IEEE P802.11
Wireless LANs

|  |
| --- |
| **Specification Framework for TGbp** |
| **Date:** 2024-09-09 |
| **Author(s):** |
| **Name** | **Affiliation** | **Address** | **Phone** | **email** |
| Yinan Qi | OPPO | 18 Haibin Road, Wusha, Chang'an Town, Dongguan, Guangdong Province, P.R. China |  | v-qiyinan@oppo.com |

Abstract

This document provides the framework from which the draft TGbp amendment will be developed. The document provides an outline of each the functional blocks that will be a part of the final amendment. The document is intended to reflect the working consensus of the group on the broad outline for the draft specification. As such it is expected to begin with minimal detail reflecting agreement on specific techniques and highlighting areas on which agreement is still required. It may also begin with an incomplete feature list with additional features added as they are justified. The document will evolve over time until it includes sufficient detail on all the functional blocks and their inter-dependencies so that work can begin on the draft amendment itself.

# Revision history

|  |  |  |
| --- | --- | --- |
| Revision | Date | Changes |
| 0 | Sep 09, 2024 | Initial version |
| 1 | Sep 19, 2024 | Add motions passed in 2024 September meeting |
| 2 | Sep 25, 2024 | Revised version based on the comments from task group members |
| 3 | Nov 21, 2024 | Add motions passed in 2024 November meeting |

**Table of Contents**

[Revision history 2](#_Toc183001539)

[1. Abbreviations and acronyms 4](#_Toc183001540)

[2. AMP architecture 4](#_Toc183001541)

[2.1 General 4](#_Toc183001544)

[2.2 Architecture feature #1 4](#_Toc183001545)

[2.3 Architecture feature #2 4](#_Toc183001546)

[3. AMP MAC 4](#_Toc183001547)

[3.1 General 4](#_Toc183001549)

[3.2 AMP TSF 4](#_Toc183001550)

[3.3 MAC feature #2 4](#_Toc183001551)

[4. AMP PHY 4](#_Toc183001552)

[4.1 General 4](#_Toc183001554)

[4.2 DL PPDU 5](#_Toc183001555)

[4.3 UL PPDU 5](#_Toc183001556)

[4.4 PHY feature #3 6](#_Toc183001557)

[5. AMP WPT 6](#_Toc183001558)

[5.1 General 6](#_Toc183001560)

[5.2 WPT feature #1 6](#_Toc183001561)

[5.3 WPT feature #2 6](#_Toc183001562)

[6. Frame format 6](#_Toc183001563)

[6.1 General 6](#_Toc183001565)

[6.2 Field #1 6](#_Toc183001566)

[6.3 Field #2 7](#_Toc183001567)

[7. References 7](#_Toc183001568)

# Abbreviations and acronyms

AMP ambient power

MAC medium access control

PHY physical layer

WPT wireless power transfer

TSF timing synchronization function

OOK on-off keying

# AMP architecture

1.
2.

## General

This section describes the features related to the AMP architecture.

## Architecture feature #1

Description for Architecture feature #1

## Architecture feature #2

Description for Architecture feature #2

# AMP MAC

1.

## General

This section describes the functional blocks in the AMP MAC.

## AMP TSF

* **MM-1**: If AMP device is able to support AMP TSF, the maximum timing offset is ±104 ppm.

[Motion #13, [1] and [2]]

## MAC feature #2

Description for MAC feature #2

# AMP PHY

1.

## General

* **PM-1**: 11bp supports a mode to enable AMP devices to operate in legacy WLAN network by defining AMP DL and required control/signaling.

[Motion #7, [1] and [3]]

* **PM-2**: 11bp defines at least one mode of MAC/PHY that allows an AMP-only device with active uplink communication in 2.4GHz subject to the following requirements:
	+ clock accuracy requirement is relaxed compared to legacy 802.11 devices;
	+ the active uplink communication can only be sent in response to being polled by the AP.

[Motion #14, [1] and [4]]

* **PM-3**: 11bp defines at least one mode of MAC/PHY that supports close-range mono-static backscattering communication in 2.4 GHz.

[Motion #15, [1] and [5]]

* **PM-4**: 11bp defines at least one mode of MAC/PHY that supports bi-static backscattering communication in 2.4 GHz.

[Motion #15, [1] and [6]]

## DL PPDU

* **PM-5**: IEEE 802.11bp will specify, in 2.4 GHz, an AMP Downlink PPDU containing at least an 802.11 preamble field, an AMP-Sync field and an AMP-Data field. Inclusion of an AMP-SIG field is TBD.
	+ The details of the 802.11 preamble field are TBD.
	+ Additionally, for transmission to backscatter STAs there will be one or more Excitation fields
	+ Additionally, for transmission to backscatter STAs there may be more than one AMP-Data field
		- Additionally, AMP-Sync and AMP-SIG field may precede each AMP-Data field
	+ Name of this Downlink PPDU is TBD.

[Motion #8, [1] and [7]]

* **PM-6**: The AMP Downlink PPDU AMP-Sync field and the AMP-Data field will use On-Off Keying (OOK) modulation.

[Motion #9, [1] and [7]]

* **PM-7**: The AMP Downlink PPDU AMP-Data field will use Manchester encoding for non-backscatter operation.
	+ For the Backscatter case, the AMP-Data field encoding scheme is TBD.

[Motion #10, [1] and [7]]

* **PM-9**: The AMP Downlink PPDU in 2.4 GHz shall support the following data rates:
	+ 1 Mb/s (for non-Backscatter STAs only)
	+ 250 kb/s.

[Motion #16, [1] and [9]]

* **PM-10**: The AMP-Sync field in AMP Downlink PPDU in 2.4 GHz is defined with chip duration of 2µs for backscattering case.

[Motion #18, [1] and [10]]

## UL PPDU

* **PM-8**: IEEE 802.11bp shall specify, in 2.4 GHz, an AMP uplink PPDU for AMP STA supporting active transmission that contains an AMP-Sync field and AMP-Data field. Inclusion of an AMP-SIG field in the AMP uplink PPDU is TBD.
	+ The bandwidth of the AMP uplink PPDU is less than 20 MHz.

[Motion #11, [1] and [8]]

* **PM-11**: 11bp defines Manchester encoding for the data portion of UL transmission in 2.4 GHz, including both backscattering and active transmission.

[Motion #19, [1] and [11]]

* **PM-12**: When performing transmission, the maximum clock offset is ± 103 ppm for AMP Non-AP STA supporting active transmission.

[Motion #20, [1], [12] and [13]]

* **PM-13**: 11bp will define On-Off Keying (OOK) modulation for AMP-Sync field and the AMP-Data field in an AMP Uplink PPDU for Active Transmission.

[Motion #21, [1], [14] and [15]]

## PHY feature #3

Description for PHY feature #3

# AMP WPT

1.

## General

This section describes the functional blocks for the AMP WPT.

## WPT feature #1

Description for WPT feature #1

## WPT feature #2

Description for WPT feature #2

# Frame format

1.

## General

This section describes the frame formats.

## Field #1

Description for field #1

## Field #2

Description for field #2

# References

1. [11-24-1322r](https://mentor.ieee.org/802.11/dcn/24/11-24-1322-05-00bp-tgbp-motion-dock.pptx)5: IEEE 802.11 TGbp Motion Dock, Bo Sun (Sanechips)
2. [11-24-1475r3](https://mentor.ieee.org/802.11/dcn/24/11-24-1475-03-00bp-discussion-on-ultra-low-power-timing-clock.pptx): Discussion on ultra-low power timing clock, Weijie Xu (OPPO)
3. [11-24-1263r0](https://mentor.ieee.org/802.11/dcn/24/11-24-1263-00-00bp-amp-supported-legacy-mode.pptx): AMP Supported Legacy Mode, Pooria Pakrooh (Qualcomm Inc.)
4. [11-24-1535r2](https://mentor.ieee.org/802.11/dcn/24/11-24-1535-02-00bp-ppdu-design-for-amp.pptx): PPDU Design for AMP, Yinan Qi (OPPO)
5. [11-24-0798r1](https://mentor.ieee.org/802.11/dcn/24/11-24-0798-01-00bp-close-range-amp-wifi-reader-feasibility-study-followup.pptx): Close-range AMP WiFi Reader Feasibility Study followup, Rui Cao (NXP)
6. [11-24-1215r1](https://mentor.ieee.org/802.11/dcn/24/11-24-1215-01-00bp-feasibility-study-on-long-range-backscatter-operation.pptx): Feasibility study on long range backscatter operation, Wei Lin (Huawei)
7. [11-24-1345r2](https://mentor.ieee.org/802.11/dcn/24/11-24-1345-02-00bp-high-level-requirements-for-downlink-phy-in-2-4-ghz.pptx): High-Level Requirements for Downlink PHY in 2.4 GHz, Steve Shellhammer (Qualcomm Inc.)
8. [11-24-1496r2](https://mentor.ieee.org/802.11/dcn/24/11-24-1496-02-00bp-ppdus-in-amp.pptx): PPDUs in AMP, Bin Qian (Huawei)
9. [11-24-179](https://mentor.ieee.org/802.11/dcn/24/11-24-1793-01-00bp-amp-downlink-data-rates.pptx)3r1: AMP Downlink Data Rates, Steve Shellhammer (Qualcomm Inc.)
10. [11-24-179](https://mentor.ieee.org/802.11/dcn/24/11-24-1797-00-00bp-design-considerations-of-dl-data-rate-and-sync.pptx)7r0: Design considerations of DL data rate and SYNC, Rui Cao (NXP)
11. [11-24-179](https://mentor.ieee.org/802.11/dcn/24/11-24-1798-00-00bp-backscattering-ul-data-rate-and-modulation.pptx)8r0: Backscattering UL data rate and modulation, Rui Cao (NXP)
12. [11-24-1](https://mentor.ieee.org/802.11/dcn/24/11-24-1475-03-00bp-discussion-on-ultra-low-power-timing-clock.pptx)475r3: Discussion on ultra-low power timing clock, Weijie Xu (OPPO)
13. [11-24-179](https://mentor.ieee.org/802.11/dcn/24/11-24-1799-00-00bp-analysis-of-free-running-oscillators-accuracy-for-active-transmission-amp-devices.pptx)9r0: Analysis of Free Running Oscillators Accuracy for Active Transmission AMP Devices, Amichai Sanderovich (Wiliot)
14. [11-24-17](https://mentor.ieee.org/802.11/dcn/24/11-24-1780-01-00bp-further-discussion-on-amp-ppdu-design.pptx)80r1: Further Discussion on AMP PPDU Design, Yinan Qi (OPPO)
15. [11-24-1](https://mentor.ieee.org/802.11/dcn/24/11-24-1237-00-00bp-amp-tag-sta-requirements-for-close-range-backscattering.pptx)237r0: AMP Tag-STA Requirements for Close-Range Backscattering, Rui Cao (NXP)