 – Michel Allegue – Wi-Fi sensing: Technical feasibility, standardization gaps.

[5] 11-1901745r0 – Oscar Au – Wireless sensing: Use cases, feasibility and standardization.

[6] 11-19-1994r0 – Bahar Sadeghi – Overview of WBA Wi-Fi sensing whitepaper.