# P802.11ah

**Submitter Email:** bkraemer@marvell.com
**Type of Project:** Amendment to IEEE Standard 802.11-2007
**PAR Request Date:** 26-Jul-2010
**PAR Approval Date:** 30-Sep-2010
**PAR Expiration Date:** 31-Dec-2014
**Status:** PAR for an Amendment to an existing IEEE Standard
**Project Record:** No Project Record
**Root Project:** 802.11-2007 Edit Root Project Record

**1.1 Project Number:** P802.11ah
**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- Sub 1 GHz License-Exempt Operation

**3.1 Working Group:** Wireless LAN Working Group (C/LM/WG802.11)
**Contact Information for Working Group Chair**
**Name:** Bruce Kraemer
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**Name:** Adrian Stephens
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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**
None

**4.1 Type of Ballot:** Individual
**4.2 Expected Date of submission of draft to the IEEE-SA for Initial Sponsor Ballot:** 11/2011
**4.3 Projected Completion Date for Submittal to RevCom:** 10/2012

**5.1 Approximate number of people expected to be actively involved in the development of this project:** 50
**5.2 Scope:** This amendment defines an Orthogonal Frequency Division Multiplexing (OFDM) Physical layer (PHY) operating in the license-exempt bands below 1 GHz, e.g., 868-868.6 MHz (Europe), 950 MHz -958 MHz (Japan), 314-316 MHz, 430-434 MHz, 470-510 MHz, and 779-787 MHz (China), 917 - 923.5 MHz (Korea) and 902-928 MHz (USA), and enhancements to the IEEE 802.11 Medium Access Control (MAC) to support this PHY, and provides mechanisms that enable coexistence with other systems in the bands including IEEE 802.15.4 and IEEE P802.15.4g.
The data rates defined in this amendment optimize the rate vs range performance of the specific channelization in a given band.
This amendment also adds support for:
-transmission range up to 1 km
-data rates > 100 kbit/s
while maintaining the IEEE 802.11 WLAN user experience for fixed, outdoor, point to multi point applications.
**5.3 Is the completion of this standard dependent upon the completion of another standard:** No
**5.4 Purpose:** The purpose of this amendment defines operation of license-exempt IEEE 802.11 wireless networks in frequency bands below 1 GHz excluding the TV White Space bands.

**5.5 Need for the Project:** Equipment ships today that utilize the IEEE 802.11 protocols in frequency bands below 1 GHz, primarily used in outdoor applications. However, the IEEE 802.11 standard does not specify channel width and center frequencies for these

AX Wireless, LLC
Exhibit AXW-2026
Intel v. AX Wireless
IPR2023-01140
AXW-2026-001

bands. This amendment will establish standard channel widths and center frequencies for OFDM PHY operations below 1 GHz. The changes primarily will be done in new regulatory classes (requiring extending annex I and J of IEEE 802.11-2007).

**5.6 Stakeholders for the Standard:** Manufacturers and users of semiconductor, personal computer, enterprise networking devices, consumer electronic devices, home networking equipment, mobile devices, and outdoor applications.

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**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

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**7.1 Are there other standards or projects with a similar scope?:** Yes
**If Yes please explain:** Explanation: IEEE P802.15.4g utilizes an OFDM PHY in similar bands however with an IEEE 802.15.4 MAC.

**and answer the following**
**Sponsor Organization:** IEEE
**Project/Standard Number:** P802.15.4g
**Project/Standard Date:** 10-Dec-2008
**Project/Standard Title:** IEEE Standard for Information Technology - Telecommunications and Information Exchange Between Systems - Local and Metropolitan Area Networks - Specific Requirements - Part 15.4: Wireless Medium Access Control (MAC) and Physical Layer (PHY) Specifications for Low Rate Wireless Personal Area Networks (WPANs) - Amendment: Physical Layer(PHY) Specifications
**7.2 Joint Development**
**Is it the intent to develop this document jointly with another organization?:** No
**7.3 International Activities**
**a. Adoption**
**Is there potential for this standard (in part or in whole) to be adopted by another national, regional or international organization?:** No
**b. Harmonization**
**Are you aware of another organization that may be interested in portions of this document in their standardization development efforts?:** No

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**8.1 Additional Explanatory Notes (Item Number and Explanation):** 7.1) IEEE P802.11af is another active project below 1GHz it but will not occupy the same spectrum.
Explanation: This amendment defines operation in license-exempt bands below 1 GHz, excluding the TV White Spaces. P802.11af defines operation in the TV White Space bands, which are below 1 GHz.
Sponsor Organization: IEEE
Project/Standard Number: P802.11af
Project/Standard Date: 09-Dec-2009
Project/Standard 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: TV White Spaces Operation