IEEE P802.11
Wireless LANs

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| 802.11 UHR Proposed PAR |
| Date: 2023-03-12 |
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Abstract

PAR document for UHR.

Revisions:

* Rev 0: Initial version of the document.
* Rev 1:
	+ section 5.2: KPI/objectives part including the result of offline discussion during January meeting and merge between several PAR proposals
	+ section 5.5 including additions proposed by Akira Kishida following SP from doc 1919r5
* Rev 2: editorial changes
* Rev 3:
	+ edits during the meeting
	+ SP ran on 01/19/2023 on initial draft for KPI/objectives part of Section 5.2b: 121Y 54N, 26A
* Rev 4:
	+ Improved language for section 5.5
	+ Explanation for using the term Ultra High in section 8.1
* Rev 5:
	+ Typos fixed in section 5.5
* Rev 6:
	+ Changes from Lei on explanatory notes
	+ Edits on 5.2 to incorporate AP and Mobile AP power save
* Rev 7: final version

# PAR

**P802.11**

**Submitter Email:**
**Type of Project:** Amendment to IEEE Standard 802.11
**PAR Request Date:** TBD
**PAR Approval Date: May 2023
PAR Expiration Date: May 2027
Status:** Unapproved PAR, PAR for an amendment to an existing IEEE Standard

**1.1 Project Number:** P802.11bn
**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 Ultra High Reliability WLAN

**3.1 Working Group:** Wireless LAN Working Group (C/LM/WG802.11)

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**3.2 Sponsoring Society and Committee:** IEEE Computer Society/LAN/MAN Standards Committee (C/LM)

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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:**July 2026
**4.3 Projected Completion Date for Submittal to RevCom:
Note: Usual minimum time between initial sponsor ballot and submission to Revcom is 6 months.:** March 2027

**5.1 Approximate number of people expected to be actively involved in the development of this project:** 200

**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 standardized modifications to both the IEEE STD802.11 physical layers (PHY) and the IEEE STD802.11 Medium Access Control (MAC) that enhance Wireless Local Area Network (WLAN) reliability by enabling, in scenarios of an isolated Basic Service Set (BSS) or of overlapping BSSs:

* + at least one mode of operation capable of increasing throughput, as measured at the MAC data service Access Point (SAP), at different Signal to Interference and Noise Ratio (SINR) levels (Rate-vs-Range), compared to IEEE P802.11be
	+ at least one mode of operation capable of improving the tail of the latency distribution and jitter compared to IEEE P802.11be and mobility between BSSs
	+ at least one mode of operation capable of improving efficient use of the medium compared to IEEE P802.11be.

This amendment provides mechanisms for enhanced power save for both AP (including mobile AP) and non-AP stations and improved Peer-to-Peer (P2P) operation compared to IEEE P802.11be.

This amendment applies to carrier frequency operation between 1 GHz and 7.250 GHz. This amendment shall ensure backward compatibility and coexistence with legacy IEEE 802.11 devices in the 2.4 GHz, 5 GHz and 6 GHz unlicensed bands.

 **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:**

The usage of WLANs based on IEEE 802.11 technology continues to grow and diversify over many market segments including residential, enterprise, industrial and agriculture. More stringent requirements are needed to meet the demands of new applications and to improve reliability (i.e., stable and consistent connectivity and quality of service). WLANs based on the IEEE 802.11 standard have already experienced a steady rise in achievable data rates. WLAN devices that support data rates in the range of a few gigabits per second (Gbps) are already available. The technology needs to further evolve to increase capacity, throughput, and throughput at range, so that it can align with symmetrical broadband speed of 10 Gbps.

Cutting-edge applications like the metaverse [1], augmented and virtual reality [2], and emerging usages like robotics, industrial automation for industrial IoT, logistics and smart agriculture [3] offer a wide range of digitally enhanced worlds, realities, and business models that have the potential to revolutionize both personal and enterprise activities in the next decade. These applications require large throughput combined with reduced and predictable worst-case delays and jitters, high reliability, and improved power efficiency [1]. Technical solutions to these challenges should address both deployments with a single isolated network (Basis Service Set) and deployments with multiple non-collocated BSSs in dense environments where in-band and optionally out-of-band (including via 802.3) AP coordination can be available (e.g., enterprise, residential). The latter type of deployment also requires seamless mobility to ensure reliable connectivity and quality of experience for mobile users.

Another trend is the growing use of WLAN Peer-to-Peer (P2P) communications in a wide range of deployment scenarios, which are competing with infrastructure WLAN usages for the same medium resources. This requires better coordination not only between neighboring APs but also between P2P networks.

Reducing power consumption of WLAN devices remains a key objective for the development of this standard. This is required to prolonge battery life of untethered devices (e.g., non-AP STA, Mobile APs), reduce device cost, and lower energy bills of non-AP and AP STAs in most deployment scenarios (e.g., residential, enterprise, industrial, venues). It also aims to decrease the carbon footprint of WLAN technology to fight greenhouse gas emissions and conform to energy regulatory requirements worldwide. AP Power Save encompasses different scenarios, including periods of low utilization while minimizing the impact on the service.

**5.6 Stakeholders for the Standard:**Manufacturers and users of semiconductors, personal computers, enterprise networking devices, consumer electronic devices, home networking equipment, 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):**

*Item 2.1: Ultra High Reliability (UHR)*

Implementations of the IEEE STD802.11 standard today provide high reliability for most use cases and deployment scenarios. The superlative “ultra-high” is intended to convey an improvement over the current baseline standard. The improvement might be realized as an expansion of the conditions under which a user gains connectivity for a given usage scenario. For example, a user experiencing marginal connectivity at the edge of a network today might experience improved connectivity with the defined enhancements. Conversely, an application (for example AR/VR) where the user experiences feedback lag under the current baseline might see reduced lag with the defined enhancements.

**References:**

[1] <https://circleid.com/posts/20220312-network-requirements-for-the-metaverse>

[2] <https://mentor.ieee.org/802.11/dcn/18/11-18-2009-06-0rta-rta-report-draft.docx>

[3] <https://mentor.ieee.org/802.11/dcn/22/11-22-1919-05-0uhr-considerations-on-uhr-par-and-kpis.pptx>