IEEE P802.11
Wireless LANs

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| Comment resolution for CIDs on dual beacon operation  |
| Date: 2017-05-04 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Yonggang Fang | ZTE TX |  |  |  |
| Kaiying Lv | ZTE |  |  |  |
| Bo Sun | ZTE |  |  |  |
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Abstract

This submission proposes resolutions for multiple comments related to TGax D1.0 with the following CIDs in

Clause 11.1.3.10 (15): ~~3054~~, 3055, 5165, 5797, 5905, 6554, 6556, 6560, 7961, 7977, 7978, 7979, 9334, 9561, 9696, 9868,

Clause 3.2 (5): 6228, 6223, 4708, 6917, 6918

Clause 9.4.2.219 (3): 7997, 9562, 9563

Revisions:

* Rev 0: Initial version of the document.
* Rev 1: modified based on comments from offline discussions.
* Rev2: modified baesd on the comments from offline discussions and added resolutions for comments in Clause 3.2 and Clause 9.4.2.219.
* Rev 3: change HE Beacon to ER Beacon, modified clause 10.7.5.1 Rate selection for non-STBC Beacon and non-STBC PSMP frames, and clause 9.4.2.219 HE Operation element.
* Rev 4: clean up text of Clause 27.16.x, 27.16.1, 10.7.5.x, 10.7.5.1 based on the comments.
* Rev 5: remove the ER Beacon in the title of Clause 10.7.5.1.

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.***

**Clause 11.1.3.10**

**CIDs: 5165**

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| **CID** | **Comment** | **Proposed Change** | **Resolution** |
| 5165 | We had dual-beacon in 11n with STBC. No one implemented it. Why are we introducing yet another dual-beacon? Delete this to reduce complexity in the spec. | as in comment  | Revised –See discussion below. Proposed resolution. 1. Change Dual Beacon to ER Beacon, which carries its own BSSID for a separate ER BSS.
2. Add the text to clarify the need for ER Beacon.

See the resolution for CID [#9334] and [#6223] as well.TGax editor please make changes as shown in 11-17/0340r3 |

**Discussion:**

STBC beacon defined in IEEE802.11-2012 intends to improve coverage of BSS. However, in the current WLAN deployment, the coverage is not limited by DL transimission. Instead, the coverage limitation is caused by the UL transmission, i.e. the STA can see the beacon of BSS, but the AP could not receive the transmission from STA at the edge of cell. This is because the transmit power of STA is a few dB lower than the transmit power of AP in most cases of deployment. In addition, the simulation result shows STBC at low data rate does not provide measurable improvement of coverage over spatial expansion using multiple antennas.

In 802.11ax PAR, it requires to support the use case of outdoor deployment and improve robustness transmission in outdoor propagation environments. 802.11ax simulation scenario [11-14-0980-16] defines the simulation and evalution cases for outdoor in the case 4 and 4a with coverage of inter-AP space 130m. The contribution [11-14-0801] simulated transmission robustness at different CP lengths, and concludes that short CP length does not secure the robustness for outdoor cases, The longer CP is needed to improve the rubustness of transmission in the outdoor deployment case. But the legacy non-HT PPDU would not be able to provide longer CP length.

802.11ax introduces OFDMA PHY to improve transmission efficiency and robustness, including for outdoor deployment cases. The UL transmission could gain about up to 10dB. This could change the coverage restriction from UL limited to DL limited in the typical deployment if HE AP still uses legacy non-HT PPDU format to carry beacon frame. Even an HE STA could be able to benefit from OFDMA for its UL transmission, but it would be difficult for an HE STA to associate with an HE AP if the HE STA could not see the beacon transmitted from the HE AP.

In addition, if the HE AP still uses non-HT PPDU format to carry beacon frame, it could not take the advantages of OFDMA, such as using longer CP for improving signal robustment in outdoor scenario.

Therefore the ER Beacon transmission is needed.

An ER Beacon may carry its own BSSID different from non-HT Beacon, and form an ER BSS separated from BSS specified by non-HT Beacon.

**Proposed Resolution:**

We agree with comments for clarifying the text to avoid the confusion.

The proposed resolution is as follows

1. Change the “HE dual beacon” to “ER Beacon” in the specification, and add that the ER Beacon frame is carried in HE\_ER\_SU 242-tone with DCM or HE\_ER\_SU 106 tone PPDU format, and may have its own BSSID to form an ER BSS separated from the BSS specified by non-HT Beacon. This is addressed by [#9334] and [#6223] as well.
2. Add explanation for the need of introducing ER Beacon.

**CIDs: 6556**

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| **CID** | **Comment** | **Proposed Change** | **Resolution** |
| 6556 | There's something odd about this idea of dual beacons. Superficlally, the idea is attractive: the extended range SU modes (purportedly) extend range, so it's natural to think of some way of conveying beacon information to the new, extended range. But there are many modes that extend range beyond 6 Mb/s: LDPC, DCM, STBC, TxBF, as well as HE\_EXT\_SU, with all permissible combinations (many optional). If the principle is that every mode has a corresponding beacon, then we have a nightmare of beacon proliferation. If instead the principle is that we have a common beacon understandable by all, why, we have that already with the good old 6 Mb/s normal beacon. The text in the current draft has the feel of a half-worked out add-on. It would be better to do this properly or not at all. Incidentally there is not one word about extended range in the PAR or CSD, so this is tangential to the entire project. (A side note: it might be preferable to remove all issues pertaining to extended range and multiple beacons to a new project, which could consider all issues in depth, including future extensibility when we add Further ER, Further Still ER, and so on, as we will inevitably do in the future.) | Delete this sentence and all references to dual beacons in the draft. | Revised –See the discussion and proposed resolution for CID 5165TGax editor please make changes as shown in 11-17/0340r3 |

**CIDs: 9334**

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| **CID** | **Comment** | **Proposed Change** | **Resolution** |
| 9334 | When the AP transmits beacons in an HE\_EXT\_SU PHY format, it uses the dual beacon mechanism. However, the dual beacon mechanism is deprecated in the baseline (see Table 9-168 and subclause 11.1.3.2 in 802.11-2016). There is no need to reintroduce this again.Just allowing the beacons to be transmitted in an HE\_EXT\_SU PHY format is enough. | Add in subclause 10.7.5.3 a condition to allow beacon frames and group addressed frames to be transmitted in an HE\_EXT\_SU PHY format if the BSSBasicRateSet, the Basic HT-MCS Set, and the basic VHT-MCS and NSS set are all empty and only the Basic HE MCS And NSS Set is not empty.Delete subclause 11.1.3.10, delete the definition of high efficient (HE) dual beacon from subclause 3.2, replace the Dual Beacon subfield in the HE Operation Parameters field to reserved and delete the description of the Dual Beacon subfield in subclause 9.4.2.219. | Revised – Agree the comment in principle. See discussion and proposed resolution below.TGax editor please make changes as shown in 11-17/0340r3 |

**Discussion:**

Agree the comment in principle. It needs to clarify the text to avoid the confusion.

**Proposed Resolution:**

The proposal for revised change is as follows

1. Change the “HE dual beacon” to “ER Beacon”. The ER Beacon is carried in the HE\_ER\_SU 242-tone with DCM or 106-tone PPDU format to form a separate ER BSS.
2. Move the clause of 11.1.3.10 to 27.16.x to follow the new style of 802.11ax specification structure.
3. Keep the ER Beacon definition in 3.2 and change the definition from “HE dual beacon” to “ER Beacon” to avoid the confusion. See to resolution for CID [#6223] and [#9334] as well.
4. Add the rate selection for ER Beacon in the Clause of 10.7.5.x
5. Change the “Dual Beacon” subfield in HE Operation Parameter to “ER Beacon Indication”. Refer to resolution for CID #9562 and #9563.

**CIDs: 9696**

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| **CID** | **Comment** | **Proposed Change** | **Resolution** |
| 9696 | Remove 11.1.3.10 because there is no evidence of the coverage improvement through the Beacon frame transmitted in an HE extended range SU PPDU.Please provide a simulation result of the Beacon transmission in an HE extended range SU PPDU.If it is proven, the rate selection rule of the Beacon transmission in an HE extended range SU PPDU shall be added.Insert a new subclause in 10.7.5 (Rate selection for Data and Management frames) for a rate selection of an HE extended range Beacon frame. | As per comment. | Revised – See discussion and proposed resolution below.TGax editor please make changes as shown in 11-17/0340r3 |

**Discussion:**

802.11ax introduces new OFDMA PHY to improve transmission efficiency and robustness, such as 256 tones of subcarriers (comparing to 64 tones in 11ac), RU with different size of OFDMA tones, longer CP length of OFDMA symbol, and RL-SIG. With HE\_ER\_SU format, an HE AP can choose the bandwidth narrower than 20MHz such as 106-tones RU and longer CP length of OFDMA symbol to transmit an ER Beacon frame for improving the transmission robustness. This is one intention of introducing OFDMA in 802.11ax. Therefore it is no need to provide extra simulation result as the ER Beacon uses the existing HE\_ER\_SU PPDU format defined in 802.11ax PHY.

Per request of the comment, we run the simulation to compare HE\_ER\_SU PPDU vs non-HT PPDU performance with following parameters:

* non-HT MCS0 (CP=0.8us)
* HE ER SU 242-tone with/without DCM (CP=3.2us)
* HE ER SU 106-tone (CP=3.2us)
* Channel model: Umi
* Payload size: 250 Bytes



From the simulation result, it can see that the transmission in HE ER SU 106-tone or HE\_ER\_SU 242-tone with DCM PPDU would provide more robustness transmission than the transmission in non-HT MCS0. The transmission in HE\_ER\_SU 242-tone PPDU has similar performance as non-HT PPDU transmission.

We agree with the comment of inserting a new subclause in 10.7.5 (Rate selection for Data and Management frames) for a rate selection of an ER Beacon frame.

**Proposed Resolution:**

Add a subclause 10.7.5.x Rate selection for ER Beacon frames.

**CIDs: 6554, 6560, 9868**

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| **CID** | **Comment** | **Proposed Change** | **Resolution** |
| 6554 | Inconsistent usage of defined terms: here we have "beacon frames", whereas everywhere else in the drfat, including several places in the same section, we have "Beacon frames". | Change "beacon frames" to "Beacon frames". | Acceped  |
| 6560 | Inconsistent use of defined term: here we have "HE EXT\_SU", whereas everywhere else in the draft we have "HE\_EXT\_SU". | Change "HE EXT\_SU" to "HE\_EXT\_SU". | Acceped  |
| 9868 | When Beacon frames are transmitted in two PHY formats, it says one of the format shall be non-HE format. However, as baseline spec. says the beacon frame to be carried in non-HE (duplicate) format, it shall be non-HT format instead of non-HE format. | As in the comment.  | Revised –As “HE dual beacon” is changed to HE Beacon, the correspond ing text is removed accordingly. Proposed resultion: delete the sentence. See resolution for CID [#7977], [#7978], [#9561]TGax editor please make changes as shown in 11-17/0340r3 |

**CIDs: 7977**

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| **CID** | **Comment** | **Proposed Change** | **Resoluiton** |
| 7977 | "The Beacon frame transmitted in non-HE PPDU format has TBTT at the TSF value 0." is unclear | Change to "Time 0 is defined to be a TBTT for the Beacon frame transmitted in non-HE PPDU format (see 11.1.3.2)." | Revised – See discussion below.Proposed resolution:delete the text related ER Beacon transmission timing to legacy Beacon.TGax editor please make changes as shown in 11-17/0340r3 |

**Discussion:**

This comment is related to ER Beacon transmission timing vs legacy Beacon transmission timing.

Agree with the comment in prinple and there is a need to clarify the text.

An ER Beacon frame transmitted in HE\_ER\_SU 242-tone with DCM or HE\_ER\_SU 106-tone PPDU may have its own BSSID and forms an ER BSS separated from BSS specified by non-HT Beacon. The ER BSS formed by ER Beacon frame is independent to the BSS formed by the Beacon frame in non-HT PPDU. As a ER Beacon transmission is controlled by HE AP when there is a need to improve Beacon transmission reliability in ER BSS coverage, it may not be necessary to bundle ER Beacon transmission with the non-HT Beacon together. Therefore HE AP can schedule an ER Beacon transmission in a normal way, and it is not necessary to restrict the time of ER Beacon transmission aligning with non-HT Beacon’s transmission.

**Proposed Resolution:**

Remove the sentences related to ER Beacon transmission timing to legacy Beacon as indicated.

**CIDs: 7978**

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| **CID** | **Comment** | **Proposed Change** | **Resoluiton** |
| 7978 | "The Beacon frame transmitted in HE extended range SU PPDU has TBTT at the TSF value 0 plus the TBTT offset which value is a half of the value of the Beacon Interval field of the Beacon frame sent in non-HE format." is unclear | Change to "The TBTT for the Beacon frame transmitted in HE extended range SU PPDU format shall be offset by half of abeacon interval from the TBTT of the Beacon frame transmitted in non-HE PPDU format." | Revised – See discussion below.Proposed resolution:Remove the sentences related ER Beacon transmission timing to legacy Beacon as indicatedSee resolution for CID [#7977].TGax editor please make changes as shown in 11-17/0340r3 |

**Discussion:**

This comment is related to ER Beacon transmission timing vs legacy Beacon transmission timing.

Agree with the comment in prinple and there is a need to clarify the text.

As discussed in the CID #7977, the ER Beacon frame transmission is controlled by HE AP when there is a need to improve Beacon transmission reliability in ER BSS coverage, which is independantly from non-HT Beacon frame transmission. It is not necessary to restrict in the spec the ER Beacon transmission time by the non-HT Beacon transmission. An HE AP should be able to schedule an ER Beacon transmission in a normal way.

**Proposed Resolution:**

Remove the sentences related ER Beacon transmission timing to legacy Beacon as indicated. See the resolution of CID #7977.

**CIDs: 9561**

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| **CID** | **Comment** | **Proposed Change** | **Resoluiton** |
| 9561 | Using a half value of Beacon Interval of legacy beacon frames as offset of HE beacon may not be flexisible in deployment. Suggest to add HE Beacon Offset in the HE Operation element, or remove this restriction. | as in the comment | Revised – Agree the comment in principle.Proposed resolution: See the resolution of CID [#7977].TGax editor please make changes as shown in 11-17/0340r3 |

**CIDs: 3055**

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| **CID** | **Comment** | **Proposed Change** | **Resolution** |
| 3055 | Only HE STAs can understand an HE Beacon in Extended PPDU format. Such beacon need not carry information that is relevant to non-HE/legacy STAs. This will help reduce the size of HE Beacon. | Add a sentence which implies that an HE beacon may not include fields/IEs that apply only to legacy STAs. | Revised -As there is no legacy STAs associated with ER BSS formed by ER Beacon frame, this restriction is not needed.TGax editor please make changes as shown in 11-17/0340r3 |

**CIDs: 5797**

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| **CID** | **Comment** | **Proposed Change** | **Resolution** |
| 5797 | Need detail description of different element sets may be included in beacons in non-HE and HE\_EXT\_SU PPDUs formats. If they are carrying different set of elements, then in order to avoid any ambiguity, need to list out which elements may differ, and the reasons behind them. | Please add detail description | Revised –See discussion and proposed resolution below.TGax editor please make changes as shown in 11-17/0340r3 |

**Discussion:**

This comment is related to the content carried in ER Beacon and legacy Beacon.

Agree with comments in principle. The current text needs to be clarified.

In general, a Beacon frame should carry the enough information about the BSS for STAs to associate with the AP and other information like DTIM. As the “HE dual Beacon” in the discussion is changed to “ER Beacon”, the ER Beacon may have its own BSSID and form an ER BSS separated from BSS specified by non-HT Beacon. ER BSS operation is independent from the operation of BSS formed by non-HT Beacon. Therefore it is not necessary to restrict the content carried in ER Beacon frame. In addition, as the content in Beacon frame is controlled by the AP through configuration and scheduling, there is no need to specify the content in the Beacon frame in the spec. The related text should be removed from the spec.

**Proposed Resolution:**

1. Delete the sentence related to the content of Beacon frame.

**CIDs: 5905**

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| **CID** | **Comment** | **Proposed Change** | **Resolution** |
| 5905 | Rather than stating different elements may be carried, it should be specified what are identical elements and contents that must be carried in both types of Beacon frames. | As suggested. | Revised –This issue can be resolved by change “HE dual beacon” to “ER Beacon”. Proposed resolusion:Delete the sentence related to the content of Beacon frame.See the discussion and proposed resoliution for CID [#5797].TGax editor please make changes as shown in 11-17/0340r3 |

**CIDs: 7961**

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| **CID** | **Comment** | **Proposed Change** | **Resolution** |
| 7961 | For dual beacons to work w.r.t. both non-HE STAs and distant HE STAs, group-addressed traffic needs to be sent twice, once after each of the beacon types | After "When Beacon frames aretransmitted in two PHY formats, the HE AP shall transmit Beacon frames in non-HE format and in HE\_EXT\_SU format." add "The HE AP shall transmit buffered non-GCR-SP group addressed BUs twice, once immediately after each of these Beacon frames, when they are DTIM Beacons frames (see 11.2.3.4)."Also add a bit to HE Operation to indicate which kind of beacon it is (cf. STBC Beacon in 802.11-2016 page 953) | Revised –See discussion and proposed resolution below.TGax editor please make changes as shown in 11-17/0340r3 |

**Discussion:**

Agree with comments in principle.

This comment is related to the content of ER Beacon and legacy Beacon.

As in the original text, Beacon frame transmissions bundle legacy Beacon and ER Beacon frame transmission together, it may require duplicated content in legacy Beacon frame and ER Beacon frame, i.e. the HE AP shall transmit buffered non-GCR-SP group addressed BUs twice, once immediately after each of these Beacon frames. As the resolution proposed for CID #5797 removes such restriction on non-HT Beacon and ER Beacon transmissions, it is not necessary to specifiy that an HE AP shall transmit buffered non-GCR-SP group addressed BUs twice.

In addition, such decoupling of non-HT and ER Beacon frame transmissions would make it possible to support HE AP to configure BSS in different ways, such as two separate concentric BSSes with their own BSSIDs, one for BSS formed by non-HT Beacon frame and the other for ER BSS formed by ER Beacon frame. Therefore it is not necessary to duplicate the content in legacy Beacon and ER Beacon frame transmission. An HE non-AP STA can only listen to Beacon frames of the BSS which it associates with.

**Proposed Resolution:**

1. Delete the sentence related to content of Beacon frames.

**CIDs: 7979**

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| **CID** | **Comment** | **Proposed Change** | **Resolution** |
| 7979 | "The non-HE format and HE EXT\_SU PPDU format Beacon frames may contain different set of elements." is far too loose. | Change to "Except for the setting of the TIM field and TSF field, all other fields inside the Beacon frame transmitted in HE extended range SU PPDU format shall be identical to the Beacon frame transmitted in non-HE PPDU format." At 141.41 delete "as indicated in the Beacon frame transmitted in non-HE PPDUformat" and change "Beacon interval" to "beacon interval". At 141.48 delete "as indicated in the Beacon frame transmitted in the HE extended range SU PPDU." | Revised –Agree the comment in principle.See the discussion and proposed resoliuton for CID [#5797]TGax editor please make changes as shown in 11-17/0340r3 |

**TGax Editor: *Move the subclause 11.1.3.10 to subcause 27.16, and change the subclauses below as follows:***

**~~11.1.3.10~~ 27.16.x ER Beacon generation in an ER BSS**

An ER Beacon frame is a Beacon frame carried in HE\_ER\_SU 242-tone with DCM or 106-tone PPDU format to provide additional link budget of downlink transmission to compensate the link budget imbalance between downlink and uplink due to introduction of UL OFDMA transmission. An HE AP may operate an ER BSS in addition to a non-HT BSS. An ER BSS, when present, shall operate independent of the non-HT BSS and shall have a BSSID different from the non-HT BSS operated by the AP. An ER BSS may have larger coverage area [#5165, #6556].

An HE AP may transmit ER Beacon frames and group addressed traffic defined in 10.7.5.x Rate selection for ER Beacon frames and group addressed frame. An HE AP may use larger CP length of HE\_ER\_SU PPDU to further improve the transmission reliability of ER Beacon frames [#6554, #5165, #6556, #9334].

. [#9562, #9563]

 [#9696, #9334]

Protection of transmission in ER BSS is out of scope of this specification.

 [#7978]

 [#7977, #7979, #9561]

 [#5797, #5905, #7961]

**TGax Editor: *Add the text in the subclause below as follows:***

**27.16.1 Basic HE BSS functionality**

….

 An HE AP corresponding to the ER BSS shall not respond to the Probe Request or (Re-)Association Request frames sent from a non-HT STA, or an HE STA that does not support Partial Band Extended Range capability if the HE AP transmits ER Beacon in HE\_ER\_SU PPDU with 106-tone RU.

**TGax Editor: *Change the subclause below as follows:***

**10.7.5.1 Rate selection for non-STBC Beacon and non-STBC PSMP frames [#9334]**

If the BSSBasicRateSet parameter is not empty, a non-STBC PSMP frame or a non-STBC Beacon frame shall be transmitted in a non-HT PPDU using one of the rates included in the BSSBasicRateSet parameter except for ER Beacon (see Clause 10.7.5.x). If the BSSBasicRateSet parameter is empty, the frame shall be transmitted in a non-HT PPDU using one of the mandatory PHY rates.

**TGax Editor: *Add the subclause below as follows:***

**10.7.5.x Rate selection for ER Beacon frames and group addressed frames [#9696, #9334]**

If the Basic HE MCS and NSS Set of the AP that starts an ER BSS is not empty, the HE AP shall transmit ER Beacon frames and group-addressed frames in HE\_ER\_SU PPDUs using one of the <HE-MCS. NSS> tuples included in the basic HE-MCS and NSS set. If the Basic HE MCS and NSS Set of the AP that starts an ER BSS is empty, the HE AP shall transmit the ER Beacon frame and group addressed frames in HE\_ER\_SU PPDUs using one of mandatory <HE-MCS, NSS> tuples.

**Clause 3.2**

**CIDs: 6228, 6223, 4708, 6917, 6918,**

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| **CID** | **Comment** | **Proposed Change** | **Resolution** |
| 6228 | The entire HE dual beacon mode purportedly enables increased BSS coverage. In dense deployments this will reduce spatial reuse, and thus will run counter to the main aims of the project. It serves to clutter up an already bloated draft amendment. | Delete the definition of HE dual beacon and all references to it in the draft.  | Revised – As discussion in the resolution for CID #5165, and#9334,  “HE dual beacon” is changed to “ER Beacon”.ER Beacon is to improve the Beacon frame transmission robustness in the outdoor hotspot cases which is described in 802.11ax PAR. AP may disable it in the dense deployment case.Proposed resolution: Modify the definition of ER Beacon. See proposed text change below.TGax editor please make changes as shown in 11-17/0340r3 |
| 6223 | The definition of an HE dual beacon starts with an action: "A BSS transmits beacons in two PHY modes ...". This is very unclear. The BSS shall transmit beacons in two PHY modes? Or the BSS may transmit beacons in two PHY modes? And either way, what is this doing in a definitions section? | Rewrite the definition so that it defines the term purportedly being defined. In particular, if or when a BSS uses HE dual beacons, are both beacons "HE dual beacons", or is only the one transmitted in HE\_EXT\_SU PY format a dual beacon? Or is it the case that neither is, and instead the BSS is in "HE dual beacon mode"?And isn't it normally the case that beacons are transmitted by an "AP", not a BSS? Clarify. | Revised – Agree with the comment in principle. The proposed resolution is to change “HE dual beacon” to “ER Beacon and re-write the definition of “ER Beacon”. See proposed text change below.TGax editor please make changes as shown in 11-17/0340r3 |
| 4708 | Some issues with this definition: 1) Replace first occurrence of "BSS" with "basic service set (BSS)", replace "PHY modes", with "physical layer (PHY) protocol data unit (PPDU)", replace "efficient" with "efficiency", replace "HE extended range PHY" with "HE extended range single user (ER SU) PPDU", replace "HE\_EXT\_SU PHY format" with "HE ER SU PPDU", and replace "non-HE" with "non-HT". Also "in the whole BSS coverage" is arguable. Even when the AP does not use ER SU PPDUs for Beacons the legacy beacon covers the "whole BSS". It is a matter of perspective. Perhaps better to say, expanding the BSS coverage or something like that. | As in comment. | Accepted TGax editor please make changes as shown in 11-17/0340r3 |
| 6917 | The definition of high efficient dual beacon is a bit odd as it is not really a beacon but an operating mode that allow for the transmission of both a non-HE formatted | rewrite the definition of the HE Dual Beacon to be for the HE Dual Beacon Mode. | Revised – Agree with the comment in principle. See the resolution of CID #6223.TGax editor please make changes as shown in 11-17/0340r3 |
| 6918 | The term: high efficient dual beacon, HE dual beacon, or high efficient (HE) dual beacon does not appear in this amendment anywhere accept the in definitions | Either add the term to some clauses in the amendment or delete the definition. | Revised – Agree with the comment in principle. Change “dual HE beacon” to “ER Beacon”, and will be used in the clause 27.16.x ER Beacon generation in an ER BSS.TGax editor please make changes as shown in 11-17/0340r3 |

**TGax Editor: *Change the subclause below as follows:***

**3.2 Definitions specific to IEEE 802.11 [#6223], [#6228], [#4708], [#6917], [#6918], [#9334]**

**Extended Range (ER) Beacon:** A Beacon frame is transmitted in HE extended range single user (ER SU) physical layer (PHY) protocol data unit (PPDU) to form a high efficiency extended range basic service set (ER BSS).

**Clause 9.4.2.219,**

**CIDs: 7997, 9562, 9563, 5393**

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| **CID** | **Comment** | **Proposed Change** | **Resolution** |
| 7997 | It seems to me that the Dual Beacon subfield does not "indicate" the TBTT offset of the Beacon frame in HE extended range SU PPDU format. This offset is fixed and defined in subclause 11.1.3.10. | Delete the sentence "The Dual Beacon subfield also indicates the TBTT offset of Beacon frame in HE extended range SU PPDU in 11.1.3.10 (Beacon generation in an HE BSS)." Add the sentence "The TBTT offset of Beacon frame in HE extended range SU PPDU is defined in 11.1.3.10 (Beacon generation in an HE BSS)." after "The subfield is set to 1 if the HE AP transmits beacons in an HE extended range SU PPDU and a non-HE PPDU.". | Revised.As “HE dual beacon” is changed to “ER Beacon”, and transmitted independently from non-HT Beacon frame, it is not necessary to bundle them together. Proposed resolution is to remove the sentence. See CID [#7978] |
| 9562 | In order to improve the deployment flexibility, it may require to independently control legacy beacon and HE beacon transmission. Increase the size Dual Beacon field to 2 bits. | as in the comment | Revised –As “HE dual beacon” is changed to “ER Beacon”, and transmitted independently from non-HT Beacon, there is no need independently control legacy beacon and ER beacon transmissions.Reselution: Change to “HE dual beacon” bit to Reserved. TGax editor please make changes as shown in 11-17/0340r3 |
| 9563 | Modify the definition of Dual Beacon field. | 00: Legacy Beacon only,01: HE beacon only,10: L+HE beacon with duplicated system info.11: L+HE with non-duplicated system info | Revised –See CID #9562. |
|  |  |  |  |

**TGax Editor: *Change the subclauses below as follows:***

**9.4.2.219 HE Operation element**

……

B0 B5 B6 B8 B9 B10 B19 B20 B21 B22 B27 B28 B29 B30 B31

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BSS Color | Default PE Duration | TWT Required | HEDurationBasedRTSThreshold | Partial BSS Color | VHTOperationInformationPresent | Reserved | MultipleBSSID AP | TxBSSIDIndicator | BSS Color Disabled | Reserved  |

Bits: 6 3 1 10 1 1 6 1 1 1 1

**Figure 9-589cr—HE Operation Parameters field format**

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(#4775)(#6437)(#6439)(#6452)(#6458)(#9673)[#9562] [#9563]