IEEE P802.11
Wireless LANs

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| Resolution of CCA-Indications related CIDs |
| Date: 2018-02-25 |
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Abstract

This submission proposes resolutions to 1708, 1943, 1097, 1463, 2111, 2343, 1003, 1009, 1094, 1035, 1942, 1109, 1266, 2112, 1098, 1248, 1249 CIDs.

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| **CID** | **Clause** | **Comment** | **Proposed change** | **Resolution**  |
| 1708 | 27.15 | The relationship between "primary", "secondary", "secondary1" and "secondary2" is not clear and certainly not apparent from the examples in the figures. Suppose the BSS uses ch2,ch3,ch4 and ch5 with ch3=primary. Which is secondary, secondary1 and secondary2? What is EDMG Primary Channel Offset? It doesn't appear anywhere else in the draft | Fix | Revised |
| 1943 | 8.3.5.12.2 | Terms of Primary Channel Offset, secondary, secondary1, and secondary2 are illustrated in Figure 1 and Figure 2 but are not defined. | Provide definition of the terms. Definition is provided as a table in separate submission |  |
| 1097 | 8.3.5.12.2 | what is the "Primary Channel Offset"? It appears suddenly on page 27 without definition and without knowledge of how to set it. | Define Primary Channel Offset and provide details of how to set this parameter |  |
| 1463 | 8.3.5.12.2 | What exactly is an EDMG Primary Channel Offset? | Define the term somewhere and reference it here. |  |
| 2111 | 8.3.5.12.2 | EDMG Primary Channel Offset is not defined anywhere in the spec | Define EDMG Primary Channel Offset |  |
| 2343 | 8.3.5.12.2 | How is an EDMG Primary Channel Offset signaled?Please define the EDMG Primary Channel Offset in an EDMG Operation element. | As in comment. |  |

**Proposed resolution**: Revise

**Discussion:**

While assigning the BSS Operating channels secondary channels, there is a motivation to assign the Secondary and Secondary1 channels close to the Primary in order to allow Channel Bonding PPDU Mask transmission options. EDMG Primary channel offset was intended to indicate allocations when the Secondary1 is contiguous to the Primary channel, however proposed text suggest to remove this definition and replace it with explicit text in section 10.22.2.12 EDCA channel access in an EDMG BSS

*Legend for the table showed below*

**P** – 2.16GHz PPDU on Primary

**PS, PS1,PS2**–4.32GHz PPDU on primary and secondary (PS), primary and secondary1 (PS1) Etc.

**P+S,P+S1,P+S2** –2.16+2.16GHz PPDU on primary and secondary (P+S), (P+S1) Etc.

**PSS1, PS1S2** - 6.48GHz PPDU on primary, secondary and secondary1 (PSS1) Etc.

**PS+S1S2** - 4.32+4.32GHz PPDU on primary, secondary, secondary1 and secondary2.

**PSS1S2** - 8.64GHz PPDU on primary, secondary, secondary1 and secondary2.

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **BSS Operating Channel Selection**  | **BSS Operating Channel Selection with Similar allocation pattern of secondary channels** | **CH1** | **CH2** | **CH3** | **CH4** | **CH5** | **CH6** | **Primary Channel Offset** | **PPDU Mask options** |
| (1) | (2),(3),(4),(5),(6) | P |  |  |  |  |  | 0 | P |
|  (1,2) | (2,3), (3,4), (4,5), (5,6) | P | S |   |   |  |  | 0 | P, PS,P+S |
| S | P |   |   |  |  | 0 |
| (1,3) | (1,4),(1,5),(1,6),(2,4),(2,5),(2,6),(3,5),(3,6),(4,6) | P |   | S |   |   |   | 0 | P, P+S |
| S |   | P |   |   |   | 0 |
| (1,2,3) | (2,3,4),(3,4,5), (4,5,6) | P | S | S1 |   |   |   | 0 | P,PS, P+S,P+S1,PSS1 |
| S | P | S1 |  |  |   | 1 | P,PS, **PS1**,P+S,P+S1,PSS1 |
| S1 | S | P |   |   |   | 0 | P,PS, P+S,P+S1,PSS1 |
| (1,2,4) | (1,2,5),(1,2,6)(2,3,5),(2,3,6)(3,4,6) | P | S |   | S1 |   |   | 0 | P, PS, P+S, P+S1 |
| S | P |  | S1 |  |   | 0 |
| S1 | S |   | P |   |   | 0 | P, P+S, P+S1 |
| (1,3,4) | (1,4,5),(1,5,6)(2,4,5),(2,5,6)(3,5,6) | P |   | S | S1 |   |   | 0 | P, P+S, P+S1 |
| S1 |  | P | S |  |   | 0 | P, PS, P+S,P+S1 |
| S1 |   | S | P |   |   | 0 |
| (1,3,5) | (1,3,6),(1,4,6)(2,4,6) | P |   | S |   | S1 |   | 0 | P, P+S,P+S1 |
| S1 |  | P |  | S |   | 0 |
| S1 |   | S |   | P |   | 0 |
| (1,2,3,4) | (2,3,4,5),(3,4,5,6) | P | S | S1 | S2 |   |   | 0 | P, PS,P+S,P+S1,P+S2,PSS1, PS+S1S2,PSS1S2 |
| S | P | S1 | S2 |  |   | 1 | P,S,**PS1**,P+S,P+S1,P+S2, PSS1, **PS1S2**, PS+S1S2, PSS1S2 |
| S2 | S1 | P | S |  |   | 1 |
| S2 | S1 | S | P |   |   | 0 | P, PS,P+S,P+S1,P+S2,PSS1, PS+S1S2, PSS1S2 |
| (1,2,3,5) | (1,2,3,6)(2,3,4,6) | P | S | S1 |   | S2 |   | 0 | P, PS, P+S, P+S1, P+S2, PSS1 |
| S | P | S1 |  | S2 |   | 1 | P, PS,**PS1**, P+S, P+S1, P+S2, PSS1 |
| S1 | S | P |  | S2 |   | 0 | P, PS, P+S, P+S1, P+S2, PSS1 |
| S2 | S1 | S |   | P |   | 0 | P, P+S, P+S1, P+S2 |
| (1,2,4,5) | (1,2,5,6)(2,3,5,6) | P | S |   | S1 | S2 |   | 0 | P,PS,P+S,P+S1,P+S2, PS+S1S2 |
| S | P |  | S1 | S2 |   | 0 |
| S2 | S1 |  | P | S |   | 0 |
| S2 | S1 |   | S | P |   | 0 |
| (1,2,4,6) |  | P | S |   | S1 |   | S2 | 0 | P,PS,P+S,P+S1,P+S2 |
| S | P |  | S1 |  | S2 | 0 |
| S2 | S1 |  | P |  | S | 0 | P,P+S,P+S1,P+S2 |
| S2 | S1 |   | S |   | P | 0 |
| (1,3,4,5) |  (1,4,5,6),(2,4,5,6) | P |   | S | S1 | S2 |   | 0 | P,P+S,P+S1,P+S2 |
| S2 |  | P | S | S1 |   | 0 | P,PS,P+S,P+S1, P+S2, PSS1 |
| S2 |  | S1 | P | S |   | 1 | P,PS,**PS1**,P+S,P+S1, P+S2, PSS1 |
| S2 |   | S1 | S | P |   | 0 | P,PS,P+S,P+S1, P+S2, PSS1 |
| (1,3,4,6) |  | P |   | S | S1 |   | S2 | 0 | P,P+S,P+S1, P+S2 |
| S1 |  | P | S |  | S2 | 0 | P,PS,P+S,P+S1, P+S2 |
| S1 |  | S | P |  | S2 | 0 |
| S2 |   | S1 | S |   | P | 0 | P,P+S, P+S1, P+S2 |
| (1,3,5,6) |  | P |  | S |  | S1 | S2 | 0 | P,P+S, P+S1, P+S2 |
| S2 |  | P |  | S | S1 | 0 |
| S2 |  | S1 |  | P | S | 0 | P,PS, P+S, P+S1, P+S2 |
| S2 |   | S1 |   | S | P | 0 |

**Proposed resolution**: Revised

**8.3.5.12.2 Semantics of the service primitive**

*Replace the text after Table 8-5 with the below*

Table 8-6 defines the assignments of secondary, secondary1 and secondary2 channels in relation to the BSS Operating Channels field and Primary Channel field as indicated by the AP’s or PCP’s EDMG Operation element (9.4.2.251).

BSS Operating Channels field are indicated as Ch(i)<Ch(k)<Ch(l)<Ch(m);

The notation CH(i) is a shorthand that identifies channel number, where i is an integer 0 <= i <= 5 that indicates a bit position (B0-B5) in the BSS Operating Channels field of the EDMG Operation element

|  |  |
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| Configuration presented in Primary Channel field and in BSS Operating Channels field | Channels’ related definitions |
| Number of channels | Channels set | Primary | Secondary | Secondary1 | Secondary2 |
| 1 | Ch(i)i = (0),(1),(2),(3),(4),(5) | Ch(i) | NA | NA | NA |
| 2 | Ch(i), Ch(k)(i,j) = (0,1), (0,2), (0,3), (0,4), (0,5),(1,2), (1,3), (1,4), (1,5), (2,3), (2,4), (2,5), (3,4), (3,5), (4,5)  | Ch(i) | Ch(k) | NA |  |
| Ch(k) | Ch(i) | NA | NA |
| 3 | Ch(i), Ch(k), Ch(l)(i,k,l) = (0,1,2), (0,1,3),(0,1,4),(0,1,5), (1,2,3), (1,2,4), (1,2,5), (2,3,4), (2,3,5), (3,4,5) | Ch(i) | Ch(k) | Ch(l) | NA |
| Ch(k) | Ch(i) | Ch(l) | NA |
| Ch(l) | Ch(k) | Ch(i) | NA |
| 3 | Ch(i), Ch(k), Ch(l)(i,k,l) = (0,2,3), (0,2,4), (0,2,5), (0,3,4), (0,3,5), (0,4,5), (1,3,4), (1,3,5), (1,4,5), (2,4,5) | Ch(i) | Ch(k) | Ch(l) | NA |
| Ch(k) | Ch(l) | Ch(i) | NA |
| Ch(l) | Ch(k) | Ch(i) | NA |
| 4 | Ch(i), Ch(k), Ch(l), Ch(m)(i,k,l,m) = (0,1,2,3),(1,2,3,4), (2,3,4,5), (0,1,3,4), (0,1,4,5), (1,2,4,5),(0,1,3,5)  | Ch(i) | Ch(k) | Ch(l) | Ch(m) |
| Ch(k) | Ch(i) | Ch(l) | Ch(m) |
| Ch(l) | Ch(m) | Ch(k) | Ch(i) |
| Ch(m) | Ch(l) | Ch(k) | Ch(i) |
| 4 | Ch(i), Ch(k), Ch(l), Ch(m)(i,k,l,m) = (0,1,2,4),(0,1,2,5), (1,2,3,5) | Ch(i) | Ch(k) | Ch(l) | Ch(m) |
| Ch(k) | Ch(i) | Ch(l) | Ch(m) |
| Ch(l) | Ch(k) | Ch(i) | Ch(m) |
| Ch(m) | Ch(l) | Ch(k) | Ch(i) |
| 4 | Ch(i), Ch(k), Ch(l), Ch(m)(i,k,l,m) = (0,2,3,4),(0,3,4,5),(1,3,4,5), (0,2,4,5) | Ch(i) | Ch(k) | Ch(l) | Ch(m) |
| Ch(k) | Ch(l) | Ch(m) | Ch(i) |
| Ch(l) | Ch(m) | Ch(k) | Ch(i) |
| Ch(m) | Ch(l) | Ch(k) | Ch(i) |
| 4 | Ch(i), Ch(k), Ch(l), Ch(m)(i,k,l,m) = (0,2,3,5) | Ch(i) | Ch(k) | Ch(l) | Ch(m) |
| Ch(k) | Ch(l) | Ch(i) | Ch(m) |
| Ch(l) | Ch(k) | Ch(i) | Ch(m) |
| Ch(m) | Ch(l) | Ch(k) | Ch(i) |

**Table 8-5A – Definition of EDMG secondary, secondary1 and secondary2 channels**

For an EDMG STA, the relationship of the channel-list parameter elements to the 4.32 GHz, 6.48 GHz, and 8.64 GHz BSS operating channel is illustrated by example in Figure 1.



**Figure 1— Example of channel-list parameter element for various BSS Operating channels.**

**10.22.2.12 EDCA channel access in an EDMG BSS***Modify after the fifth paragraph as follow:*

1. Transmit a 8.64 GHz mask PPDU, if primary, secondary, secondary1 and secondary2 channels are contiguous and secondary, secondary1 and secondary2 were idle during an interval of PIFS immediately preceding the start of the TXOP.
2. Transmit a 4.32+4.32 GHz mask PPDU if primary and secondary are contiguous, secondary1 and secondary2 channels are contiguous and secondary, secondary1 and secondary2 channels were idle during an interval of PIFS immediately preceding the start of the TXOP
3. Transmit a 6.48 GHz mask PPDU if primary, secondary and secondary1 channels are contiguous and secondary and secondary1 were idle during an interval of PIFS immediately preceding the start of the TXOP or if primary, secondary1 and secondary2 channels are contiguous and secondary1 and secondary2 were idle during an interval of PIFS immediately preceding the start of the TXOP
4. Transmit a 4.32 GHz mask PPDU if primary and secondary channels are contiguous and secondary channel was idle during an interval of PIFS immediately preceding the start of the TXOP or if primary and secondary1 channels are contiguous and the secondary1 channel was idle during an interval of PIFS immediately preceding the start of the TXOP
5. Transmit a 2.16+2.16 GHz mask PPDU if the secondary, secondary1 or secondary2 channel was idle during an interval of PIFS immediately preceding the start of the TXOP
6. Transmit a 2.16 GHz mask PPDU on the primary channel
7. Restart the channel access attempt by invoking the backoff procedure as specified in 10.22.2 (HCF contention based channel access (EDCA)) as though the medium is busy on the primary channel as indicated by either physical or virtual CS and the backoff timer has a value of 0

In case an EDMG STA initiates transmission to another peer EDMG STA, the EDMG STA shall set the TXVECTOR parameter CH\_BANDWIDTH of the PPDU to the channels in which the CCA were idle according to Table 8.5a and shall set the TXVECTOR parameter SCRAMBLER\_INIT\_SETTING to a value that provides bandwidth information to the peer STA.

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| **CID** | **Clause** | **Comment** | **Proposed change** | **Resolution**  |
| 1003 | 3.2 | secondary channel also needs to be defined for 2.16+2.16 GHz channel or 4.32+4.32 GHz channel | change "...creating a 4.32 GHz, 6.48 GHz or 8.64 GHz channel" to"...creating a 2.16+2.16 GHz, 4.32 GHz, 6.48 GHz, 4.32+4.32 GHz or 8.64 GHz channel" | Revised  |

**Proposed resolution**: Revised

*Modify and add the relevant text in 3.2 with the below*

**secondary channel**: In non-DMG, a 20 MHz channel associated with a primary channel used by high-throughput (HT) stations (STAs) for the purpose of creating a 40 MHz channel or used by very high throughput (VHT) STAs for the purpose of creating the primary 40 MHz channel. In DMG, a 2.16 GHz channel associated with a primary channel used by enhanced directional multi-gigabit (EDMG) STAs for the purpose of creating a 4.32 GHz, 6.48GHz, 8.64 GHz channel,2.16+2.16 GHz or 4.32+4.32 GHz.

**secondary1 channel:** a 2.16 GHz channel associated with a primary channel and secondary channel used by enhanced directional multi-gigabit (EDMG) STAs for the purpose of creating a 6.48 GHz channel

**secondary2 channel:** a 2.16 GHz channel associated with a primary channel, secondary channel, and secondary channel1 used by enhanced directional multi-gigabit (EDMG) STAs for the purpose of creating a 8.64 GHz channel, or a 4.32+4.32GHz channel

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| **CID** | **Clause** | **Comment** | **Proposed change** | **Resolution**  |
| 1009 | 8.3.5.12.2 | In Table 8-5, the definitions of channel-list parameter secondary1 and secondary2 are not clear. Does secondary1 mean "the secondary 2.16GHz channel is idle and the second secondary channel is busy"? Does secondary2 mean "the secondary 2.16GHz channel and the second secondary channel are idle, and the third secondary channel is busy"? | For clarification, change the "Meaning" column for secondary1 as below:Indicates that the primary 2.16GHz channel and the secondary 2.16GHz channel are idle and the second secondary channel is busy.Similarly, the meanings of secondary2 and secondary should be clarified as well.Alternatively, similar to VHT STA, describe exact CCA requirements in separate subclauses and refer them. | Reviesed  |
| 1094 | 8.3.5.12.2 | the terms "second secondary channel" and "third secondary channel" need to be defined | as in comment | Rejected |
| 1035 | 8.3.5.12.2 | "In an EDMG STA, indicates that the primary 2.16 GHz channel is busy". Add reference of rules. | Change the cited sentence to "In an EDMG STA, indicates that the primary 2.16 GHz channel is busy according to the rules specified in xxxxx." Similar changes are needed for "Secondary", "Secondary1" and "Secondary 2" rows. | Reviesed  |
| 1942 | 8.3.5.12.2 | No references to channel CCA rules in the Table 8-5 | "append ""primary 2.16 GHz channel is busy according to the rules specified in 30.3.8append ""secondary 2.16 GHz channel is busy according to the rules specified in 30.3.8append ""secondary channel is busy according to the rules specified in 30.3.8" |  |

**Discussion**

Both Sections 8.3.5.12.2 and 30.3.8 indicate that three separate CCA indications are provided by the PHY service, accepting the comment to provide reference to the section 30.3.8.

“Second secondary” is not a definition hence doesn’t need to be defined further.

**Proposed resolution**: Revised

*Modify the relevant rows in Table 8-5 as follows*

|  |  |
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| **channel-listparameter** | **Meaning** |
| primary  | In an HT STA that is not a VHT STA, indicates that the primary 20 MHz channel is busy.In a VHT STA, indicates that the primary 20 MHz channel is busy according to the rules specified in 21.3.18.5.3.In a TVHT STA, indicates that the primary channel is busy according to the rules specified in 22.3.18.6.3.In an EDMG STA, indicates that the primary 2.16 GHz channel is busy according to the rules specified in 30.3.8. |
| secondary | In an HT STA that is not a VHT STA, indicates that the secondary channel is busy.In a VHT STA, indicates that the secondary 20 MHz channel is busy according to the rulesspecified in 21.3.18.5.4.In a TVHT STA, indicates that the secondary channel is busy according to the rules specifiedin 22.3.18.6.4.In an EDMG STA, indicates that the secondary 2.16 GHz channel is busy according to the rules specified in 30.3.8. |
| secondary1  | Indicates that the second secondary 2.16 GHz channel is busy according to the rules specified in 30.3.8. |
| secondary2  | Indicates that the third secondary 2.16 GHz channel is busy according to the rules specified in 30.3.8. |

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| **CID** | **Clause** | **Comment** | **Proposed change** | **Resolution**  |
| 1109 | 10.3.1 | the names of the secondary channels are not accurate | Similarly, an RTS/DMG CTS exchange by EDMG STAs performs fast collision inference on the secondary channel, secondary1 channel, and secondary2 channel and helps the EDMG STA transmitting the RTS to determine the available bandwidth at the responder. | Revised.  |

**Proposed resolution**: Revised

**10.3.1 General***Change the 8th paragraph as follows*

The RTS/CTS exchange also performs both a type of fast collision inference and a transmission path check.
If the return CTS frame is not detected by the STA originating the RTS, the originating STA may repeat the
process (after observing the other medium-use rules) more quickly than if the long Data frame had been
transmitted and a return Ack frame had not been detected. An RTS/CTS exchange by VHT STAs also
performs fast collision inference on the secondary 20 MHz channel, secondary 40 MHz channel, and
secondary 80 MHz channel and helps the VHT STA transmitting the RTS to determine the available
bandwidth at the responder. Similarly, an RTS/DMG CTS exchange by EDMG STAs performs fast
collision inference on the secondary channel, secondary1 channel, and secondary2 channel and helps the EDMG STA transmitting the RTS to determine the available bandwidth at the
responder.

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| **CID** | **Clause** | **Comment** | **Proposed change** | **Resolution**  |
| 1266 | 8.3.5.12.2 | in the first figure of Figure 2, the second 4.32 GHz channel should include the secondary1 and primary channels rather than across the secondary1, primary and secondary channels. | as in comment | Reject |
| 2112 | 8.3.5.12.2 | Figrue 3 indicates the channel-list parameter element for the case of channel aggregation. However, there is no indication from the channel-list parameter element for channel aggregation or bonded channel with EDMG Primary Channel Offset | Clarify | RejectFigure 3 was removed per CID 1943, the same as EDMG Primary Offset was omitted from the draft |

**Discussion**

Figure 2 was removed per above CID. However, transmission over the primary and secondary1 if those are contiguous and have CCA indication IDLE is allowed.

**Proposed resolution**: Reject

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| **CID** | **Clause** | **Comment** | **Proposed change** | **Resolution**  |
| 1098 | 8.3.5.12.2 | Figure 3 shows two primary channel. There should be some explanation which one is used to transmit the DMG Beacon and how each of these two primaries are used. | as in comment | Revised. Figure 3 was replaced per CID 1943. Having two primary channels is not a supported case hence no further action.  |
| 1248 | 8.3.5.12.2 | Not sure how to use the primary channel offset value (=0 ) | Please clarify it with information | Revised EDMG Primary Offset was removed per per CID 1943 in this document  |
| 1249 | 8.3.5.12.2 | Not sure how to use the primary channel offset value (=1 ) | Please clarify it with information | Revised EDMG Primary Offset was removed per per CID 1943 in this document |

**SP/M:** Do you accept the resolutions given in this document?