IEEE P802.11
Wireless LANs

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| LB238 CR UL MU Power Capabilities  |
| Date: 2019-07-02 |
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Abstract

This submission proposes resolutions of comments received from TGax LB238.

(The proposed change is based on TGax Draft 4.2.)

* CIDs: ~~21049,~~ 20688, 21328, 21330, 21331, 21332, 20204, 21333, 20499~~, 20689, 21329~~ (~~11~~ 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** |
| --- | --- | --- | --- | --- | --- |
| ~~21049~~ | ~~202.34~~ | ~~9.4.2.256~~ | ~~There is a note that says that the reference power can change after association, yet the only frames in which this element is allowed to be inserted are the (Re)Association frames. This element needs to be allowed within some other frame in order for the STA to be able to change the values of the powers after association, otherwise the note is incorrect.~~ | ~~Add the element to some action frame, maybe a new HE Action?~~ | ~~Revised-~~~~Agree in principle.~~ ~~As suggested by the commenter, an UL MU Power Capabilities action frame is added to HE Action frame.~~ ~~TGax editor makes changes as specified in 11-19/1140r1 for CID 21049.~~ |
| 9.6.31 HE Action frame details9.6.31.1 HE Action field***TGax Editor: Change Table 9-524a (HE Action field values) as the following (#21049):***

|  |
| --- |
| * HE Action field values
 |
| Value | Meaning |
| 0 | HE Compressed Beamforming/CQI |
| 1 | Quiet Time Period |
| 2 | OPS |
| 3 | UL MU Power Capabilities |
| ~~3~~4-255 | Reserved |

***TGax Editor: Insert the following subclause after 9.6.31.4 (OPS frame format) (#21049):*** 9.6.31.6 UL MU Power Capabilities frame formatThe UL MU Power Capabilities frame is an Action frame of of category HE. The Action field of an UL MU Power Capabilities frame contains the information shown in Table 9-1140 (UL MU Power Capabilities frame Action field format).

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| Table 9-1140 – UL MU Power Capabilities Action field format  |
| Order | Information |
| 1 | Category |
| 2 | HE Action |
| 3 | UL MU Power Capabilities element (see 9.4.2.257 (UL MU Power Capabilities element))  |

The Category field is defined in Table 9-53 (Category values).The HE Action field is defined in Table 9-524a (HE Action field values).An UL MU Power Capabilities is always present in the frame. A Vendor-Specific element is not present in the frame.  |
| 21330 | 203.03 | 9.4.2.256 | Where is the transmit power meassured? Conducted power at the antenna port? | Define where the transmit power is measured | Rejected- The transmit power in the UL MU Power Capabilities element is referring Tx{Max}\_{pwr} in the UL power headroom calculation (Equation (26-2)). Tx{Max}\_{pwr} in the UL power headroom calculation (Equation (26-2)) is an implementation specific measurement. Accordingly, the measurement detail of the transmit power in the UL MU Power Capabilities element is also not needed to be specified in the spec.  |
| 20204 | 203.13 | 9.4.2.256 | The way of handling variable length lists in IEEE 802.11-2016/REVmd changed to the pattern shown at 1605.26 - 1605.56 or 1606.38-1606.60 (REVmd D2.0). Figure 9-772ai follows the old pattern with repeating fields shown in the frame format. | Change the format of figure 9-772ai to the format that is similar to 1605.26 - 1605.56 or 1606.38-1606.60 (REVmd D2.0). | Rejected- Please look at Figure 9-501 (Beacon Timing element format), 9.4.2.115 (PXU element), and so on, in REVmd 2.0.REVmd is still using both styles. And, if it is a formal guideline, please update 802.11 Editorial Style Guide (<https://mentor.ieee.org/802.11/dcn/09/11-09-1034-13-0000-802-11-editorial-style-guide.docx>).  |
| 21331 | 203.03 | 9.4.2.256 | Provide clarity on wherther the maximum trasnmit power is absolute maximum across all PPDU bandwidths and channels or just in the operating channel and operating channel width. | As in comment | Revised- Agree in principle. The maximum trasnmit power is just for the operating channel and operating channel width.For a clarification, change “… in the current channel” to “… in the operating channel width”. TGax editor makes changes as specified in 11-19/1140r1 for CID 21331. |
| ***TGax Editor: Change the subclause 9.4.2.256 (UL MU Power Capabilities element) as the following (#21331):*** 9.4.2.256 UL MU Power Capabilities elementThe UL MU Power Capabilities element indicates the relative maximum transmit power that a STA is capable of transmitting an HE TB PPDU for each MCS in the ~~current channel~~ operating channel width when using RU size greater than or equal to 242 subcarriers. The format of the UL MU Power Capability element is shown in Figure 9-772ai (UL MU Power Capabilities element). |
| 20688 | 203.01 | 9.4.2.256 | "in the current channel" is meaningless and "for each MCS" is unclear. MCS should be HE-MCS and have space. The encoding is dB, not the maths. "the reference maximum transmit power minus the nominal maximum transmit power for an HETB PPDU using RU size greater than or equal to 242 subcarriers, and HE-MCS n. The reference maximumtransmit power is the nominal maximum transmit power for an HE TB PPDU using RU size greater than orequal to 242 subcarriers, and HE-MCS 0." is not clear | Change the first sentence to "The UL MU Power Capability element specifies the relative maximum transmit powers with which a STA is capable of transmitting an HE TB PPDU when using an RU size greater than or equal to 242 tones, as a function of HE-MCS.". In the figure, change each "MCS" to "HE-MCS " (note space). In the rest of the subclause change " MCS" to " HE-MCS" (note spaces). Change "encoded as" to "containing". Change "the reference maximum transmit power minus the nominal maximum transmit power for an HETB PPDU using RU size greater than or equal to 242 subcarriers, and HE-MCS n. The reference maximumtransmit power is the nominal maximum transmit power for an HE TB PPDU using RU size greater than orequal to 242 subcarriers, and HE-MCS 0." to "the difference between the nominal maximum transmit power for an HE TB PPDU using an RU size greater than or equal to 242 subcarriers for HE-MCS 0 and that for HE-MCS n." | Revised- The ambiguity about “in the current channel” is clarified by changing to “in operating channel width”. Agree on changing MCS to HE-MCS. "encoded as" is changed to "contains” as suggested by the commenter.The last changes are also applied with minor editorial updates. TGax editor makes changes as specified in 11-19/1140r1 for CID 20688. |
| 21332 | 203.03 | 9.4.2.256 | What is the reference transmit power and what is the nominal maximum transmit power? | Define reference and nominal transmit power | Revised- Instead of defining the reference maximum transmit power, two sentence is merged into one sentence. TGax editor makes changes as specified in 11-19/1140r1 for CID 21332. |
| 21333 | 203.26 | 9.4.2.256 | "encoded as reference minus nominal" does not make sense. Encoding is how a value is represented as a finite number of bits. Also, dB is a relative scale so there needs to be a reference. Its an unsigned integer so what happens to the encoding if the reference (whatever that is) is less than the nominal? | Define meaning of reference and nominal transmit power. Rewrite as "The Relative Max Transmit Power MCS n field is the reference transmit power relative to the nominal transmit power expressed in dB" | Revised- Agree in principle. Instead of defining the reference maximum transmit power, the wording is changed. And, the nominal maximum transmit power of an HE TB for HE-MCS 0 is always greater than or equal to that for HE-MCS n.TGax editor makes changes as specified in 11-19/1140r1 for CID 21333. |
| ***TGax Editor: Change the 9.4.2.256 (UL MU Power Capabilities element) as the following (#20688, 21332, 20688, 21333):*** 9.4.2.256 UL MU Power Capabilities elementThe Relative Max Transmit Power MCS *n* field (where *n* = 1, ..., 11) is an unsigned integer in dB and ~~encoded as~~ contains ~~the reference maximum transmit power minus the nominal maximum transmit power for an HE TB PPDU using RU size greater than or equal to 242 subcarriers, and HE-MCS~~ *~~n~~*~~. The reference maximum transmit power is the nominal maximum transmit power for an HE TB PPDU using RU size greater than or equal to 242 subcarriers, and HE-MCS 0~~ the difference between the nominal maximum transmit power in dBm of an HE TB PPDU using an RU size greater than or equal to 242 subcarriers for HE-MCS 0 and that for HE-MCS *n*. ***TGax editor replaces “ MCS” with “HE-MCS”, in 9.4.2.256 UL MU Power Capabilities element (including Figure 9-772ai (UL MU Power Capabilities element)) for CID 20688.*** |
| 20499 | 203.31 | 9.4.2.256 | " If a STA does not support HE-MCSs 8 to 11, the Relative MaxTransmit Power MCS n fields (where n = 8, ..., 11) are reserved." -- what if it supports HE-MCSs 8 and 9, but not 10 and 11? | Change to " If a STA does not support certain HE-MCSs, the Relative MaxTransmit Power MCS n fields corresponding to those HE-MCSs are reserved." | Revised- Agree in principle. TGax editor makes changes as specified in 11-19/1140r1 for CID 20499. |
| 20689 | 203.31 | 9.4.2.256 | "If a STA does not support HE-MCSs 8 to 11, the Relative MaxTransmit Power MCS n fields (where n = 8, ..., 11) are reserved." is not clear in the case where the STA supports 8 and 9 but not 10 or 11 | Change to "If a STA does not support HE-MCSs 8 and 9, the Relative Max Transmit Power HE-MCS n fields (where n = 8 or 9) are reserved. If a STA does not support HE-MCSs 10 and 11, the Relative Max Transmit Power HE-MCS n fields (where n = 10 or 11) are reserved." | Revised- Agree in principle. TGax editor makes changes as specified in 11-19/1140r1 for CID 20689. |
| ***TGax Editor: Change the subclause 9.4.2.256 (UL MU Power Capabilities element) as the following (#20499, 20689):*** 9.4.2.256 UL MU Power Capabilities elementThe Relative Max Transmit Power MCS *n* field (where *n* = 1, ..., 11) is an unsigned integer in dB and encoded as the reference maximum transmit power minus the nominal maximum transmit power for an HE TB PPDU using RU size greater than or equal to 242 subcarriers, and HE-MCS *n*. The reference maximum transmit power is the nominal maximum transmit power for an HE TB PPDU using RU size greater than or equal to 242 subcarriers, and HE-MCS 0. ~~If a STA does not support HE-MCSs 8 to 11, the Relative Max Transmit Power MCS~~ *~~n~~* ~~fields (where~~ *~~n~~* ~~= 8, ..., 11) are reserved.~~ The Relative Max Transmit Power MCS n fields corresponding to HE-MCSs that are not supported by the HE STA that transmits this element are reserved. |
| ~~21329~~ | ~~203.34~~ | ~~9.4.2.256~~ | ~~The note is meaningless. The max transmit power is the max the implementation is capable of. How can this change after association?~~ | ~~Delete note~~ | ~~Rejected-~~ ~~The spec does not say that the max transmit power is constrained by only hardware capability.~~ ~~The max transmit power is constrained by the hardware capability, regulatory requirements and local maximum transmit power levels.~~ ~~So, if the local local maximum transmit power level is changed, the maximum transmit power of the STA can be also changed.~~  |
| ~~21328~~ | ~~203.03~~ | ~~9.4.2.256~~ | ~~Normative behavior for the UL MU Power Capabilities element has not been defined. In is not clear when this element is transmitted.~~ | ~~Either remove the definition of the element or define how and when this element is transmitted.~~ | ~~Revised-~~ ~~Agree in principle.~~ ~~The normative behaviour for the UL MU Power Capabilities element has been proposed.~~ ~~TGax editor makes changes as specified in 11-19/1140r1 for CID 21328.~~ |
| ***TGax Editor: Insert the following subclause after 26.5.9 (Use of TSPEC by HE STAs) (#21328):*** 26.5.9 UL MU transmit power capabilitiesAn HE non-AP STA may inform an HE AP of the relative maximum transmit power that the HE non-AP STA is capable of transmitting an HE TB PPDU for each MCS in the current operating channel width when using RU size greater than or equal to 242 subcarriers, by including an UL MU Power Capabilities element in (Re)Association Request frame.An HE AP might use the UL MU transmit power capabilities of the associated HE non-AP STAs as an input into an algorithm used to schedule the HE non-AP STA for the UL MU transmission. The specification of the algorithm is beyond the scope of this standard. |