IEEE P802.11
Wireless LANs

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| PDT MAC M-AP Coordination Framework |
| Date: 2025-01-01 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Arik Klein | Huawei |  | +972548085336 | Arik.Klein@huawei.com |
| Abhishek Chaturvedi | Samsung Electronics |  |  | ac.vrns@GMAIL.COM |
| Abhishek Patil | Qualcomm |  |  | appatil@qti.qualcomm.com |
| Alfred Asterjadhi | Qualcomm |  |  | asterjadhi@gmail.com |
| Binita Gupta | Cisco Systems |  |  | bingupta.ieee@GMAIL.COM |
| Brian Hart | Cisco Systems |  |  | brianh@cisco.com |
| Dana Ciochina | Sony Corporation |  |  | Dana.Ciochina@sony.com |
| Dibakar Das | Intel |  |  | dibakar.das@intel.com |
| Gaius Wee | Panasonic Corporation |  |  | yaohuang.wee@SG.PANASONIC.COM |
| Gaurang Naik | Qualcomm |  |  | gnaik@qti.qualcomm.com |
| Guarav Patwardhan | Hewlett Packard Enterprise |  |  | gauravpatwardhan1@gmail.com |
| GeonHwan Kim | LG ELECTRONICS |  |  | geonhwan.kim@LGE.COM |
| Giovanni Chisci | Qualcomm |  |  | gchisci@qti.qualcomm.com |
| Gwangho Lee | Korea National University of Transportation |  |  | gwangho.lee@A.UT.AC.KR |
| Haorui Yang | China Mobile |  |  | yanghaorui0217@163.COM |
| Hirohiko INOHIZA | Canon |  |  | inohiza.hirohiko@mail.canon |
| Insun Jang | LG ELECTRONICS |  |  | insun.jang@LGE.COM |
| Jason Yuchen Guo | Huawei |  |  | guoyuchen@huawei.com |
| Jay Yang | ZTE |  |  | yang.zhijie@ZTE.COM.CN |
| Jeongki Kim | Ofinno |  |  | jeongki.kim.ieee@GMAIL.COM |
| Jerome Gu |  Clourney Semicondcutor |  |  | jeg150@clourneysemi.com |
| Jiayi Zhang | Ofinno |  |  |  jzhang@ofinno.com |
| John Wullert | Peraton Labs |  |  | jwullert@PERATONLABS.COM |
| Jonghoe Koo | Samsung Electronics |  |  | jh89.koo@SAMSUNG.COM |
| Kaikai Huang | Nokia |  |  | kaikai.huang@NOKIA-SBELL.COM |
| Kaiying Lu | Mediatek |  |  | Kaiying.Lu@MEDIATEK.COM |
| Kazuto Yano | ATR |  |  | kzyano@IEEE.ORG |
| Ke Zhong | Ruijie Networks |  |  | zhongke@RUIJIE.COM.CN |
| Kosuke Aio | Sony Corporation |  |  | Kosuke.Aio@sony.com |
| Kyosuke Inoue | SHARP CORPORATION |  |  | kyosuke\_inoue@SHARP.CO.JP |
| Lei Zhou | H3C Technologies |  |  | zhou.leiH@H3C.COM |
| Leif Wilhelmsson | Ericsson |  |  | leif.r.wilhelmsson@ericsson.com |
| Leonardo Lanante | Ofinno |  |  | llanante@OFINNO.COM |
| Lili Hervieu | Cable Television Laboratories |  |  | L.Hervieu@CABLELABS.COM |
| Liuming Lu | Guangdong Oppo |  |  | luliuming@OPPO.COM |
| Liwen Chu | NXP Semiconductors |  |  | liwen.chu@nxp.com |
| Lyutianyang Zhang |  Huawei |  |  | zhanglyutianyang@huawei.com |
| Massinissa Lalam | SAGEMCOM |  |  | massinissa.lalam@SAGEMCOM.COM |
| Jun Minotani | Panasonic |  |  | minotani.jun@JP.PANASONIC.COM |
| Muhammad Kumail Haider | Meta |  |  | kumail.ieee@GMAIL.COM |
| Nima Namvar | Charter Communications |  |  | nimanamvar1987@GMAIL.COM |
| Pascal Viger | Canon |  |  | pascal.viger@crf.canon.fr |
| Patrice Nezou | Canon |  |  | patrice.nezou@crf.canon.fr |
| Pei Zhou | TCL |  |  | Zhoupei36@gmail.com |
| Peshal Nayak | Samsung |  |  | p.nayak@SAMSUNG.COM |
| Rishabh Roy | Samsung Electronics |  |  | 201082002@IITDH.AC.IN |
| Ross Jian Yu | Huawei |  |  | ross.yujian@huawei.com |
| Rubayet Shafin | Samsung |  |  | r.shafin@SAMSUNG.COM |
| Sanket Kalamkar | Qualcomm |  |  | sankal@qti.qualcomm.com |
| Shawn Kim |  WILUS |  |  | Shawn.kim@wilusgroup.com |
| Shuang Fan | Sanechips Technology |  |  | fan.shuang@SANECHIPS.COM.CN |
| Shubhodeep Adhikari | Broadcom |  |  | shubhodeep.adhikari@broadcom.com |
| Sindhu Verma | Broadcom |  |  | sindhu.verma@broadcom.com |
| Sungjin Park | senscomm |  |  |  |
| SunHee Baek | LG ELECTRONICS |  |  | sunhee.baek@LGE.COM |
| Taeyoung Ha | Samsung Electronics |  |  | ty1115.ha@samsung.com |
| Tong Bian | Panasonic Corporation |  |  | tong.bian@SG.PANASONIC.COM |
| Vishnu Ratnam | Samsung |  |  | vishnu.r@SAMSUNG.COM |
| Woojin Ahn | KNUT |  |  | Woojin.ahn@ut.ac.kr |
| Xiandong Dong | Xiaomi |  |  |  |
| Xiangxin Gu | Spreadtrum |  |  | Xiangxin.Gu@UNISOC.COM |
| Xiaofei Wang | Interdigital |  |  | Xiaofei.Wang@INTERDIGITAL.COM |
| Xuwen Zhao | TCL |  |  | li.yan16@zte.com.cn |
| Yajun Cheng |  |  |  | 000038d07d12e9a7-dmarc-request@listserv.ieee.org |
| Yanjun Sun | Apple Inc |  |  | yanjunsunstd@GMAIL.COM |
| Yaoshen Cui | TP-Link Systems |  |  | cuiyaoshen@TP-LINK.COM.HK |
| Yelin Yoon | LG ELECTRONICS |  |  | yl.yoon@LGE.COM |
| Yongho Seok | Apple Inc |  |  | y\_seok@apple.com |
| Yongsen Ma | Samsung Electronics |  |  | yongsen.ma@samsung.com |
| Yuki Fujimori | Canon |  |  | Yuki.Fujimori@CRF.CANON.FR |
| Yunpeng Yang | TP-Link Systems |  |  | yangyunpeng@TP-LINK.COM.HK |
| Yusuke Tanaka | Sony Corporation |  |  | yusuke.yt.tanaka@sony.com |
| Yuxin Lu | TCL |  |  | eeluyx@GMAIL.COM |
| Zhenpeng Shi | Huawei |  |  | shizhenpeng1@huawei.com |
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|  |  |  |  |  |

Abstract

This document contains Proposed Draft Text (PDT) for the Multi AP (M-AP) Coordination framework feature of the proposed TGbn (UHR, Ultra High Reliability) amendment to the 802.11 standard.

# Revision information

The following is a summary of the important changes that occurred within each revision of this document:

|  |  |
| --- | --- |
| **Revision** | **Major changes** |
| 0 | Initial revision |
| 1 | Typo corrections, adding AP ID definition, updates in 9.4.2.x UHR Capabilities element, text modifications in 37.7.1 General due to comments from: Jay, Xiaofei, Giovanni |
| 2 | Typo corrections, Adding reference to corresponding motions, Adding subclause 37.7.1 for Common procedures for all M-AP Coordination schemes (with Technical editor approval), Adding subclause 37.7.2 for (Particular) Procedures for specific M-AP Coordination schemes (with Technical editor approval), removing “in TBD frames” from the AP ID definition due to further comments from: Jiayi, Robbe, Haorui, You-Wei |
| 3 | Further wording corrections (Mark R.) and replacing the UHR Capabilites with MAPC Capabilities (Abhi, Binita) – following comments during TGbn MAC discussion |
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# Introduction

Interpretation of a Motion to Adopt

A motion to approve this submission means that the editing instructions and any changed or added material are actioned in the TGbe Draft. The abstract, revision information, introduction, explanation of the proposed changes and references sections are not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGbe Draft (i.e. they are instructions to the 802.11 editor on how to merge the text with the baseline documents).***

## Explanation of the proposed changes:

The proposed changes to the 802.11 TGbn draft within this document are based on the following motions adopted by the TGbn task group:

### Relevant passing motions:

* 11bn defines a common framework of a Multi-AP Coordination for various coordination schemes.
	+ Note - Coordination schemes such as (but not limited to): Co-SR (TXOP-based with power control), Co-BF, Co-TDMA, Co-RTWT, etc.

[Motion #50, [1] and [131, 151, 134, 137, 141, 152-156, 117, 157, 158]]

* 11bn defines a common framework of a Multi-AP Coordination that can enable the following procedures:
	+ Multi-AP Coordination Discovery procedure
	+ Multi-AP Coordination agreement negotiation procedure
	+ Note: Details of the procedures and whether the above procedures are mandatory/optional - TBD

[Motion #51, [1] and [131, 151, 134, 137, 141, 152-156, 117, 157, 158]]

* A UHR AP shall indicate to another AP its capability to respond in a TB PPDU or not
[Motion #120, [1] and [108, 115, 122, 123, 124]]
* APs that intend to participate in Multi-AP coordination can use management frames to advertise/discover the capabilities and/or parameters of individual schemes.

[Motion #147, [1] and [134, 110, 117, 157, 158, 218]]

* APs that discovered each other and want to establish agreement(s) for Multi-AP coordination scheme(s), can use individually addressed management frames to establish the agreement(s) and negotiate parameters
	+ Note: The management frame can be a Public Action and/or new Action frames, and so on.

[Motion #148, [1] and [134, 110, 117, 157, 158, 218]]

* The sharing AP, that transmits a Trigger frame as part of a transmission sequence in a Multi-AP coordinated transmission scheme, identifies the shared AP via an AP ID carried in the AID12 field of the User Info field of the frame
	+ Note: the name of "sharing AP" and "shared AP" are TBD
	+ Note: Multi-AP coordinated transmission schemes are Co-SR, Co-BF and Co-TDMA

[Motion #135, [1] and [207, 208, 157, 117, 118, 122, 123, 108, 115, 124, 158]]

# Text to be adopted begins here:

***TGbn editor: Please make the following changes to the 802.11bn draft D0.1:***

3.2 Definitions specific to IEEE Std 802.11 [ M#135]

***TGbn editor: Please insert a new definition as follows:***

access point identifier: [AP ID] A value used for identifying an AP, with which a Multi -AP coordination agreement has been established prior to or during a M-AP Coordination transmission.

**9.3.3.2. Beacon frame format**

***TGbn editor: Please insert a new row as follows:***

**Table 9-64—Association Request frame body**

|  |  |  |
| --- | --- | --- |
| **Order** | **Information** | **Notes** |
| … |  |  |
| <Last assigned + 1> |  MAPC Capabilities | The MPAC Capabilities element is present if dot11UHROptionImple mented is true and if dot11MAPCOptionImplemented is true; otherwise, it is not present. |

* + - 1. **Probe Request frame format**

***TGbn editor: Please insert a new row as follows:***

**Table 9-68—Probe Request frame body**

|  |  |  |
| --- | --- | --- |
| **Order** | **Information** | **Notes** |
| … |  |  |
| <Last assigned + 1> |  MAPC Capabilities | The MPAC Capabilities element is present if dot11UHROptionImple mented is true and if dot11MAPCOptionImplemented is true; otherwise, it is not present. |

* + - 1. **Probe Response frame format**

***TGbn editor: Please insert a new row as follows:***

**Table 9-67—Probe Response frame body**

|  |  |  |
| --- | --- | --- |
| **Order** | **Information** | **Notes** |
| … |  |  |
| <Last assigned + 1> |  MAPC Capabilities | The MPAC Capabilities element is present if dot11UHROptionImple mented is true and if dot11MAPCOptionImplemented is true; otherwise, it is not present. |

* + 1. **Elements**
			1. **General**

***TGbn editor: Please insert a new row as follows:***

**Table 9-128—Element IDs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Element** | **Element ID** | **Element ID Extension** | **Extensible** | **Fragmentable** |
| … |  |  |  |  |
| MAPC Capabilities (see [9.4.2.x (MAPC](#_bookmark180)  [Capabilities element)](#_bookmark180)) | 255 | <ANA> | Yes | No |

***TGbn editor: Please insert a new subclause as follows:***

**9.4.2.x MAPC Capabilities element [M# 120 ]**

The format of the MAPC Capabilities element is shown in [Figure 9-X1 (MAPC Capabilities element format)](#_bookmark181).

|  |  |  |  |
| --- | --- | --- | --- |
| Element ID | Length | Element ID Extension | MAPC Capabilities Information |

Octets: 1 1 1 TBD

**Figure 9-X1—MAPC Capabilities element format**

The Element ID, Length, and Element ID Extension fields are defined in 9.4.2.1 (General)

The format of the MAPC Capabilities Information field is defined in Figure 9-X2 (MAPC

Capabilities Information field format).

|  |  |  |  |
| --- | --- | --- | --- |
|  | B0 |  B1 - TBD |  |
|  | AP TB PPDU Response | Reserved |  |
| Bits: | 1 | TBD |  |

**Figure 9-X2—** **MAPC Capabilities Information field format**

The AP TB PPDU Response field indicates whether an AP supports a TB PPDU response to a preceding trigger frame that is destined to that AP. A value of 1 in this field indicates that the AP supports a TB PPDU response to a trigger frame that includes it’s AP ID value in the User Info field. A value of 0 in this field indicates that the AP does not support a TB PPDU response to a trigger frame that includes it’s AP ID value in the User Info field.

***TGbn editor: Please add the following subclause 37.7 M-AP Coordinated framework in 802.11bn D0.1:***

37.7 Multi-AP Coordination framework

37.7.1 Common procedures for all Multi-AP Coordination schemes [M# 50, 51]

37.7.1.1 General [M# 50, 51]

The Multi-AP Coordination feature includes a set of schemes and procedures in which OBSS APs coordinate their transmission to improve communication reliability.

This section details all the procedures that are common for all coordination schemes:

* The Multi-AP Coordination Discovery procedure is defined in 37.7.1.2
* The Multi-AP Coordination agreement negotiation procedure is defined in 37.7.1.3

All other procedures that are specific per coordination scheme are detailed in 37.7.2.

37.7.1.2 Multi -AP Coordination Discovery [M# 147]

UHR APs participating in Multi -AP coordination may transmit TBD Management frames to advertise capabilities of Multi-AP coordination schemes and their parameters.

Details are TBD.

37.7.1.3 Multi -AP Coordination agreement negotiation [M# 148]

A UHR AP shall follow the rules defined in this subclause to establish an agreement for Multi-AP Cooridnation through negotiation, in addition to the specific rules for Multi-AP coordination scheme used for this agreement and are defined in 37.7.2 subclause.

A UHR AP may initiate a negotiation with one or more UHR APs that support the same Multi-AP coordination scheme (as the initiating AP) and may transmit TBD individually addressed Management frame(s) to establish a Multi-AP Coordination agreement with the one or more UHR APs.

Details are TBD.

37.7.1.4 AP ID assignment [M# 135]

A UHR AP shall follow the rules defined in this subclause additionally to the rules defined in 37.7.1.3 (Multi-AP Coordination Agreement Negotiation) to assign an AP ID to another AP with which it establishes a Multi-AP Coordination agreement.

Details of AP ID assignment are TBD.

37.7.2 (Particular) Procedures for specific Multi-AP Coordination schemes [M# 50, 51]

37.7.2.1 General

TBD

37.7.2.2 Coordinated beamforming

TBD

37.7.2.3 Coordinated spatial reuse

TBD

37.7.2.4 Coordinated time division multiple access

TBD

37.7.2.5 Coordinated R-TWT

TBD

# Text to be adopted ends here.

**References:**

1. [11-24-0171r21](https://mentor.ieee.org/802.11/dcn/24/11-24-0171-21-00bn-tgbn-motions-list-part-1.pptx): 11-24-0171-21-00bn-tgbn-motions-list-part-1, Alfred Asterjadhi (Qualcomm Inc.)