IEEE P802.11
Wireless LANs

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| Proposed resolution for comments related to BSS Color |
| Date: 2017-01-17 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Abhishek Patil | Qualcomm Inc. | 5775 Morehouse Drive, San Diego, CA 92121 | +1-858-845-4434 | appatil@qti.qualcomm.com |
| Alfred Asterjadhi | Qualcomm Inc. | 5775 Morehouse Drive, San Diego, CA 92121 | +1-858-658-5302 | aasterja@qti.qualcomm.com |
| George Cherian | Qualcomm Inc. | 5775 Morehouse Drive, San Diego, CA 92121 | +1-858-651-6645 | gcherian@qti.qualcomm.com |
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Abstract

This submission proposes resolutions for multiple comments related to TGax D1.0 with the following CIDs (11 CIDs): 3084, 3085, 3086, 5387, 7166, 3088, 9458, 10299, 6777, 6781, 6786.

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 Draft. This introduction is not part of the adopted material.

***Editing instructions formatted like this are intended to be copied into the TGax 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.***

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| --- | --- | --- | --- | --- | --- |
| **CID** | **Section** | **Pg / Ln** | **Comment** | **Proposed Change** | **Resolution** |
| 3084 | 27.11.4 | 196: 39 | Add section reference to setting NAV | Update sentence as follows: "the channel access rules as described in 27.9 (Spatial reuse operation) or reduce power consumption as described in 27.14.1 (Intra-PPDU power save for HE non-AP STAs) or set the NAV as described in 27.2.2 (Updating two NAVs)." | AcceptedPlease see document 11-17-0134-03-00ax |
| 3085 | 27.11.4 | 196: 43 | Mention that BSS Color is a 6-bit value | Edit sentence as follows: "An HE STA transmitting an HE Operation element shall select a value in the range 1 to 63 to include in the 6-bit BSS Color subfield of the HE Operation element ..." | AcceptedPlease see document 11-17-0134-03-00ax |
| 3086 | 27.11.4 | 196: 43 | Since BSS Color can change when AP determines a prolonged color collision, remove text that states that BSS Color is maintained for the lifetime of the BSS | Remove follow from the sentence: " and shall maintain that single value of the BSS Color subfield for the lifetime of the BSS" | RevisedAgree with the comment – added text to capture the BSS Color change case. Please see document 11-17-0134-03-00ax |
| 5387 | 27.11.4 | 196: 44 | A BSS may change its BSS Color (Subclause 27.16.2 Selecting and advertising new BSS Color) during the operation. | The BSS shall maintain the single value of the BSS Color subfield of the HE Operation element for the lifetime of the BSS or until the BSS changes the BSS Color to the new value. | AcceptedPlease see document 11-17-0134-03-00ax |
| 7166 | 27.11.4 | 196: 43 | When BSS Color collision happens, an HE AP may switch the BSS Color to a new one. | Please change the text as follows: "shall maintain that single value of the BSS Color subfield until the HE STA transmitting an HE operation element switches to a new BSS Color" | RevisedAgree with the comment – added text to capture the color change case. Please see document 11-17-0134-03-00ax |
| 6786 | 27.16.2 | 206: 25 | "An HE AP may choose to change the BSS Color under certain conditions". That's not what was said back on page 196 (lines 43-44), where HE STAs had to use the same BSS Color for the lifetime of the BSS. The reader shouldn't have to flip backwards and forwards through the specification to see if apparently definitive requirements are countermanded by statements far away. | Reconcile the two statements at issue. For example, add some "Except when ..." qualifier to the earlier statement. | RevisedAgree with the comment. The sentence is modified to include the following text: “or until the BSS changes the BSS Color to the new value”Please see document 11-17-0134-03-00ax |
| 3088 | 27.11.4 | 197: 8 | A non-AP STA may determine BSS Color overlap with a neighboring (OBSS) AP. In such cases, the non-AP STA needs a mechanism to report a color collision to its associated AP. | Define a mechanism where a non-AP STA can autonomously report a color collision to its associated AP. | AcceptedPlease see document 11-17-0134-03-00ax |
| 9458 | 27.16.2 | 206: 24 | It may be possible that an OBSS using the same BSS Color may be only visible to STAs, but may or may not be visible to the AP. A mechanism is needed for a STA to report a visible OBSS with the same BSS Color to its AP. The AP may then make decisions whether to change the BSS Color. | Provide a mechanism for STAs to report to AP an OBSS that is visible to the STAs that uses the same BSS Color as the AP that the STAs are associated with. | AcceptedPlease see document 11-17-0134-03-00ax |
| 10299 | 27.16.2 | 206: 28 | The algorithm to choose a new BSS Color is beyond the scope of this standard, but it is beneficial to define frames and procedure to gather color information. | Add texts as follows."An HE non-AP STA may report the information of BSS color in the PPDUs it received before the association via the BSS Color Statistics Report element(TBD) in Probe Request or (Re)Association Request frames." | RevisedAgee with the comment that there should be a mechanism for non-AP STA to report the OBSS colors that it sees in its neighborhood. However, this can be done post association and can leverage existing framework without needing to define a new element.Please see document 11-17-0134-03-00ax |
| 6777 | 27.11.4 | 197: 9 | Unnecessary variant used for defined term: "BSS color". The term is "BSS Color". | Change to "BSS Color". | AcceptedPlease see document 11-17-0134-03-00ax |
| 6781 | 27.11.4 | 197: 27 | Unnecessary variant used for defined term: "BSS color". The term is "BSS Color". | Change to "BSS Color". | AcceptedPlease see document 11-17-0134-03-00ax |

TGax Editor: Please modify this section as follows:

**27.11.4 BSS\_COLOR**

The BSS Color is an identifier of the BSS and is used to assist a receiving STA in identifying the BSS from which a PPDU originates so that the STA can use the channel access rules as described in 27.9 (Spatial reuse operation) or reduce power consumption as described in 27.14.1 (Intra-PPDU power save for HE non-AP STAs) or set the NAV as described in 27.2.2 (Updating two NAVs)[CID 3084].

An HE STA transmitting an HE Operation element shall select a value in the range 1 to 63 to include in the 6-bit[CID 3085] BSS Color subfield of the HE Operation element that it transmits and shall maintain that single value of the BSS Color subfield for the lifetime of the BSS or until the BSS changes the BSS Color to the new value[CID 3086, 5387, 6786, 7166]. An HE STA that transmitted an HE Operation element shall set the TXVECTOR parameter BSS\_COLOR of an HE PPDU to the value indicated in the BSS Color subfield of its HE Operation element.

An HE STA receiving an HE Operation element shall set the TXVECTOR parameter BSS\_COLOR of an HE PPDU to the value indicated in the BSS Color subfield of the HE Operation element received from the HE STA with which it is associated or intends to transmit.

An HE STA that received an HE PPDU with RXVECTOR parameter BSS\_COLOR with a value between 1 and 63 may ignore the HE PPDU subject to the rules as described in 27.9 (Spatial reuse operation).

An HE STA transmitting an HE SU PPDU or an HE extended range SU PPDU for which one or more intended recipient STAs is not a member of a transmitting STA's BSS shall set the TXVECTOR parameter BSS\_COLOR of the HE PPDU to 0.

An HE STA that received an HE SU PPDU or an HE extended range SU PPDU with RXVECTOR parameter BSS\_COLOR equal to 0 shall not discard the HE PPDU.

An HE STA associated with an HE AP that is transmitting an HE PPDU in a direct path to a DLS or TDLS peer STA shall set the TXVECTOR parameter BSS\_COLOR to the value of the value indicated in the BSS Color subfield of the HE Operation element received from the HE AP.

All APs that are members of a Multiple BSSID Set element shall use the same BSS Color.

An HE AP that decides to discontinue the use of the BSS ~~color~~Color[CID 6777] for the BSS that it serves, for example, after detecting a BSS Color overlap with an OBSS (see section 27.16.3)[CID 3088, 9458, 10299] shall set the value of BSS Color Disabled subfield in the HE Operation element to 1 to inform associated STAs that the BSS Color is disabled; otherwise the AP shall set the BSS Color Disabled subfield to 0.

If the most recently received HE Operation element from the AP to which it is associated contained a value of 1 in the BSS Color Disabled subfield then:

* A HE non-AP STA should use the A1, A2 and Duration/ID fields of the MPDUs contained in the received PPDUs instead of the BSS\_COLOR and TXOP\_Duration field in the ~~HE-SIG-A field~~ RXVECTOR to determine whether the STA should update the Intra-BSS NAV.
* A HE non-AP STA should use the A1, A2 of the MPDUs contained in the received PPDUs instead of the BSS\_COLOR and STA\_ID\_LIST field in the ~~HE SIG A field~~ RXVECTOR to determine whether the STA may go to doze state for the duration of that PPDU (see 27.14.1 (Intra-PPDU power save for HE non-AP STAs)).

The HE non-AP STA may use the BSS ~~color~~Color[CID 6781] if the most recently received HE Operation element from the AP to which it is associated contained a value of 0 in the BSS Color Disabled subfield.

Following changes are required to resolve CIDs 3088, 9458, 10299

TGax Editor: Please add a new section after 27.16.3 as follows:

**27.16.3 Detecting BSS Color Collision**

An HE AP shall disable BSS Color by setting the BSS Color Disabled bit in HE Operation element to 1 when it receives a frame from another HE AP containing the same BSS Color as the one it selected.

An HE non-AP STA may autonomously report BSS Color collision when it receives frames from another HE AP containing the same BSS Color as the one advertised by the AP it is associated with. An HE STA’s autonomous report shall include BSS Color used by neighboring APs operating on the same channel as the AP the reporting STA is associated with and whose frames can be received by the reporting STA. When an HE STA is autonomously reporting a BSS Color collision, it shall transmit an Event Report frame (see section 9.6.14.3) containing a single Event Report Element (see section 9.4.2.68) with Event Token=0 (autonomous report), Event Type = BSS Color Collision and Event Report Status value of 0 (Successful).

Note: Since all APs that are members of a Multiple BSSID Set element use the same BSS Color, HE non-AP STAs need to filter such APs while determining if there is a BSS Color collision.

TGax Editor: Please modify this section as follows:

**4.3.18.8 Event reporting**

Event requests enable a STA to request a non-AP STA to send particular real-time event reports. The types of events include transition, RSNA, WNM log, BSS Color Collision, and peer-to-peer link events. A transition event is transmitted after a non-AP STA successfully completes a BSS transition. Transition events are used to diagnose transition performance problems. An RSNA event report describes the type of Authentication used for the RSNA. RSNA events are used to diagnose security and authentication performance problems. A WNM log event report enables a non-AP STA to transmit a set of WNM log event messages to the requesting STA. WNM log event reports are used to access the contents of a STA’s WNM log. A BSS Color Collision event report enables an HE non-AP STA to signal BSS Color Collision to its associated AP. A peer-to-peer link event report enables a non-AP STA to inform the requesting STA that a peer-to-peer link has been established. peer-to-peer link event reports are used to monitor the use of peer-to-peer links in the network.

TGax Editor: Please modify this section as follows:

**9.4.2.67 Event Request element**

**9.4.2.67.1 Event Request definition**

**Table 9-171—Event Type field definitions for event requests and reports**

|  |  |
| --- | --- |
| **Name** | **Event Type** |
| Transition | 0 |
| RSNA | 1 |
| Peer-to-peer link | 2 |
| WNM log | 3 |
| BSS Color Collision | 4 |
| Reserved | ~~4-220~~5-220 |
| Vendor Specific | 221 |
| Reserved | 222-255 |

TGax Editor: Please modify this section as follows:

**9.4.2.68 Event Report element**

**9.4.2.68.1 Event Report Definition**

TGax Editor: Please update the following paragraphs in this section as:

The Event TSF, UTC Offset, Event Time Error, and Event Report fields are present only when the Event Report Status field is 0. UTC Offset and Event Time Error are not present when the Event Type is BSS Color Collision.

The Event Report field contains the specification of a single event report, as described in 9.4.2.68.2 (Transition event report) to 9.4.2.68.5 (WNM log event report) and 9.4.2.68.7 (BSS Color Collision event report).

TGax Editor: Please add a new section as follows:

**9.4.2.68.7 BSS Color Collision event report**

Event Report field carries BSS Color of each near-by AP that the reporting STA is able to receive frames from. The format of the Event Report field corresponding to a BSS Color Collision event report is shown in Figure 9-xxx (Event Report format of BSS Color Collision event). Each OBSS Color field consists of 6 bits of BSS Color field which carries the BSS Color value advertised by neighboring AP and 2 bits of reserved field shown in Figure 9-xxx (OBSS Color field format).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|   | OBSS Color\_1 | OBSS Color\_2 | …… | OBSS Color\_N |
| Octets: | 1 | 1 | …… | 1 |

**Figure 9-xxx—Event Report format for BSS Color Collision event**

|  |  |  |
| --- | --- | --- |
|  | B0 B5 | B6 B7 |
|  | BSS Color | Reserved |
| Bits: | 6 | 2 |

Figure 9‑xxx – OBSS Color field format

TGax Editor: Please modify this section as follows:

**11.24.2 Event request and report procedures**

**11.24.2.1 Event request and event report**

The Event Request and Event Report frames enable network real-time diagnostics. A STA whose dot11EventsActivated is true shall support event requests and reports and shall set to 1 the Event field of the Extended Capabilities elements that it transmits. An HE STA shall set to 1 the Event field of the Extended Capabilities elements that it transmits.

In case of a non-HE STA:

* If dot11EventsActivated is true, a STA shall log all Transition, RSNA, peer-to-peer, and WNM log events, including the corresponding TSF, UTC Offset and Event Time Error.
* The STA log of events shall not be cleared as a result of BSS transitions. However, if the STA moves to a different ESS or IBSS, the STA shall delete all event log entries.

TGax Editor: Please add a new section as follows:

**11.24.2.7 BSS Color Collision event**

The BSS Color Collision event report is intended to notify an HE AP that a BSS Color Collision has occurred and to provide information regarding the BSS Color used by APs in range of the reporting non-AP HE STA. An HE STA that determines a BSS Color collision may transmit an autonomous (Event Token = 0) Event Report to inform its associated HE AP that a Color collision has been detected. The report carries Event Report field which carries BSS Color values advertised by neighboring APs operating on the same channel as the AP the reporting STA is associated with and whose frames can be received by the reporting STA.