IEEE P802.11  
Wireless LANs

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| A PAR Proposal for Wake-up Radio | | | | |
| Date: 2015-07-28 | | | | |
| Author(s): | | | | |
| Name | Affiliation | Address | Phone | Email |
| Shahrnaz Azizi | Intel Corporation | 2200 Mission College Blvd, Santa Clara, CA 95054 |  | [shahrnaz.azizi@intel.com](mailto:shahrnaz.azizi@intel.com) |
| Minyoung Park | Intel Corporation |  |  | Minyoung.park@intel.com |
| Osama Aboul-Magd | Huawei Technologies |  |  | osama.aboulmagd@huawei.com |
| Steve Shellhammer | Qualcomm |  |  | shellhammer@qti.qualcomm.com |
| Leif Wilhelmsson | Ericsson |  |  | leif.r.wilhelmsson@ericsson.com |
| William Carney | Sony |  |  | William.Carney@am.sony.com |
| Mark Rison | Samsung |  |  | m.rison@samsung.com |
| John Son | WILUS |  |  | john.son@wilusgroup.com |
| Kenichi Mori |  |  |  | ken1.morius@gmail.com |
| Minho Cheong | Newracom |  |  | minho.cheong@newracom.com |
| Eduard Garcia-Villegas | UPC |  |  | eduardg@entel.upc.edu |
| Eunsung Park | LGE |  |  | esung.park@lge.com |
| Yongho Seok | Newracom |  |  | yongho.seok@newracom.com |
| Igor Kim | ETRI |  |  | ikim@etri.re.kr |
| Sung-Hyun Hwang | ETRI |  |  | shwang@etri.re.kr |
| James Lepp | BlackBerry |  |  | jlepp@ieee.org |
| Jae Seung Lee | ETRI |  |  | jasonlee@etri.re.kr |
| Reza Hedayat | Newracom |  |  | reza.hedayat@newracom.com |
| Ke Yao | ZTE |  |  | yao.ke5@zte.com.cn |
| Jinsoo Choi | LGE |  |  | js.choi@lge.com |
| Shimi Shilo | Huawei |  |  | Shimi.Shilo@huawei.com |
| Ping Fang | Huawei Device |  |  | ping.fang@huawei.com |
| Bo Sun | ZTE |  |  | sun.bo1@zte.com.cn |
| HanGyu Cho | LGE |  |  | hg.cho@lge.com |
| Francois Simon | Pilot Research |  |  | fygs@pilotresearch.com |
| Ansley, Carol | Arris |  |  | Carol.Ansley@arris.com |
| Jinsam Kwak | WILUS |  |  | jinsam.kwak@wilusgroup.com |
| Kiseon Ryu | LGE |  |  | kiseon.ryu@lge.com |
| Minseok Oh | LGE |  |  | minseok.oh@lge.com |
| Saishankar Nandagopalan | Cypress |  |  | snan@cypress.com |
| Sung Eun Lee | Cypress |  |  | SULE@cypress.com |
| Yangxun David | Huawei |  |  | david.yangxun@huawei.com |
| Junghoon Suh | Huawei |  |  | Junghoon.Suh@huawei.com |
| Lei Wang | Marvell |  |  | leileiw@marvell.com |
| Robert Stacey | Intel |  |  | robert.stacey@intel.com |
| Yunsong Yang | Huawei |  |  | yangyunsong@huawei.com |
| Peter Loc | Huawei |  |  | peterloc@iwirelesstech.com |

Abstract

This submission includes a PAR proposal for the IEEE 802.11 Wake-up Radio (WUR) Study Group.

# PAR

**P802.11**

**Submitter Email:**   
**Type of Project:** Amendment to IEEE Standard 802.11  
**PAR Request Date:** 19-SEP-2016   
**PAR Approval Date:   
PAR Expiration Date:   
Status:** Unapproved PAR, PAR for an amendment to an existing IEEE Standard

**1.1 Project Number:** P802.11ba  
**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: Wake-up radio operation

**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@ieee.org **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:**November 2019   
**4.3 Projected Completion Date for Submittal to RevCom:**July 2020

**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 a physical (PHY) layer specification and defines modifications to the medium access control (MAC) layer specification that enables operation of a wake-up radio (WUR). The wake-up frames carry only control information. The reception of the wake-upframe by the WUR can trigger a transition of the primary connectivity radioout of sleep. The WUR is a companion radio to the primary connectivity radio and meets the same range requirement as the primary connectivity radio. The WUR devices coexist with legacy IEEE 802.11 devices in the same band. The WUR has an expected active receiver power consumption of less than one milliwatt.

**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.

**5.5 Need for the Project:** Low power devices manifest themselves in a number of applications and Internet-of-Things (IOT) usage cases. These use cases include healthcare, smart home, industrial sensors, wearables, etc. Devices used in these applications are usually powered by a battery. Prolonging the battery lifetime while in some use cases also maintaining low latency becomes an imperative requirement. A typical OFDM active receiver consumes tens to hundreds of milliwatts. To further reduce power consumption, devices use power save modes. **Devices based on the IEEE 802.11 power save modes periodically wake up from a sleep**

state to receive information from an access point (AP) and to know whether there are data to receive from the AP. The longer the devices stay in the sleep state, the lower power the devices consume but at the expense of increased latency of data reception. **Power efficient mechanisms need**  to be used with battery-operated devices while maintaining low latency where it is required.

**5.6 Stakeholders for the Standard:** Manufacturers and users of semiconductors, personal computers, enterprise networking devices, consumer electronic devices, home networking equipment, producers of industrial sensors, mobile devices, and cellular operators.

**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?: 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):**