### IEEE P802.11Wireless LANs

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| 11ax D2.3 Multiple BSSID Group Addressed Transmission |
| Date: 2018-04-30 |
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Abstract

This submission proposes a scheme to spread out the group addressed transmission of Multiple BSSID feature:

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 TGax D2.3 Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGax D2.3 Draft (i.e. they are instructions to the 802.11 editor on how to merge the text with the baseline documents).***

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

**Discussion:**

Consider a baseline operation with two VAPs with Beacon Interval 250ms as shown in Figure 1. When multiple BSSID element is used, all group addressed transmission for different BSSs in a multiple BSSID set are either aggregated after transmitted BSSID DTIM Beacon (Figure 2) or spread over different transmitted BSSID DTIM Beacon (Figure 3). The scheme in Figure 2 increases the the awake time for some non-AP STAs, where the relevant multicast transmission is at the end. The scheme in Figure 1 also may force AP to hold other critical services, i.e. VI / VO until all multicast transmissions are concluded. The scheme in Figure 3 avoids the above problem, but the delay to receive the multicast transmission is increased.



Figure 1



Figure 2



Figure 3

We propose a scheme to spread out group addressed transmission in DTIM Beacon interval as shown in Figure 4.



Figure 4

**Propose:**

***TGax editor: Modify 9.4.2.1 General as the following: (Track Change on)***

* Elements
* General

***Insert the following new rows into Table 9-77 (Element IDs) (header row shown for convenience):***

|  |
| --- |
| * Element IDs
 |
| Element | Element ID | Element ID Extension | Extensible |
| HE Capabilities (see 9.4.2.237 (HE Capabilities element)) | 255 | 35 | Yes |
| HE Operation (see 9.4.2.238 (HE Operation element)) | 255 | 36 | Yes |
| UORA Parameter Set element (see 9.4.2.239 (UL OFDMA-based Random Access (UORA) Parameter Set element)) | 255 | 37 | Yes |
| MU EDCA Parameter Set (see 9.4.2.240 (MU EDCA Parameter Set element)) | 255 | 38 | Yes |
| Spatial Reuse Parameter Set element (see 9.4.2.241 (Spatial Reuse Parameter Set element)) | 255 | 39 | Yes |
| NDP Feedback Report Parameter Set element (see 9.4.2.242 (NDP Feedback Report Parameter Set element)) | 255 | 41 | Yes |
| BSS Color Change Announcement (see 9.4.2.243 (BSS Color Change Announcement element)) | 255 | 42 | Yes |
| Quiet Time Period Setup (see 9.4.2.244 (Quiet Time Period element)) | 255 | 43 | Yes |
| ESS Report (see 9.4.2.245 (ESS Report element))(#13699) | 255 | <ANA> | Yes |
| Multiple BSSID-Index Extension element | 255 | <ANA> | Yes |

***TGax editor: Add 9.4.2.245a Multiple BSSID-Index Extension element as the following:***

9.4.2.245a Multiple BSSID-Index Extension element

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Element ID | Length | Element ID Extension | BSSID Index | Group Addressed Transmission Offset |
| Octets: | 1 | 1 | 1 | 1 | 2 |

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

The BSSID Index field is a value between 1 and 2*^n*– 1 that identifies the nontransmitted BSSID, where *n* is a
nonzero, positive integer value.

The Group Addressed Transmission Offset field indicates the number of time units (TUs) used to calculate the target transmission time of group addressed frame for an AP corresponding to the nontransmitted BSSID identified by the BSSID Index field (see 11.1.3.8 Multiple BSSID procedure).

The Multiple BSSID-index Extension element is included in the nontransmitted BSSID profile element, as described in 11.1.3.8. The use of the Multiple BSSID element and frames is described in 11.11.14.

***TGax editor: Modify 11.1.3.8 Multiple BSSID procedure as the following:***

* MLME
* Synchronization
* Maintaining synchronization
* Multiple BSSID procedure

Change the 5th paragraph as follows:

The Partial Virtual Bitmap field in the transmitted BSSID Beacon frame or DMG Beacon frame shall
indicate the presence or absence of traffic to be delivered to all stations associated to a transmitted or
nontransmitted BSSID. The first 2^*n* bits of the bitmap are reserved for the indication of group addressed
frame for the transmitted and all nontransmitted BSSIDs. The AID space is shared by all BSSs and the
lowest AID value that shall be assigned to a station is 2*n* (see 9.4.2.6).

For an AP corresponding to a nontransmitted BSSID, if all the associated non-AP STA of the AP are HE non-AP STAs, then a Multiple BSSID-Index Extension element with BSSID Index field identifying the nontransmitted BSSID may be included in the nontransmitted BSSID profile; otherwise, a Multiple BSSID-Index Extension element with BSSID Index field identifying the nontransmitted BSSID shall not be included in the nontransmitted BSSID profile. If a Multiple BSSID-Index Extension element with BSSID Index field identifying the nontransmitted BSSID is included in the nontransmitted BSSID profile, the target transmission time of group addressed frame for the AP is equal to the DTIM of the AP plus the value indicated by the Group Addressed Transmission Offset field of the Multiple BSSID-Index Extension element.

***TGax editor: Modify 11.2.3 as the following:***

**11.2.3 Power management in a non-DMG infrastructure network
11.2.3.1 General**

Change the 3rd paragraph as follows:

If any STA in its BSS is in PS mode, the AP shall buffer all non-GCR-SP group addressed BUs and deliver
them to all STAs immediately following the next target transmission time of group addressed BUs.

The next target transmission time of group addressed BUs is the next DTIM if one of the following condition is met:

* the AP is not in a multiple BSSID set
* the AP is in a multiple BSSID set, and the BSSID of the AP is the transmitted BSSID
* the AP is in a multiple BSSID set, the BSSID of the AP is a nontransmitted BSSID, and the AP does not include Multiple BSSID-Index Extension element in its nontransmitted BSSID profiels.

The next target transmission time of group addressed BUs is the next DTIM plus the value indicated by a Group Addressed Transmission Offset field of the Multiple BSSID-Index Extension element if the AP is in a multiple BSSID set, the BSSID of the AP is a nontransmitted BSSID, and the AP includes a Multiple BSSID-Index Extension element with BSSID Index field identifying the nontransmitted BSSID of the AP in the nontransmitted BSSID profile.

**11.2.3.4 TIM types**

Change the 1st and 3rd paragraph as follows:

Two different TIM types are distinguished: TIM and DTIM. After a target transmission time of group addressed BUs calculated from DTIM (see 11.2.3.1 General), the AP shall transmit buffered non-GCR-SP group addressed BUs, before transmitting any individually addressed frames.

The AP shall transmit a TIM with every Beacon frame. Every dot11DTIMPeriod, a TIM of type *DTIM* is
transmitted within a Beacon frame, rather than an ordinary TIM.

Figure 11-7 illustrates the AP and STA activity under the assumptions that no PCF is operating, that a
DTIM is transmitted once every three TIMs, and the target transmission time of group addressed BUs is equal to DTIM. The top line in Figure 11-7 represents the time axis, with the
beacon interval shown together with a DTIM Interval of three beacon intervals. The second line depicts AP
activity. The AP schedules Beacon frames for transmission every beacon interval, but the Beacon frames
may be delayed if there is traffic at the TBTT. This is indicated as “busy medium” on the second line. For
the purposes of this figure, the important fact about Beacon frames is that they contain TIMs, some of which
are DTIMs. Note that the second STA with ReceiveDTIMs equal to false does not power-on its receiver for
all DTIMs.

(…existing texts…)

**11.2.3.6 AP operation during the CP**

Change the 2nd paragraph as follows:

The following rules describe operation during the CP:

(…existing texts…)

f) When dot11FMSActivated is false, the AP shall transmit all buffered non-GCR-SP group addressed
BUs immediately after every target transmission time of group addressed BUs calculated from DTIM (see 11.2.3.1 General).

**11.2.3.8 Receive operation for STAs in PS mode during the CP**

The following rules describe operation of a STA in PS mode during the CP:

(…existing texts…)

e) When dot11FMSActivated is false and ReceiveDTIMs is true, the STA shall wake up early enough
to be able to receive either every non-STBC DTIM or every STBC DTIM sent by the AP of the BSS. Furhter, the STA shall wake up early enough before the target transmission time of group addressed BUs calculated from non-STBC DTIM (see 11.2.3.1 General) if the non-STBC DTIM indicates existence of buffered group addressed BUs and the target transmission time of group addressed BUs is not equal to non-STBC DTIM.When dot11FMSActivated is true and ReceiveDTIMs is true and the STA has been granted by the
AP an alternate delivery interval for a multicast stream, the STA shall wake up before the non-STBC
DTIM or STBC DTIM having Current Count of FMS Counter field set to 0 for that particular FMS
stream.

A STA may go to doze state after receiving the non-STBC DTIM if the non-STBC DTIM indicates existence of buffered group addressed BUs and the target transmission time of group addressed BUs is not equal to non-STBC DTIM.

(…existing texts…)