IEEE P802.11  
Wireless LANs

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| PDT for CC36 Resolution for SN indication | | | | |
| Date: 2021-07-16 | | | | |
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Abstract

This submission proposes CR for CID 5386 (CC36).

Revisions:

* Rev 0: Initial version of the document.

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. This introduction is 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).***

***TGbe Editor: Editing instructions preceded by “TGbe Editor” are instructions to the TGbe editor to modify existing material in the TGbe draft. As a result of adopting the changes, the TGbe editor will execute the instructions rather than copy them to the TGbe Draft.***

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| **CID** | **Commenter** | **Pg/Ln** | **Section** | **Comment** | **Proposed Change** | **Resolution** |
| 5380 | Jay Yang | 274/05 | 35.3.13.2 | 11be shall define a mechanism to detect the missing issue or duplicated issue before non-AP MLD intends to switch the groupcast data frame indicated link at any time. | SN is a simple tool and is widely used to detect the duplicated issue according to 802.11 SPEC, suggest using MLD SN for groupcast data frame to address to duplicate or missing issue, which the MLD SN carried in MGMT frame can facilitate the non-AP MLD detect in advance. | **Revised—**  **Agree in principle with the comment. More detailed discussion for this aspect**  **And the proposal change**  **can be found in** 11-21/1330r0  **TGbe editor please implement changes as shown in doc** 11-21/1330r0 **tagged as 5380** |
| 6648 | Prabodh Varshney | 274/  05 | 35.3.13.2 | Define a mechanism to detect the missing issue or duplicated issue before non-AP MLD intends to switch the groupcast data frame indicated link at any time. | SN is a simple tool and is widely used to detect the duplicated issue. Suggest using MLD SN for groupcast data frame to address to duplicate or missing issue, which the MLD SN carried in MGMT frame can facilitate the non-AP MLD detect in advance. | **Revised—**  **Agree in principle with the comment. More detailed discussion for this aspect**  **And the proposal change**  **can be found in** 11-21/1330r0  **TGbe editor please implement changes as shown in doc** 11-21/1330r0 **tagged as 5380** |

## Discussion

MLD-level sequence numbers on groupcast frames proposed by Qi from Apple makes it possible for a non-AP MLD to detect duplicate groupcast frames and identify possibly missing frames. This works all fine as long as the link it uses to receive groupcast frames works properly. The non-AP MLD may, however, start experiencing problems (weak signal level, increased occupancy level, collisions due to e.g. hidden STAs, increased interference, etc.) with the selected link and may want to select another available link to receive groupcast frames. The non-AP MLD should be able to move from one available link to another available link without missing any groupcast frames. The non-AP MLD doesn’t, however, know how far the other APs have proceeded in the sequence number space applied to the groupcast frames and thus doesn’t know which of the other available links would be such that the non-AP MLD would not miss any groupcast frames in the transition to the new link.

In following Figure, we have the example case of three links between an AP MLD and a non-AP MLD and the non-AP MLD using originally the link1 to receive groupcast frames. At time point t1, the non-AP MLD would like to start using one of the two other available links (link2, link3) to receive groupcast frames. At that point of time, it should select the link2 as the new link as that is the link which runs with the smaller SN than its current link. The non-AP MLD doesn’t, however, have such knowledge available per the current features and procedures specified in 802.11 or proposed for 802.11be.

![A screenshot of a computer

Description automatically generated with medium confidence]()

An example of a non-AP MLD with three links and using the link1 to receive groupcast frames but wishing to select one of the other two available links (link2, link3) to receive groupcast frames.

Solution:

1. For an AP MLD to indicate with a transmission in an enabled link delta sequence number carried in the last group addressed data frame transmitted in the other available links via Beacon frame, probe response frame and (Re)association response frame.
2. For a non-AP MLD to receive on a link it uses to receive group addressed data frames from the AP MLD information on the delta sequence number carried in the last group addressed data frame transmitted in the other available links and use that information to determine which of the other available links it could and should use to receive group addressed data frame frames without missing any group addressed data frame frames.

***TGbe editor: Please note Baseline is 11be D1.01***

***TGbe editor: Please revise subclause 9.4.2.170.2 as follows:***

* Neighbor AP Information field

Change the sixth paragraph and Table 9-281 (TBTT Information field con­tents(#1205)(#1728)(#2567)) as follows:

The TBTT Information Length subfield is 1 octet in length and indicates the length of each TBTT Information field included in the TBTT Information Set field of the Neighbor AP Information field. If the TBTT Information Field Type subfield is 0, the TBTT Information Length subfield:

—contains the length in octets of each TBTT Information field that is included in the TBTT Informa­tion Set field of the Neighbor AP Information field

—(#1015)(#1124)(#2567)is set to 1, 2, 4, 5, 6, 7, 8, 9, 10, 11, or 12, 13, or 16; other values are reserved.

indicates the TBTT Information field contents as shown in Table 9-281 (TBTT Information field con­tents(#1205)(#1728)(#2567) ***(#5380***).

|  |  |
| --- | --- |
| * TBTT Information field contents | |
| TBTT Information Length subfield value | TBTT Information field contents |
| 1 | The Neighbor AP TBTT Offset subfield |
| 2 | The Neighbor AP TBTT Offset subfield and the BSS Parameters  subfield |
| 4 | The Neighbor AP TBTT Offset subfield and the MLD Parameters subfield |
| 5 | The Neighbor AP TBTT Offset subfield and the Short SSID subfield |
| 6 | The Neighbor AP TBTT Offset subfield, the Short-SSID subfield, and the BSS Parameters subfield |
| 7 | The Neighbor AP TBTT Offset subfield and the BSSID subfield |
| 8 | The Neighbor AP TBTT Offset subfield, the BSSID subfield, and the BSS Parameters subfield |
| 9 | The Neighbor AP TBTT Offset subfield, the BSSID subfield, the BSS Parameters subfield, and the 20 MHz PSD subfield |
| 11 | The Neighbor AP TBTT Offset subfield, the BSSID subfield and the Short SSID subfield |
| 12 | The Neighbor AP TBTT Offset subfield, the BSSID subfield, the Short-SSID subfield and the BSS Parameters subfield |
| 0, 3, 14,15,16 | Reserved |
| 13 | The Neighbor AP TBTT Offset subfield, the BSSID subfield, the Short-SSID subfield, the BSS Parameters subfield and the 20 MHz PSD subfield |
| 17 | The Neighbor AP TBTT Offset subfield, the BSSID subfield, the Short-SSID subfield, the BSS Parameters subfield, the 20 MHz PSD subfield and the MLD Parameters subfield |
| 18~~4~~–255 | The first 16~~3~~ octets of the field contain the Neighbor AP TBTT  Offset subfield, the BSSID subfield, the Short-SSID subfield the  BSS Parameters subfield, ~~and~~ the 20 MHz PSD subfield and the MLD Parameters subfield (i.e.,  same contents as when the length of the TBTT Information field is  16~~3~~). The remaining octets are reserved |

***Change Figure 9-632 (TBTT Information field format (#1901)(#1902)(#2566)(#2969)(#1016)(#1017)(#1205)(#1125)*** (#5380 ***) as follows:***

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Neighbor AP TBTT Offset | BSSID (optional) | Short SSID (optional) | BSS parameters | 20 MHz PSD | MLD Parameters |
| Octets: | 1 | 0 or 6 | 0 or 4 | 0 or 1 | 0 or 1 | 0 or 4 |
| * TBTT Information field format | | | | | | |

***Insert the following at the end of this subclause:***

The format of the MLD Parameters subfield is defined in Figure 9-632a (MLD Parameters subfield format (#5380) ).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | B0 B7 | B8 B11 | B12 B19 | B20 B31 |
|  | MLD ID | Link ID | Change Sequence | Delta GSNS |
| Bits: | 8 | 4 | 8 | 12 |
| * MLD Parameters subfield format | | | | |

The MLD ID subfield indicates the identifier of the AP MLD to which the reported AP is affiliated. If the reported AP is affiliated to the same MLD as the reporting AP, the MLD ID subfield is set to 0. If the reported AP is affiliated to the same MLD as a nontransmitted BSSID that is in the same multiple BSSID set as the reporting AP, the MLD ID subfield is set to the same value as in the BSSID Index field in the Multiple BSSID-Index element in the nontransmitted BSSID profile corresponding to the nontransmitted BSSID. If the reported AP is part of another AP MLD, the MLD ID subfield is set to a value higher than 0 and lower than 255 if no Multiple BSSID element is carried in the same frame or a value higher than and lower than 255 if a Multiple BSSID element is carried in the same frame, where *n* is the value contained in the MaxBSSID Indicator field in the Multiple BSSID element(#2972)(#3361)(#1041)(#1923)(#1973). The MLD ID subfield is set to 255 if the reported AP is not part of an AP MLD, or if the reporting AP does not have that information(#2156).

(#3014)NOTE 1—The MLD ID is used to identify the list of reported APs affiliated to the same AP MLD, especially when APs from multiple AP MLDs are reported, and is given uniquely to an AP MLD only in the frames which carries the Reduced Neighbor Report element describing reported APs affiliated to the AP MLD. Following the rules to set the MLD ID field, another AP may use a different MLD ID for the same AP MLD.

(#1019)(#1775)(#2157)(#2568)(#2974)(#3015)(#3259)(#3362)(#2976)The Link ID subfield indicates the link identifier of the reported AP within the AP MLD to which the reported AP is affiliated. The Link ID subfield is set to 15 if the reported AP is not part of an AP MLD, or if the reporting AP does not have that information.

NOTE 2—The link identifier is unique to an AP within an AP MLD.

(#1068)The BSS Parameters Change Count subfield is an unsigned integer, initialized to 0, that increments when a critical update to the Beacon frame of the reported AP occurs. The critical updates are defined in 11.2.3.15 (TIM Broadcast). The BSS Parameters Change Count subfield is set to 255(#2156) if the reported AP is not part of an AP MLD, or if the reporting AP does not have that inform.

The Delta GSNS subfield represents the delta SNS for group addressed data frame between the reporting AP and reported AP within same AP MLD, and is a signed integer, initialized to 0. And the Delta GSNS subfield is set to 0x800 if the reported AP within another AP MLD or if it’s an inviliad value.

Note:

The computation of delta GSNS between the reporting AP(on L1) and reported AP(on L2) within same AP MLD is shown in following Equation

Where,

is the delta GSNS between L2 and L1, can be a negative or positive value, is set to 0x800 if indicating an unavaible value.

is the latest SNS of group addressed data frame of reporting AP on L1.

is the latest SNS of group addressed data frame of reported AP on L2. (#5380)