IEEE P802.11
Wireless LANs

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| Proposed text to resolve CID 147 in CC12 |
| Date: 2015-1-20 |
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Abstract

This document presents suggested text proposal towards CID 147. The related PPT document has been presented in document 802.11-14/1131r0.

***Modify the following definition into 10.3.1 as highlighted in red texts:***

* STA authentication and association

***Discussion:***

CID 147 provides a comment about SP Protected Period mechanism in IEEE 802.11aj. This proposal is intended to address and resolve the comments with adoption to the suggestions.

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| --- | --- | --- | --- | --- | --- |
| CommentID | CommenterName | Subclause | Comment  | SuggestedRemedy | Response |
| 147 | Dejian Li | 9.33.8 | In subclause 9.33.6.6, whether a DMG Protected Period is created during an SP is mainly determined by the source DMG STA in most circumstances, except that it is determined by PCP/AP when using centralized clustering mechanism. However, if whether to create a Protected Period is only determined by the STA, the STA might make a decision blindly due to lack of the scheduling or interference information of the other neighboring BSS at the PCP/AP. | PCP/AP should provide a recommendation of whether to create a Protected Period when scheduling an SP. |  |

Proposed Resolution: **Accept and revised**

##### **9.33.6.6.2 DMG Protected Period establishment and maintenance**

***Insert the following subclause, 9.33.6.6.2a, after 9.33.6.6.2:***

**9.33.6.6.2a CDMG Protected Period establishment and maintenance**

In addition to establishing a DMG Protected Period on its current operating channel, a CDMG STA might create another DMG Protected Period on an overlapping channel to avoid the potential interference from the overlapping channel. This subclause describes rules for establishing and maintaining a CDMG Protected Period for a pair of CDMG STAs.

A CDMG PCP/AP shall set the Protected Period field within the Extended Schedule element sent to the source and destination STAs to indicate whether the Protected Period is enforced to create and on which channels the Protected Period should be created for an SP allocation. The CDMG PCP/AP should determine the time and frequency overlapping status of a scheduled SP with other SPs/CBAPs scheduled by other PCPs/APs and itself according to the schedule information of the adjacent PCPs/APs and itself. The CDMG PCP/AP can obtain the schedule information of the adjacent PCPs/APs by receiving the DMG Beacon frames directly if it is within a PCP/AP cluster, or by receiving interference reports included in Cluster Report elements or DMG TSPEC elements transmitted by STAs within the BSS.

If a CDMG PCP/AP determines that there exists at least an SP/CBAP overlapping in both time and frequency with an allocated SP, and can not exclude that the other SP/CBAP does not interfere the allocated SP, the CDMG PCP/AP shall set the Protected Period field to a nonzero value; otherwise, the CDMG PCP/AP shall set the Protected Period field to 0 to indicate the source and destination CDMG STAs do not have to establish a Protected Period for the SP.

If a potentially interfering SP or CBAP is allocated on the current operating channel, the PCP/AP shall set the Protected Period field within the Allocation Control field to 1. The source and destination CDMG STAs shall follow the rules defined in 9.33.6.6.2 to establish a DMG Protected Period on its current operating channel.

If the source CDMG STA and destination CDMG STA are operating on a 1.08 GHz channel and a potentially interfering SP or CBAP is allocated on the overlapping 2.16 GHz channel, the CDMG PCP/AP shall set the Protected Period field to 2. The source CDMG STA and destination CDMG STA shall create a CDMG Protected Period on both the current operating 1.08 GHz channel and the overlapping 2.16 GHz channel.

If the source CDMG STA and destination CDMG STA are operating on a 2.16 GHz channel and a potentially interfering SP or CBAP is allocated on the overlapped low-frequency 1.08 GHz channel, the CDMG PCP/AP shall set the Protected Period field to 2 to indicate the source CDMG STA and destination CDMG STA create a DMG Protected Period on both the current operating 2.16 GHz channel and the low-frequency 1.08 GHz channel.

If the source CDMG STA and destination CDMG STA are operating on a 2.16 GHz channel and a potentially interfering SP or CBAP is allocated on the overlapped high-frequency 1.08 GHz channel, the CDMG PCP/AP shall set the Protected Period field to 3 to indicate the source CDMG STA and destination CDMG STA create a DMG Protected Period on both the current operating 2.16 GHz channel and the high-frequency 1.08 GHz channel.

If creating a CDMG Protected Period on two channels is required, the source and destination STAs shall listen to the current channel first and transition to and stay in Listening Mode following the rules specified in 9.33.6.6.2. If both the results of the PHY layer carrier sensing (CS) and the virtual carrier sensing show that the current channel is idle, the source STA and destination STA shall perform a RTS/DMG CTS handshake on the current channel. Once the first RTS/DMG CTS handshake is completed, the source STA and destination STA shall perform another RTS/DMG CTS handshake on the second channel after a SIFS interval. After the second RTS/DMG CTS handshake is done, the source STA and destination STA shall switch back to their operating channel and transmit data following a SIFS interval. An example of creating a CDMG Protected Period through two RTS/DMG CTS handshakes for CDMG STAs operating on a 1.08 GHz channel is shown in Figure 9-45a.



Figure 9-45a An example of creating a CDMG Protected Period on two channels for CDMG STAs

In order to maintain STAs that are not aware of the establishment of the CDMG Protected Period because they have begun listening to the medium after the establishment of a CDMG Protected Period, a CDMG STA that established a CDMG Protected Period should transmit additional RTSs on the channels that are the same as the channels when establishing the CDMG Protected Period. Additional two RTS frames should be sent at the end of every (aDMGPPMinListeningTime – aRTSTimeoutTime) interval during the CDMG Protected Period if the duration of the RTS/DMG CTS handshake(s) exchange is less than the time remaining in the SP.

A CDMG PCP/AP can merge the time interval of Listening Mode when creating a CDMG Protected Period and the channel measurement time during SPSH (see 10.31) by using the Protected Period field and the Directional Channel Quality Request element. If a pair of CDMG STAs within the BSS should create a Protected Period for their SP, the PCP/AP may transmit the Directional Channel Quality Request element to a pair of STAs. The directional channel measurement time interval indicated by the Directional Channel Quality Request element of one pair STAs should cover the Listening Mode that begins at the start of the SP of this pair of STAs. Thus, the pair of STAs can perform channel monitoring required by the Protected Period establishing and the channel measurement required by the SPSH mechanism simultaneously. The PCP/AP may use the received Directional Channel Quality Report element after the Listening Mode for subsequent SPSH.

8.4.2.134 Extended Schedule element

***Change Figure 8-401aba as follows:***

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B0 B3 | B4 B6 | B7 | B8 | B9 | B10 | B11 | B12 | B13 B14 | B15 |
|  | Allocation ID | Allocation Type | Pseudo-static | Truncatable | Extendable | PCP Active | LP SCUsed | Truncation Type | Protected Period | Reserved |
| Bits: | 4 | 3 | 1 | 1 | 1 | 1 | 1 | 1 |  | 3 |

Figure 8-401aba Allocation Control field (CDMG)

***Insert the following paragraph at the end of 8.4.2.134:***

For CDMG STAs, the Protected Period field is used to indicate whether the owner STAs of the allocated SP are enforced to establish a Protected Period and on which channels the Protected Period is established. The Protected Period field is set to 0 to indicate the source and destination STAs of the SP are allowed to create a Protected Period and the STAs determine whether to establish a Protected Period. The Protected Period field is set to a nonzero value to indicate the source and destination STAs of the SP are enforced to create a Protected Period on the indicated channel(s). The values of the Protected Period field for CDMG STAs operating on a 2.16 GHz channel or a 1.08 GHz are listed in Table 8-183ia and Table 8-183ib, respectively. For a CBAP allocation, the Protected Period field is reserved.

Table 8-183ia Protected Period field value for CDMG STAs operating on a 2.16 GHz channel

|  |  |
| --- | --- |
| **Value of the Protected Period field** | **Meaning** |
| 0 | The STA determines whether to establish a Protected Period. |
| 1 | The current channel needs a Protected Period. |
| 2 | Both the current 2.16 GHz channel and the low-frequency channel 5 or channel 7 need a Protected Period. |
| 3 | Both the current 2.16 GHz channel and the high-frequency channel 6 or channel 8 need a Protected Period. |

Table 8-183ib Protected Period field value for CDMG STAs operating on a 1.08 GHz channel

|  |  |
| --- | --- |
| **Value of the Protected Period field** | **Meaning** |
| 0 | The STA determines whether to establish a Protected Period. |
| 1 | The current channel needs a Protected Period. |
| 2 | The current 1.08 GHz channel and the overlapping 2.16 GHz channel need a Protected Period. |
| 3 | Reserved. |