IEEE P802.11
Wireless LANs

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| LB238 CR HE Subchannnel Selective Transmission  |
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| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Yongho Seok | MediaTek Inc. | 2840 Junction Ave, San Jose, CA 95134 |  | yongho.seok@mediatek.com  |
| Chao-Chun Wang | MediaTek Inc. |  |  |  |
| James Yee  | MediaTek Inc. |  |  |  |

Abstract

This submission proposes resolutions of comments received from TGax LB238.

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

* CIDs: 21514, ~~21515,~~ 21516, ~~21206,~~ 21517, ~~20236,~~ 20246, 21518, 21520, 20122, ~~20123,~~ 21207, 21519, 20407 (~~14~~ 11 CIDs)

NOTE1- CID 200123 is is resolved in <https://mentor.ieee.org/802.11/dcn/19/11-19-0961-00-00ax-mac-cr-group-addressed-mpdus-delivery.docx>. (Alfred Asterjadhi)

NOTE2- CID 21206 is transferred to David Kloper and CID 20236 is transferred to Zhou Lan. The resolution of CID 21515 is not proposed in this 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 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** |
| --- | --- | --- | --- | --- | --- |
| 21516 | 386.19 | 26.8.7.1 | "An HE STA may set up SST operation by negotiating a trigger-enabled TWT as defined in 26.8.2 (IndividualTWT agreements) except that:"This rule is for an HE SST STA. | Change "An HE STA" to "An HE SST STA". | Accepted-Editorial changes have been applied in the below proposed text updates. |
| 21517 | 386.23 | 26.8.7.1 | The SST STA is too broad. | Change "the SST STA" to "the HE SST STA" throughout 26.8.7.1. | Accepted-Editorial changes have been applied in the below proposed text updates. |
| 20246 | 386.41 | 26.8.7.2 | In multiple instances, "SST STA" should be "HE SST STA" and "SST AP" should be "HE SST AP", to be consistent with the definitions. | As suggested. | Revised- Agree in principle. Editorial changes have been applied in the below proposed text updates.TGax editor makes changes as specified in 11-19/0771r1 for CID 20246. |
| 21520 | 386.46 | 26.8.7.2 | The SST STA is too broad. | Change "the SST STA" to "the HE SST STA" throughout 26.8.7.2. | Accepted-Editorial changes have been applied in the below proposed text updates. |
| 21518 | 386.41 | 26.8.7.2 | "An SST STA that successfully sets up SST operation shall follow the rules defined in this subclause."This rule is for an HE SST STA and an HE SST AP. | Change to "An HE SST STA and an HE SST AP that successfully set up SST operation shall follow the rules defined in this subclause." | Accepted-Editorial changes have been applied in the below proposed text updates. |
| 21519 | 386.56 | 26.8.7.2 | "An SST STA operating on the secondary channel shall not conduct OMI operation as defined in 26.9 (Operating mode indication) or OMN operation as defined in 11.41 (Notification of operating mode changes) to change the operating bandwidth."This rule is for an HE SST STA. | Change "An SST STA" to "An HE SST STA". | Accepted-Editorial changes have been applied in the below proposed text updates. |
| ***TGax Editor: Changes "the STA is an SST STA" to "the STA is an HE SST STA" at the 9.2.4.6a.2 (OM Control) (#20246).******TGax Editor: Change the subclause 26.8.7 (HE subchannel selective transmission) as the following (#21516, 21517, 20246, 21520, 21518, 21519):*** * HE subchannel selective transmission
* General

…An HE SST (#21516) STA may set up SST operation by negotiating a trigger-enabled TWT as defined in 26.8.2 (Individual TWT agreements) except that:* The TWT request may have a TWT Channel field with up to one bit set to 1 to indicate which of the secondary channel is requested to contain the RU allocations addressed to the HE SST STA (#21517, 20246, 21520, 21519) that is a 20 MHz operating STA
* The TWT request may have a TWT Channel field with all the four LSBs or all the four MSBs set to 1 to indicate whether the primary 80MHz channel or the secondary 80 MHz channel is requested to contain the RU allocations addressed to the HE SST STA (#21517, 20246, 21520, 21519) that is an 80MHz operating STA
* The TWT response shall have a TWT Channel field with up to one bit set to 1 to indicate which of the secondary channel will contain the RU allocations addressed to the HE SST STA (#21517, 20246, 21520, 21519) that is a 20 MHz operating STA
* The TWT response shall have a TWT Channel field with all the 4 LSBs or all the 4 MSBs to indicate whether the primary 80 MHz channel or the secondary 80 MHz channel will contain the RU allocations addressed to the HE SST STA (#21517, 20246, 21520, 21519) that is a 80 MHz operating STA.
* SST operation

An HE SST STA (#21517, 20246, 21520, 21519) and HE SST AP (#21518) that successfully set~~s~~ up SST operation shall follow the rules defined in this subclause.The HE SST AP follows the rules defined in 26.8.2 (Individual TWT agreements) to exchange frames with the HE SST STA during negotiated trigger-enabled TWT SPs, except that the AP shall ensure that:* The RUs allocated in DL MU PPDUs and in Trigger frames addressed to the HE SST STA (#21517, 20246, 21520, 21519) are within the subchannel indicated in the TWT Channel field of the TWT response and follows the RU restriction rules defined in 27.3.2.8 (RU restrictions for 20 MHz operation) if the HE SST STA (#21517, 20246, 21520, 21519) is a 20 MHz operating STA
* The trigger-enabled TWT SPs do not overlap with TBTTs at which DTIM Beacon frames are sent
* The same subchannel is used for all trigger-enabled TWT SPs that overlap in time.

An HE SST STA (#21517, 20246, 21520, 21519) operating on the secondary channel shall not conduct OMI operation as defined in 26.9 (Operating mode indication) or OMN operation as defined in 11.41 (Notification of operating mode changes) to change the operating bandwidth.... An HE SST STA may include a Channel Switch Timing element in (Re-)Association Request frames it transmits to an HE SST AP (#21517, 20246, 21520, 21519) to indicate the time required by the STA to switch between different subchannels. The received channel switch time informs the HE SST AP (#21517, 20246, 21520, 21519) of the duration of time that the HE SST STA (#21517, 20246, 21520, 21519) might not be available to receive frames before the TWT start time and after the end of the trigger-enabled TWT SP.NOTE—An HE SST STA in PS mode is not required to move to the primary channel after the end of the trigger-enabled TWT SP. |
| 21514 | 386.01 | 26.8.7 | Please clarify a termination rule of the HE SST operation. | As in comment. | Revised- An HE SST AP may need to change its operating channel width. For example, when the HE SST AP operating in the DFS band detects a radar signal, the HE SST AP shall switch its operating channel or reduce its operating channel width for avoiding the detected DFS signal. In such case, the HE SST AP should be able to change its operating channel without individually terminating TWT agreements associated with all HE SST STAs. TGax editor makes changes as specified in 11-19/0771r1 for CID 21514. |
| ***TGax Editor: Change the subclause 26.8.7.2 (SST operation) as the following (#21514):*** **26.8.7.2 SST operation**An SST STA operating on the secondary channel shall not conduct OMI operation as defined in 26.9 (Operating mode indication) or OMN operation as defined in 11.41 (Notification of operating mode changes) to change the operating bandwidth.When an HE SST AP causes its operating channel or channel width to a change, if a secondary channel of a negotiated trigger-enabled TWT is not within the new operating channel or channel width, the HE SST AP and the HE SST STA implicitely terminate the negotiated trigger-enabled TWT.  |
| 21515 | 386.01 | 26.8.7 | Please clarify a protection mechanim of the HE SST operation. | As in comment. | Need more discussion. |
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| ~~21206~~ | ~~386.22~~ | ~~26.8.7.1~~ | ~~There is insufficient rigor in the definitions in this section. Is all (or part) of any prior OMI disregarded? Are we to assume that non-20M operating STA must switch to 80M (and max Rx/Tx NSS) during each TWT? What if the operating BW of the BSS is 20 or 40 MHz? Can't an 160/80+80M Client associated to a 160/80+80M BSS remain at full BW?~~ | ~~A more general solution is to leave the OMI in affect during the TWT. Let the request provide set of channels Client supports, and response always include a single bit set. The actual frequency tuned would be the same as if that channel was now the P20 when operating at the current BW (per most recent OMI), which may or may not require retuning.~~ | ~~Revised-~~ ~~The HE SST operation follows constraints caused by the prior OMI procedure.~~ ~~So, the TWT Channel field shall be set within the operating channel width.~~ ~~TGax editor makes changes as specified in 11-19/0771r1 for CID 21206.~~ |
| ***TGax Editor: Change the subclause 26.8.7 (HE subchannel selective transmission) as the following (#21206):*** * HE subchannel selective transmission
* General

…An HE STA may set up SST operation by negotiating a trigger-enabled TWT as defined in 26.8.2 (Individual TWT agreements) except that:* The TWT request may have a TWT Channel field with up to one bit set to 1 to indicate which of the secondary channel within the operating channel width is requested to contain the RU allocations addressed to the SST STA that is a 20 MHz operating STA
* The TWT request may have a TWT Channel field with all the four LSBs or all the four MSBs set to 1 to indicate whether the primary 80MHz channel or the secondary 80 MHz channel within the operating channel width is requested to contain the RU allocations addressed to the SST STA that is an 80MHz operating STA
* The TWT response shall have a TWT Channel field with up to one bit set to 1 to indicate which of the secondary channel within the operating channel width will contain the RU allocations addressed to the SST STA that is a 20 MHz operating STA
* The TWT response shall have a TWT Channel field with all the 4 LSBs or all the 4 MSBs to indicate whether the primary 80 MHz channel or the secondary 80 MHz channel within the operating channel width will contain the RU allocations addressed to the SST STA that is an 80 MHz operating STA.
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| ~~20236~~ | ~~386.39~~ | ~~26.8.7.2~~ | ~~Allow SST STAs To Receive Beacons & Broadcast/mcast frames while stay in the secondary channel~~ | ~~Add optional rules:1. AP sends beacons and broadcast/mcast frames using non-HT-dup PPDU with non-HT-dup BW covers the secondary channels where SST STAs are scheduled.~~ | ~~Revised –~~~~The same comment was resolved in~~ [~~https://mentor.ieee.org/802.11/dcn/19/11-19-0304-02-00ax-mac-cr-he-bss-operation-in-6-ghz.docx~~](https://mentor.ieee.org/802.11/dcn/19/11-19-0304-02-00ax-mac-cr-he-bss-operation-in-6-ghz.docx)~~, and the proposed text changes were also approved in TGax May 2019 F2F meeting.~~ ~~Agree in principle with the comment. Proposed resolution is to add a bit in the HE Operation element that is used by the AP to declare non-HT duplicate beacon generation in 6 GHz band.~~~~TGax editor does not need any text changes.~~ |
| 20122 | 386.47 | 26.8.7.2 | Need to clarify that the RUs do not exceed the BW of the receiving STA now that they can be 80 MHz STAs as well. Also clarify that whether the RUs addressed to the SST STAs can also be the broadcast RUs as well or rather the STA is required to move to the primary to receive these group addressed frames. | As in comment. | Revised- Agree in principle. 80 MHz operating SST STA can receive 160 MHz or 80+80 MHz HE MU PPDU. Clarification texts are included. The broadcast RU for SST STA are implementation specific. Any requirement is not defined in the spec. TGax editor makes changes as specified in 11-19/0771r1 for CID 20122. |
| ***TGax Editor: Change the subclause 27.3.2.9 (80 MHz operating non-AP HE STAs) as the following (#20122):*** **27.3.2.9 80 MHz operating non-AP HE STAs**A non-AP HE STA capable of up to 80 MHz channel width, when operating with 80 MHz channel width, indicates support of reception of 160 MHz or 80+80 MHz HE MU PPDU, or the transmission of 160 MHz or 80+80 MHz HE TB PPDU in the 80 MHz In 160/80+80 MHz HE PPDU subfield in the HE PHY Capabilities Information field in the HE Capabilities element (see 9.4.2.242.3 (HE PHY Capabilities Information field)).An HE AP STA shall not allocate RUs outside of the primary 80 MHz when allocating an RU in an 160 MHz or 80+80 MHz HE MU PPDU or HE TB PPDU to a non-AP HE STA that sets the 80 MHz In 160/ 80+80 MHz HE PPDU subfield in the HE PHY Capabilities Information field in the HE Capabilities element to 1 and is operating in 80 MHz channel width mode unless the non-AP HE STA has set up SST operation on the secondary 80 MHz channel with the HE AP (#20122).***TGax Editor: Change the subclause 26.5.1.3 (RU allocation in an HE MU PPDU) as the following (#20122):*** **26.5.1.3 RU allocation in an HE MU PPDU** An AP shall not transmit a 40 MHz HE MU PPDU in the 2.4 GHz band with an RU allocated to a 20 MHz operating non-AP HE STA(#20389) unless the AP has received from the 20 MHz operating non-AP HE STA an HE Capabilities element with the 20 MHz In 40 MHz HE PPDU In 2.4 GHz Band subfield in the HE PHY Capabilities Information field equal to 1. An AP shall not transmit a 160 MHz or 80+80 MHz HE MU PPDU with an RU allocated to a 20 MHz operating non-AP HE STA unless the AP has received from the 20 MHz operating non-AP HE STA an HE Capabilities element with the 20 MHz In 160/80+80 MHz HE PPDU subfield in the HE PHY Capabilities Information field equal to 1.An AP shall not transmit a 160 MHz or 80+80 MHz HE MU PPDU with an RU allocated to an 80 MHz operating non-AP HE STA unless the AP has received from the 80 MHz operating non-AP HE STA an HE Capabilities element with the 80 MHz In 160/80+80 MHz HE PPDU subfield in the HE PHY Capabilities Information field equal to 1.***TGax Editor: Change the subclause 26.8.7.2 (SST operation) as the following (#20122):*** * SST operation

The HE SST AP follows the rules defined in 26.8.2 (Individual TWT agreements) to exchange frames with the HE SST STA during negotiated trigger-enabled TWT SPs, except that the AP shall ensure that: * The individually addressed RUs allocated in DL MU PPDUs and in Trigger frames addressed to the SST STA are within the subchannel indicated in the TWT Channel field of the TWT response and follows the RU restriction rules defined in 27.3.2.8 (RU restrictions for 20 MHz operation) if the SST STA is a 20 MHz operating STA and in 27.3.2.9 (80 MHz operating non-AP HE STAs) if the SST STA is an 80 MHz operating STA (#21207).
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| ~~20123~~ | ~~386.47~~ | ~~26.8.7.2~~ | ~~It is not clear how the AP delivers group addressed DL BUs in the 6 GHz band using the HE PPDU format.~~ | ~~As in comment.~~ | ~~Revised –~~~~Agree in principle with the comment. Baseline rules still apply. In addition, we need to add rules for the case of including the group addressed frames in an A-MPDU when carried in an HE PPDU. Hence adding these clarifications in clause 10.13.4, and in the additional rules for HE SU beacons and group addressed frames. Proposed resolution is to add these clarifications.~~ ~~TGax editor to make the changes shown in 11-19/0961r0 under all headings that include CID 20123.~~ |
| 21207 | 386.53 | 26.8.7.1 | This feature has no value, unless the AP can place different Clients on different channels. | Reword as "The same subchannel is used for all trigger-enabled TWT SPs that overlap in time with the same non-AP STA" | Revised- Agree in principle. TGax editor makes changes as specified in 11-19/0771r1 for CID 21207. |
| ***TGax Editor: Change the subclause 26.8.7.2 (SST operation) as the following (#21207):*** * SST operation

The HE SST AP follows the rules defined in 26.8.2 (Individual TWT agreements) to exchange frames with the HE SST STA during negotiated trigger-enabled TWT SPs, except that the AP shall ensure that:… * The trigger-enabled TWT SPs do not overlap with TBTTs at which DTIM Beacon frames are sent
* The same subchannel is used for all trigger-enabled TWT SPs with the same HE SST STA (#21207) that overlap in time.
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| 20407 | 387.03 | 26.8.7 | this should be also applied to PS STA in primary channel. Otherwise remove it. | As in comment | Rejected- The rule is for the HE SST STA operating in the non-primary channel.The STA operating in the primary channel is not related with the SST operation.  |