IEEE P802.11
Wireless LANs

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| Proposed resolution of CID 3518 text |
| Date: 2018-14-11 |
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|  |  |  |  |  |

Abstract

This submission proposes resolutions to CID 3518 related to Multi-band.

The CID is in reference to Comment database on Draft IEEE 802.11ay/D2.0.

# Comment:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CID** | **PP.LL** | **Comment** | **Proposed Change** | **Suggested Resolution** |
| 3518 | 11.31.6 | Multi-band discovery assistance allows discovery of an AP or PCP that this STA is connected to however this is not enough. For some use cases, the STA might need to talk to a non-AP/PCP STAs in the same BSS or even in other BSSs . A STA should find other non-AP in that BSS and other BSS | The standard should define a mechanism to allow new STA to find neighbor STAs in an on-demand fashion. Commenter is willing to provide resolution text. | REVISED: Adopt changes proposed in doc11-18/1910r0 |

# Discussion:

An AP/PCP supporting multi-band discovery assistance may propagate a discovery assistance request received from a multi-band STA to other STAs connected to it. The AP/PCP collects the discovery assistance responses from all STAs received the propagated discovery assistance request before sending the discovery assistance response to the STA requesting discovery assistance. The STAs that received the propagated discovery assistance request, support discovery assistance and accepted the request shall offer discovery assistance as indicated in the discovery assistance response sent to the AP/PCP.

The Information Request frame is used to propagate the discovery assistance request from the AP/PCP to the STAs connected to it. The Information Response frame is used to send the discovery assistance response from the STAs received the request to the AP/PCP. The information Request and Information Response frames uses the DMG Discovery Assistance element to carry the discovery assistance request and response information.

# Proposed changes:

Apply the following changes.

Corresponding changes to 802.11ay D2.1 and 802.11md are indicated in the following text with “Track Changes” on, to clarify the direction to the editor.

**9. Frame formats**

**9.4 Management and Extension frame body components**

**9.4.2 Elements**

***To TGay Editor: Update the subclause 9.4.2:***

**9.4.2.273 DMG Discovery Assistance element**

The DMG Discovery Assistance element indicates parameters and attributes of the discovery assistance. This element is optionally present in FST Setup Request frame, FST Setup Response frame, Information Request frame and Information Response frame. The format of the DMG Discovery Assistance element is shown in Figure 103 (DMG Discovery Assistance element format).

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Element ID | Length | Element ID Extension | Discovery Assistance Control | Discovery Assistance Request Status Code | Discovery Assistance Window Length | Sector Sweep Start Time(Optional) | Temporary AID (Optional) | Dwelling Time(Optional) |
| Octets: | 1 | 1 | 1 | 1 | 2 | 3 | 4 | 1 | 2 |

**Figure 103 ~~E~~DMG Discovery Assistance element format**

The Element ID, Length, and Element ID extension fields are defined in 9.4.2.1.

The format of the Discovery Assistance Control field is shown in Figure 104. This field is reserved when the element is contained in FST Setup Request frame.

|  |  |  |  |
| --- | --- | --- | --- |
|  | B0  | B1 | B2 B7 |
|  | Discovery Assistance Type | Dwelling Time Present | Reserved |
| Bits: | 1 | 1 | 6 |

**Figure 104 Discovery Assistance Control field format**

The Discovery Assistance Type subfield is set to 0, to indicate that Sector Sweep Start Time field is present. When this field is set to 1, the discovery assistance signal schedule is indicated in the Extended Schedule element. This field is reserved when the Discovery Assistance Request Status Code subfield is not equal to SUCCESS.

Dwelling Time Present subfield is set to 1 to indicate that the Dwelling Time field is present in the DMG Discovery Assistance element and set to 0 otherwise. The Dwelling time Present subfield is reserved when the element is contained in the Information Request frame.

The Discovery Assistance Request Status Code field contains the result of the discovery assistance request and is one of the status codes specified in Table 9-52 (Status codes) in 9.4.1.9 (Status Code field). This field is reserved when the element is contained in FST Setup Request frame or the Information Request frame.

The Discovery Assistance Window Length field indicates the discovery assistance window length value as confirmed by the STA transmitting this element in microseconds. This field is reserved when the element is contained in FST Setup Request frame or the Information Request frame.

The Sector Sweep Start Time field indicates the lower 4 octets of the TSF of the DMG BSS at the time the sector sweep transmission starts. This field is present if the Discovery Assistance Type subfield is 0. This field is reserved when the element is contained in FST Setup Request frame or the Information Request frame.

The Temporary AID field indicates a temporary AID assigned by an AP or PCP to the STA receiving this element. The Temporary AID is used for scheduling discovery assistance only. This field is present if the Discovery Assistance Type subfield is 1.

The Dwelling Time field indicates the recommended time to sweep the received antenna pattern in scanning for beamforming or discovery signal in microseconds. This field is present if the Dwelling Time Present subfield 1.

**11. MLME**

**11.29 DMG BSS peer and service discovery**

***To TGay Editor: Insert the following new subclause to the end of subclause 11.29:***

**11.29.3 DMG discovery assistance**

**11.29.3.1 DMG discovery assistance through Information Request and Information Response frames**

When dot11DiscoveryAssistanceActivated is true, a DMG AP or PCP supports on-demand sector sweeping to assist discovery of the DMG BSS toward a STA requesting discovery assistance (see 11.31.6 (Multi-band discovery assistance procedure) for details). Upon reception of a discovery assistance request, the DMG AP or PCP may send a DMG discovery assistance request to other DMG STAs in its BSS to assist a DMG STA requesting discovery assistance discovering neighbor STAs in the BSS. The DMG discovery assistance request is an Information request frame containing the DMG Discovery Assistance element and the DMG Capabilities element of the STA requesting the discovery assistance. The Information Request frame carries no other DMG Capabilities element in case of DMG discovery assistance request. The DMG AP or PCP may send the DMG discovery assistance request only when the recipient is supposed to be in awake state. The DMG AP or PCP decides on the type of discovery assistance offered and sets fields in the DMG Discovery Assistance element in the Information Request frame as follows:

* If the discovery assistance is performed through scheduling DMG beacon transmission sweeping all sectors or initiating TDD beamforming:
	+ - Sets the Discovery Assistance Type subfield in the Discovery Assistance Control field to 0
* If the discovery assistance is performed through scheduled beamforming training period or scheduled TDD beamforming period:
	+ - Sets the Discovery Assistance Type subfield in the Discovery Assistance Control field to 1; and
		- Sets the Temporary AID field to the temporary AID assigned by the DMG AP or PCP to the DMG STA requesting discovery assistance (see 11.31.6.2 (Discovery assistance action determination and on-demand sector sweeping) for details)

When dot11DiscoveryAssistanceActivated is true, the DMG STA receiving the DMG discovery assistance request shall determine if it accepts the request. Further, it shall respond back to the DMG AP or PCP with DMG discovery assistance response, i.e., an Information Response frame containing the DMG Discovery Assistance element. If the DMG STA accepted the discovery assistance request, it sets the Discovery Assistance Request Status Code field in the DMG Discovery Assistance element in the Information Response frame to SUCCESS. The field is set to REFUSED otherwise. When accepting the discovery assistance request, the DMG STA shall take one of the following actions:

* + If the discovery assistance is requested through scheduling DMG beacon transmission sweeping all sectors or initiating TDD beamforming:

The DMG STA shall use the DMG Capabilities element of the DMG STA requesting discovery assistance contained in the Information Request frame to calculate the Discovery Assistance Window Length as described in 11.31.6.2 (Discovery assistance action determination and on-demand sector sweeping) and to schedule sector sweeping. The DMG STA sets the DMG Discovery Assistance element fields in the Information Response frame as follows:

* + - Sets the Discovery Assistance Type subfield in the Discovery Assistance Control field to 0; and
		- Sets the Dwelling Time Present subfield in the Discovery Assistance Control field to 0; and
		- Sets the Discovery Assistance Window Length field to the discovery assistance window length value, in microseconds as described in 11.31.6.2 (Discovery assistance action determination and on-demand sector sweeping); and
		- Sets the Sector Sweep Start Time field to the TSF value indicating when the discovery assistance starts.

The DMG STA shall start DMG beacon sweeping as specified in the DMG discovery assistance response that it transmitted.

* If the discovery assistance is requested through scheduled beamforming training period or scheduled TDD beamforming period:

The DMG Discovery Assistance element fields in the Information Response frame are set as follows:

* + - Sets the Discovery Assistance Type subfield in the Discovery Assistance Control field to 1; and
		- Sets the Dwelling Time Present subfield in the Discovery Assistance Control field to 0; and
		- Sets the Discovery Assistance Window Length field to 0; and
		- Sets the Temporary AID field to the temporary AID assigned by the DMG AP or PCP to the DMG STA requesting discovery assistance

After transmitting a DMG discovery assistance request, the DMG AP or PCP shall wait for a DMG discovery assistance response for dot11DiscoveryAssistanceResponseTimeout microseconds. After the timer expiration or reception of the DMG discovery assistance response, it shall determine the discovery assistance offered to the STA requesting the discovery assistance as described in 11.29.3.3 (Processing discovery assistance responses) and 11.31.6.2 (Discovery assistance action determination and on-demand sector sweeping).

**11.29.3.2 Initiator TXSS and responder TXSS scheduling**

If the discovery assistance is performed through scheduled beamforming training period or scheduled TDD beamforming period and the AP or PCP received DMG discovery assistance response indicating SUCCESS in the Status Code field in the DMG Discovery Assistance element, the AP or PCP shall schedule beamforming training periods between the DMG STA requesting discovery assistance and DMG STAs offering discovery assistance. The DMG AP or PCP further shall send the Extended Schedule element containing the schedule of the discovery assistance to all DMG STAs offering discovery assistance. The DMG AP or PCP may send the Extended Schedule element using the Announce frame or other frames, when the recipient of the frame is in awake state.

**11.29.3.3 Processing discovery assistance responses**

After determining discovery assistance actions, the DMG AP or PCP shall send the discovery assistance response to the DMG STA requesting discovery assistance. If at least one STA in the DMG BSS is providing discovery assistance, the DMG AP or PCP shall set the Discovery Assistance Request Status Code field in the DMG Discovery Assistance element sent to the STA requesting discovery assistance to SUCCESS. The DMG AP or PCP sets the DMG Discovery Assistance element as described in 11.31.6.2 (Discovery assistance action determination and on-demand sector sweeping) and updates the following fields in the transmitting discovery assistance response:

* If discovery assistance is performed through scheduling DMG beacon transmission sweeping all sectors or initiating TDD beamforming:
	+ Sets the Discovery Assistance Window Length field in the DMG Discovery Assistance element to the time duration after Sector Sweep Start Time till all STAs offering discovery assistance finish discovery assistance; and
	+ Sets the Sector Sweep Start Time field in the DMG Discovery Assistance element to the earliest start time value among STAs offering discovery assistance, the time when the first DMG STA offering discovery assistance starts discovery assistance.
* If the discovery assistance is performed through scheduled beamforming training period or scheduled TDD beamforming period:
	+ Sets the Discovery Assistance Window Length field in the DMG Discovery Assistance element to the time duration of the all STAs beamforming periods starting from the first allocation, including all time blocks if more than one time block is scheduled.
	+ Includes all scheduled beamforming allocation to the Allocation fields in the Extended Schedule element.

The DMG AP or PCP and other STAs offering discovery assistance start on-demand sector sweeping as described in 11.31.6.2 (Discovery assistance action determination and on-demand sector sweeping) at the scheduled time.

**11.31 Multi-band operation**

**11.31.6 Multi-band discovery assistance procedure**

**11.31.6.1 Multi-band discovery assistance request procedure**

***To TGay Editor: Insert a new paragraph after the 5th paragraph as follows:***

The two multi-band capable devices exchange FST Setup Request frame and FST Setup Response frames, as described in 11.31.2 (FST setup protocol), containing the DMG Discovery Assistance element. Upon reception of the MLME-FST-SETUP.indication, the SME of the STA that received the discovery assistance request determines if it accepts the requested discovery assistance.

As an option, the SME may propagate the discovery assistance request to other STAs that belong to a DMG BSS that it created in order to assist the STA requesting discovery assistance finding neighbor DMG STAs, as described in 11.29.3 (DMG discovery assistance). If the SME propagated the discovery assistance request to other STAs, it shall wait for responses up to dot11DiscoveryAssistanceResponseTimeout microseconds and compile the determination result including responses from other DMG STAs.

The SME shall encode the determination results in the DMG Discovery Assistance element, and issue an MLME-FST SETUP.response to the Old Band MLME to send back discovery assistance response.

**Annex C**

**C.3 MIB Detail**

***To TGay Editor: Change the definition of “Dot11DMGSTAConfigEntry” in C.3 as follows:***

Dot11DMGSTAConfigEntry ::=

 SEQUENCE {

 dot11DMGOptionImplemented TruthValue,

 dot11RelayActivated TruthValue,

 dot11REDSActivated TruthValue,

 dot11RDSActivated TruthValue,

 dot11MultipleMACActivated TruthValue,

 dot11ClusteringActivated TruthValue,

 dot11DiscoveryAssistanceActivated TruthValue,

 dot11DiscoveryAssistanceResponseTimeout Unsigned32

 }

***To TGay Editor: Insert the definition of the new MIB variable (dot11DiscoveryAssistanceResponseTimeout) to the end of dot11DMGSTAConfigTable in C.3 as follows:***

dot11DiscoveryAssistanceResponseTimeout OBJECT-TYPE

 SYNTAX unassgned32 (0..262143)

 UNITS "microseconds"

 MAX-ACCESS read-write

 STATUS current

 DESCRIPTION

 "This is a control variable.

 It is written by the SME or external management entity.

 Changes take effect as soon as practical in the implementation.

 This attribute indicates the maximum wait time for a discovery assistance response after transmitting a discovery assistance request."

 ::= { dot11DMGSTAConfigEntry 8 }