IEEE P802.11  
Wireless LANs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 802.11 NGP SG Proposed PAR | | | | |
| Date: 2015-05-12 | | | | |
| Author(s): | | | | |
| Name | Affiliation | Address | Phone | Email |
| Jonathan Segev | Intel Corporation |  | +972-54-2403587 | jonathan.segev@intel.com |
| Peter Thornycroft | Aruba |  |  | pthornycroft@arubanetworks.com |
| Dorothy Stanley | Aruba |  |  | DStanley@arubanetworks.com |
| Qi Wang | Broadcom |  |  | qi.wang@broadcom.com |
| Brian Hart | Cisco |  |  | brianh@cisco.com |
| Santosh Pandey | Cisco |  |  | sanpande@cisco.com |
| Naveen Kakani | CSR |  |  | naveen.kakani@csr.com |
| Jon Roshdahl | CSR |  |  | Jon.Rosdahl@csr.com |
| Ganesh Venkatesan | Intel Corporation |  |  | Ganesh.venkatesan@intel.com |
| Liwen Chu | Marvell |  |  | liwenchu@marvell.com |
| Edward Au | Marvell |  |  | edwardau@marvell.com |
| Gabor Bajko | MediaTek |  |  | gabor.bajko@mediatek.com |
| ChaoChung Wang | MediaTek |  |  | chaochun.wang@mediatek.com |
| Mark Rison | Samsung |  |  | m.rison@samsung.com |
| Fei Tang | Samsung |  |  | f.tong@samsung.com |
| Carlos Aldana | Qualcomm |  |  | caldana@qti.qualcomm.com |
| Praveen Dua | Qualcomm |  |  | [pdua@qti.qualcomm.com](mailto:pdua@qti.qualcomm.com) |
| Meng Wang | Ericsson |  |  | meng.a.wang@ericsson.com |

Abstract

This submission includes the IEEE 802.11 Next Generation Positioning (NGP) Study Group PAR.

# PAR

**P802.11**

**Submitter Email:** jonathan.segev@intel.com  
**Type of Project:** Amendment to IEEE Standard 802.11  
**PAR Request Date:** July 2015   
**PAR Approval Date:** July 2015 **PAR Expiration Date:** July 2019 **Status:** Unapproved PAR, PAR for an amendment to an existing IEEE Standard

**1.1 Project Number:** P802.11az  
**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: Positioning Enhancements.

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

**Name:** Adrian Stephens  
**Email Address:** Adrian.P.Stephens@intel.com   
**Phone:** +44 (1793) 404825

**Contact Information for Working Group Vice-Chair Name:** Jon Rosdahl  
**Email Address:** jrosdahl@ieee.org  
**Phone:** +1-801-492-4023

**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   
**Phone:** +1-857.205.0050

**Contact Information for Standards Representative Name:** James Gilb  
**Email Address:** gilb@ieee.org  
**Phone:** +1-858-229-4822

**4.1 Type of Ballot:** Individual  
**4.2 Expected Date of submission of draft to the IEEE-SA for Initial Sponsor Ballot:**Sep. 2018.   
**4.3 Projected Completion Date for Submittal to RevCom:**Sep. 2019.

**5.1 Approximate number of people expected to be actively involved in the development of this project:** 40.

**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) of High Throughput (HT), Very High Throughput (VHT), Directional Multi Gigabit (DMG) and PHYs under concurrent development (e.g. High Efficiency (HE), Next Generation 60GHz (NG60)) that enables determination of absolute and relative position with better accuracy with respect to the Fine Timing Measurement (FTM) protocol5 executing on the same PHY-type, while reducing existing wireless medium use and power consumption and is scalable to dense deployments.

These modifications shall enable coexistence and backward compatibility with other 802.11 devices, operating in the same band. Backward compatibility with legacy 802.11 devices implies that devices implementing this amendment shall (a) maintain data communication compatibility and (b) support the Fine Timing Measurement (FTM) protocol.

**5.3 Is the completion of this standard dependent upon the completion of another standard:** The HE task group is amending 802.11 and a task group (if any) arising from the NG60 study group might amend 802.11. It is anticipated that the NGP, HE and (if applicable) NG60 amendments will coordinate their drafts in accordance with their expected completion dates.  **5.4 Purpose:**The purpose of this amendment is to enhance accuracy and scalability of positioning (over and above that provided by the Fine Timing Measurement mechanism in IEEE Std 802.11) for fixed, portable, and mobile stations.

**5.5 Need for the Project**With the introduction of accurate location support to IEEE Std 802.11, a broad set of mass market applications and Use Cases have been enabled.

However, as the technology penetrates the market, user expectations are for positioning services to be made available anytime, any place at increasing level of performance.

According to market research the year over year market till 2018 for 802.11 based positioning technology is expected to grow by roughly 15% for AP to STA usages and 50% for peer to peer usages year over year for the same period2. Thus the opportunity arises for 802.11 based systems to extend their location capabilities to new use case scenarios.

Current standardized technology already enables 802.11 based navigation for pedestrians, yet other usages and use cases are in need of additional positioning services:

* A more robust, accurate and precise location such as guidance to a product on a specific shelf1,6 while retaining the existing infrastructure deployment density.
* A highly scalable indoor positioning system for crowded metro stations and stadiums3,4,6.
* Non-AP STA to non-AP STA positioning such as support for peer to peer connectivity and decision making6.

**5.6 Stakeholders for the Standard**Manufacturers and users of semiconductors, personal computers, enterprise networking devices, consumer electronic devices, home networking equipment, mobile wearable devices, test and measurement equipment 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

**7.1 Are there other standards or projects with a similar scope?**

Sponsor Organization: IEEE 802  
Standard Number: IEEE 802.15.7  
Standard Date: 5/2017 (projected)   
Standard Title: 802.15.7 IEEE Standard for Local and Metropolitan Area Networks--Part 15.7: Short-Range Wireless Optical Communication Using Visible Light.

https://mentor.ieee.org/802.15/dcn/15/15-15-0064-00-0007-p802-15-7-revision-par-approved-2014-12-10.pdf

**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):**The PAR for IEEE 802.15.7 (see Cl. 7.1for a link to the PAR) includes the following in Cl. 5.5 Need for the project, and calls out Location Based Services explicitly:

“Potential applications include secure point-to-point communication, Location Based Services (LBS), secure point-to-multipoint communication (office, hospital, air plane), Intelligent Transportation Systems (ITS), General Information Broadcasting, Line-of-Sight (LOS) marketing, LED-ID, Device-to-Device (D2D), IoT, digital signage, Augmented Reality, and many more.”

**References:**

1. “Indoor Location Positioning Technology: Research, Start-ups and Predictions”, by Grizzly Analytics Market Research, March 2013.
2. “Smartphone Indoor Location Technologies”, by ABI Research, June 2013
3. 11-14/1235r0, “[Scalable Location](https://mentor.ieee.org/802.11/dcn/14/11-14-1235-00-0wng-scalable-location.pptx)”, by Brian Hart (Cisco Systems) et al.
4. 11-13/72r1, “[Client Positioning using Timing Measurements between Access Points](https://mentor.ieee.org/802.11/dcn/13/11-13-0072-01-000m-client-positioning-using-timing-measurements-between-access-points.pptx)”, by Erik Lindskog (CSR Technology) et al.
5. 11-12/1249r4, “[CIDs 46,47,48 Regarding Fine Timing Measurement](https://mentor.ieee.org/802.11/dcn/12/11-12-1249-04-000m-802-11-2012-cid-46-47-48.doc)”, by Carlos Aldana (Qualcomm) et al.
6. 11-14/1464r2, “[Next Generation Positioning Overview and Challenges](https://mentor.ieee.org/802.11/dcn/14/11-14-1464-02-0wng-ng-positioning-overview-and-chalanges.pptx)”, by Jonathan Segev (Intel) et al.