IEEE P802.11
Wireless LANs

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| LB230 CR TXVECTOR parameter BSS\_COLOR (27.11.4)  |
| Date: 2018-03-06 |
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Abstract

This submission proposes resolutions of comments received from TGax LB230.

(The proposed change is based on TGax Draft 2.2.)

* CIDs: 11043, 12148, 11734, 13943, 11044, 13942, 13944, 12810 (8 CIDs)

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.***

| **CID** | **Page** | **Clause** | **Comment** | **Proposed Change** | **Resolution** |
| --- | --- | --- | --- | --- | --- |
| 11043 | 305.14 | 27.11.4 | The 1st sentence of this paragraph is way too long and confusing - consider splitting to multiple sentences to improve readibility | As in comment | Revised- Agree in principle. As requested by the commenter, split the first sentence to multiple sentences. TGax editor makes changes as shown in the as specified in 11-18/0456r0.  |
| 12148 | 305.20 | 27.11.4 | When two HE STAs are associated with a non-HE AP, there might be a TDLS link between the two HE STAs. How to select the BSS color? Please clarify it | as comment | Rejected- The first sentence of this paragraph already covers an HE STA that is associated with a non-HE AP. The HE STA shall select a value in the range 1 to 6.  |
| 11734 | 305.25 | 27.11.4 | Sometimes there is a conflict on two BSS\_COLOR setting rules of line 25 and line 52. For example, when an AP transmits an HE SU PPDU to a STA not in its own BSS, which rule takes priority? Need to define the order of priority. | As in the comment | Revised- Agree in principle. Allow to use the BSS\_COLOR 0. TGax editor makes changes as shown in the as specified in 11-18/0456r0. |
| 13943 | 305.26 | 27.11.4 | "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."In a mesh BSS, a mesh station may receive an HE Operation element that has the BSS Color subfield and also transmit an HE Operation element that has the BSS Color subfield.In such case, which BSS Color is used in an HE PPDU? | Define the TXVECTOR parameter BSS\_COLOR for an HE PPDU in a mesh BSS. | Revised- Based on TGax D2.0, the TXVECTOR parameter BSS\_COLOR for an HE PPDU in a mesh BSS is set to a value indicated in the BSS Color subfield of the HE Operation element transmitted by a mesh STA. But, need a clarification for the SR operation when mesh STAs are using the different BSS Color. Refer the discussion in 11-18/0456r0.TGax editor makes changes as shown in the as specified in 11-18/0456r0. |
| 11044 | 305.29 | 27.11.4 | It is not clear from the paragraph that active color can either be the one advertised in HE Operation element or the one advertised in the BSS Color Change Announcement after the color change TBTT. Consider adding two bullets to cover each case. Also mention TXVECTOR PARAMETER BSS\_COLOR | Change the paragraph as:"The TXVECTOR parameter BSS\_COLOR is set to the active BSS color. The active BSS color is the value carried in the BSS Color field contained in: - the HE Operation element transmitted by the peer HE STA - the BSS Color Change Announcement element transmitted by a peer HE STA after the BSS color change TBTT has passed (see 27.16.2.1 (Selecting and advertising a new BSS color))." | Revised- Agree in principle. To improve a readability, makes the sentence to the bullets. TGax editor makes changes as shown in the as specified in 11-18/0456r0. |
| 13942 | 305.39 | 27.11.4 | A mesh BSS is missed. | Define the TXVECTOR parameter BSS\_COLOR for an HE PPDU in a mesh BSS. | Revised- Based on TGax D2.0, the TXVECTOR parameter BSS\_COLOR for an HE PPDU in a mesh BSS is set to a value indicated in the BSS Color subfield of the HE Operation element transmitted by a mesh STA. But, need a clarification for the SR operation when mesh STAs are using the different BSS Color. Refer the discussion in 11-18/0456r0.TGax editor makes changes as shown in the as specified in 11-18/0456r0. |
| 13944 | 305.53 | 27.11.4 | "An HE STA transmitting an HE SU PPDU or an HE ER SU PPDU for which one or more of the intended recipient STAs is not a member of the transmitting STA's HE BSS shall set the TXVECTOR parameter BSS\_COLOR of the HE PPDU to 0."The parameter BSS\_COLOR 0 is not used for an HE MU PPDU and HE TB PPDU.Please include that the parameter BSS\_COLOR 0 is reserved for an HE MU PPDU and HE TB PPDU. | As in comment. | Revised- Agree in principle. As suggested by the commenter, add the following sentence. “…Otherwise, the HE STA shall not set the TXVECTOR parameter BSS\_COLOR of an HE PPDU to 0.”TGax editor makes changes as shown in the as specified in 11-18/0456r0. |
| 12810 | 306.24 | 27.11.4 | "PARTIAL\_AID [5:8] in the transmitting VHT PPDU with theTXVECTOR parameter GROUP\_ID equal to 63 is not the same as the partial BSS color announced by anHE AP" | Reword as "PARTIAL\_AID [5:8] for VHT PPDUs transmitted by an HE AP with the TXVECTOR parameter GROUP\_ID equal to 63 is not compatible with the BSS color announced by the HE AP" | Revised- Agree in principle.TGax editor makes changes as shown in the as specified in 11-18/0456r0. |

**Discussion:**

An HE STA can use two different BSS colors.

For example, the HE STA works as an HE AP and serves its own HE BSS with the BSS color A. Simultaneously, it works as an HE non-AP STA and is associated with another HE AP with the BSS color B.

See the below example.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| HE AP1 (BSS Color B) |  | HE non-AP STA1 (BSS Color B) | HE AP2(BSS Color A) |  | HE non-AP STA2 (BSS Color A) |

In this scenario, while the HE AP2 is receiving an HE PPDU with the BSS color A, the HE AP1 can access the channel through the SR (because the the HE PPDU addressed to the HE AP2 is considered as an inter-BSS frame) and transmit another HE PPDU addressed to the HE non-AP STA1.

The proposed solution is that the HE non-AP STA1 provides the BSS Color in use (e.g., BSS Color A in the above example) to the HE AP1.

***TGax editor: change the sub-clause 27.11.4 as the following:***

* 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 non-AP HE STAs) or update the NAV as described in 27.2.4 (Updating two NAVs).

An HE STA transmitting an HE Operation element or a BSS Color Change Announcement element except when the HE STA is a non-AP STA associated with an HE AP shall select a value in the range 1 to 63 to include in either the BSS Color subfield of the HE Operation element or the New BSS Color subfield of the BSS Color Change Announcement element respectively that it transmits ~~and~~. The HE STA shall maintain that single value of the BSS Color subfield for the lifetime of the BSS or until the BSS color changes as described in 27.16.2.1 (Selecting and advertising a new BSS color). A non-AP HE STA(#11865) 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 BSS Color subfield of the HE Operation element it transmits to the peer STA to the value indicated in the BSS Color subfield of the HE Operation element received from the HE AP.

An HE STA that transmitted an HE Operation element shall set the TXVECTOR parameter BSS\_COLOR of an HE SU PPDU, an HE ER SU PPDU, or a DL HE MU PPDU to the value indicated in the BSS Color subfield of its HE Operation element, except when the HE STA transmits an HE (ER) SU PPDU for which one or more of the intended recipient STAs is not a member of the transmitting STA's HE BSS. In which case, the HE STA shall set the TXVECTOR parameter BSS\_COLOR of the HE (ER) SU PPDU to 0. (#13944, 11734)

An HE non-AP STA transmitting an HE (ER) SU PPDU for which one or more of the intended recipient STAs is not a member of the transmitting STA's HE BSS shall set the TXVECTOR parameter BSS\_COLOR of the HE (ER) SU PPDU or the HE ER SU PPDU to 0. (#13944, 11734)

~~An active BSS color is used to set the BSS\_COLOR parameter and is the BSS Color field value in the HE Operation element when an HE STA receives an HE Operation element from a peer HE STA. When an HE STA receives a BSS Color Change Announcement element and the BSS color change TBTT has passed, it is the BSS color value received in the BSS Color Change Announcement element (see 27.16.2.1 (Selecting and advertising a new BSS color)) transmitted by a peer HE STA.~~ (#11044)

The active BSS color is used to set the TXVECTOR parameter BSS\_COLOR and is one of the following values:

* The value of the BSS Color field in the most recently received HE Operation element when an HE STA receives an HE Operation element from a peer HE STA.
* The value of the New BSS Color field in the most recently received BSS Color Change Announcement element (see 27.16.2.1 (Selecting and advertising a new BSS color)) when an HE STA receives a BSS Color Change Announcement element from a peer HE STA and the BSS color change TBTT has passed. (#11044)

An HE STA shall set the TXVECTOR parameter BSS\_COLOR for an HE SU PPDU, an HE ER SU PPDU, or an UL HE MU PPDU (#11734) that is addressed to a peer STA to the active BSS color value, if the HE STA has established any of the following:

* An association with the peer STA
* A TDLS link with the peer STA
* A DLS link with the peer STA
* An IBSS membership with the peer STA

NOTE— An mesh STA that not only transmitted an HE Operation element to a peer STA but also received an HE Operation element from a peer STA sets the the TXVECTOR parameter BSS\_COLOR of an HE PPDU to the value in the BSS Color subfield of its transmitted HE Operation element. The mesh STA does not use the active BSS color value to set the the TXVECTOR parameter BSS\_COLOR of an HE PPDU. (#13942, 13943)

An HE STA that receives an HE PPDU with RXVECTOR parameter BSS\_COLOR with a value between 1 and 63 follows the spatial reuse rule described in 27.9 (Spatial reuse operation).

NOTE—An HE STA that received an HE PPDU with the RXVECTOR parameter BSS\_COLOR equal to 0 does not follow the spatial reuse rule described in 27.9 (Spatial reuse operation).

~~An HE STA transmitting an HE SU PPDU or an HE ER SU PPDU for which one or more of the intended recipient STAs is not a member of the transmitting STA's HE BSS shall set the TXVECTOR parameter BSS\_COLOR of the HE PPDU to 0.~~ (#13944, 11734)

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

All APs that are members of a multiple BSSID set shall use the same BSS color.

An HE AP that decides to discontinue the use of the BSS color for the BSS that it serves, for example, after detecting a BSS color collision(#11866) with an OBSS (see 27.16.2.2 (Detecting and reporting BSS color collision)), shall set the value of BSS Color Disabled subfield in the HE Operation element to 1 to inform associated HE STAs(#11943) that the BSS color(#Ed) is disabled; otherwise the HE AP(#11944) 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 non-AP HE STA should use the A1, A2 and Duration/ID fields of the MPDUs contained in the received HE PPDUs instead of the RXVECTOR parameters BSS\_COLOR and TXOP\_DURATION to determine whether the STA should update the intra-BSS NAV.
* A non-AP HE STA should use the A1, A2 fields of the MPDUs contained in the received HE PPDUs instead of the RXVECTOR parameters BSS\_COLOR and STA\_ID\_LIST 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 non-AP HE STAs)).

A non-AP HE STA may use the RXVECTOR parameter BSS\_COLOR of an HE PPDU to determine whether it should update the intra-BSS NAV (see 27.2.4 (Updating two NAVs)) and/or the STA may go to doze state for the duration of the PPDU (see 27.14.1 (Intra-PPDU power save for non-AP HE STAs)) 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.

When the value of TXVECTOR parameter PARTIAL\_AID [5:8] ~~in the transmitting VHT PPDU~~ for VHT PPDUs transmitted by an HE AP (#12810) with the TXVECTOR parameter GROUP\_ID equal to 63 is not the same as the partial BSS color announced by ~~an~~ the HE AP, the HE AP shall set the Partial BSS Color field in the HE Operation element to 0. Otherwise, the HE AP may set the Partial BSS Color subfield in the HE Operation element to 1 (see 27.16.3 (AID assignment)).

***TGax editor: change the sub-clause 14.2.4 as the following:***

**14.2.4 Mesh STA configuration**

The mesh STA configuration consists of the mesh profile (see 14.2.3 (Mesh profile)), the Supported Rates and BSS Membership Selectors element, the Extended Supported Rates and BSS Membership Selectors element, the HT Operations element (if present), ~~and~~ the VHT Operations element (if present), and the HE Operation element (if present).

Mesh STA configurations are identical if the following conditions hold:

— The mesh profiles are identical.

— The BSSBasicRateSet parameter of the MLME-START.request is identical to the basic rate set indicated by the Supported Rates and BSS Membership Selectors element and Extended Supported Rates and BSS Membership Selectors element, if present, received in the MLMEMESHPEERINGMANAGEMENT.indication.

— For HT mesh STAs, the Basic HT-MCS Set field of the HT Operation parameter of the MLMESTART.request is identical to the HT Operation element received in the MLMEMESHPEERINGMANAGEMENT.indication.

— For VHT mesh STAs, the Basic VHT-MCS and NSS fields in the VHT Operation element of the MLME-START.request are identical to the Basic VHT-MCS and NSS fields in the VHT Operation element received in the MLME-MESHPEERINGMANAGEMENT.indication.

— For HE mesh STAs, the Basic HE-MCS and NSS Set field in the HE Operation element of the MLME-START.request are identical to the Basic HE-MCS and NSS Set field in the HE Operation element received in the MLME-MESHPEERINGMANAGEMENT.indication.

***TGax editor: change the sub-clause 14.2.7 as the following:***

**14.2.7 Candidate peer mesh STA**

When a mesh STA discovers a neighbor mesh STA through the scanning process and the discovered mesh STA is considered a candidate peer mesh STA, it may become a member of the mesh BSS of which the discovered mesh STA is a member and establish a mesh peering with the neighbor mesh STA.

The discovered neighbor mesh STA shall be considered a candidate peer mesh STA if and only if all of the following conditions are met:

a) The mesh STA uses the same mesh profile as the received Beacon or Probe Response frame indicates for the neighbor mesh STA.

NOTE—If the scanning mesh STA has not become a member of any MBSS yet, it might simply activate the same mesh profile as the discovered neighbor mesh STA’s profile to fulfill this condition.

b) The Accepting Additional Mesh Peerings subfield in the Mesh Capability field in the received Beacon or Probe Response frame equals 1.

c) The mesh STA supports the data rates indicated by the BSSBasicRateSet of the received Beacon or Probe Response frame.

d) If both the scanning mesh STA and the discovered neighbor STA are HT STAs, the STA has the same value in the Basic HT-MCS Set field of the HT Operation parameter of the MLMESTART.request primitive as the received Beacon or Probe Response frame indicates for the neighbor mesh STA.

e) If both the scanning mesh STA and the discovered neighbor STA are VHT STAs, the mesh STA uses the same value for the Basic VHT-MCS And NSS Set field in its VHT Operation element as received in the Beacon or Probe Response frame from the neighbor mesh STA.

f) If both the scanning mesh STA and the discovered neighbor STA are HE STAs, the mesh STA uses the same value for the Basic HE -MCS And NSS Set field in its HE Operation element as received in the Beacon or Probe Response frame from the neighbor mesh STA.

g) If the scanning mesh STA has dot11MeshSecurityActivated equal to true and the dot11MeshActiveAuthenticationProtocol is ieee8021x (2), either the scanning mesh STA has an active connection to an AS or the discovered mesh STA has the Connected to AS subfield in the Mesh Formation field in the Mesh Configuration element equal to 1 in the received Beacon or Probe Response frame.

***TGax editor: insert the following paragraph at the end of the sub-clause 27.9.1:***

**27.9 Spatial reuse operation**

**27.9.1 General**

If an HE STA ignores an inter-BSS PPDU following the procedure in this clause and obtains a TXOP, the HE STA shall not transmit frames to a peer STA that is a member of an OBSS associated with the inter-BSS PPDU. (#13942, 13943)

**4.3.19.8 Event reporting**

***TGax editor: change the sub-clause 4.3.19.8 as the following:***

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, BSS color in use 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 perfor-mance problems. A WNM log event report enables a non-AP STA to transmit a set of WNM log event mes-sages 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 a non-AP HE STA to signal BSS color collision to its associated AP. A BSS color in use event report enables a non-AP HE STA to signal a BSS color in use by the non-AP HE STA 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.

**9.4.2.66.1 Event Request definition**

***TGax editor: insert a new row and update the first reserved row of Table 9-186 as follows:***

|  |
| --- |
| * Event Type field definitions for event requests and reports
 |
| Name | Event Type |
| BSS Color Collision | 4 |
| BSS Color In Use  | 5 |
| Reserved | ~~4~~6–220 |

**9.4.2.67.1 Event Report definition**

***TGax editor: change the 6th paragraph as follows:***

The Event TSF, UTC Offset, Event Time Error, and Event Report fields are present only when the Event Report Status field is 0 (Successful) and Event Type is ~~not~~ neither 4 (BSS Color Collision) nor 5 (BSS Color In Use). Event TSF and Event Report fields are present only when Event Status is 0 (Successful) and Event Type is either 4 (BSS Color Collision) or 5 (BSS Color In Use).

TGax editor: Change the 10th paragraph as follows:

The Event Report field contains the specification of a single event report, as described in 9.4.2.67.2 (Transition event report) to 9.4.2.67.5 (WNM log event report), ~~and~~ 9.4.2.67.7 (BSS Color Collision event report), and 9.4.2.67.8 (BSS Color In Use event report).

***TGax editor: insert a new subclause at the end of 9.4.2.67:***

**9.4.2.67.8 BSS Color In Use event report**

Event Report field is 1-octet in length and indicates the BSS color value in the range 1 to 63 which is in use by the reporting non-AP HE STA.

**11.22.2 Event request and report procedures**

***TGax editor: change the 1st paragraph and insert a new paragraph as follows:***

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. If dot11EventsActivated is true and the Event Type is ~~not~~ neither BSS Color Collision nor BSS Color In Use, a STA shall log all Transition, RSNA, peer-to-peer, and WNM log events, including the corresponding TSF, UTC Offset and Event Time Error. An HE STA that has dot11EventsActivated equal to true and reports BSS color collisions shall log all BSS color collision events, including the TSF value when the STA finished logging the events that are reported (see 11.24.2.7 (BSS Color Collision event)).

A STA whose either dot11AutonomousBSSColorCollisionReportingImplemented or dot11AutonomousBSSColorInUseReportingImplemented is true shall set the Event field of the Extended Capabilities elements that it transmits to 1.

***TGax editor: insert a new subclause at the end of 11.22.2:***

**11.22.2.7 BSS color in use event**

The BSS color in use event report enables a non-AP HE STA to inform a BSS color in use by the non-AP HE STA to its associated AP. When the AP that received the BSS color in use event report from the non-AP HE STA ignores an inter-BSS PPDU with the BSS color value carried in the BSS color in use event report following the procedure in 27.9.2.2 (General operation with non-SRG OBSS\_PD level) and 27.9.2.3 (General operation with SRG OBSS\_PD level OBSS\_PD level), it shall not transmit frames to the non-AP HE STA.

***TGax editor: change Annex C as follows:***

**C.3 MIB Detail**

Dot11HEStationConfigEntry ::=

 SEQUENCE {

 …

 dot11HESubchannelSelectiveTransmissionImplemented TruthValue,

 dot11AutonomousBSSColorInUseReportingImplemented TruthValue

 }

dot11AutonomousBSSColorCollisionReportingImplemented OBJECT-TYPE

 SYNTAX TruthValue

 MAX-ACCESS read-only

 STATUS current

 DESCRIPTION

 "This is a capability variable.

 Its value is determined by device capabilities.

 This attribute, when true, indicates that autonomously

 reporting of BSS color in use is implemented."

 DEFVAL { false }

 ::= { dot11HEStationConfigEntry 25}