IEEE P802.11
Wireless LANs

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| Operation at 6GHz Band |
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Abstract

This submission proposes the operation at 6GHz band:

* TXOP protection and available channel polling.
* TXOP bandwidth.

Revisions:

* R1 changes highlighted in green
* R2 changes highlighted in Turpuoise.

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. The text under the discussion 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.***

Discussion 1:

In 2.4/5 GHz band, an HT AP can disallow low MCS for improving throughput of multiple BSSs in enterprise WLAN. The STAs in the HT BSS follows the indication. In 2.4/5 GHz band, a VHT AP can disallow low MCS for improving throughput of multiple BSSs in enterprise WLAN. The STAs/AP in the VHT BSS is recommended to follow the indication. In 2.4/5 GHz band, an HE AP can disallow low MCS for improving throughput of multiple BSSs in enterprise WLAN. The STAs/AP in the HT BSS is required to follow the indication. In 6GHz band, the same requirement should be defined for AP/STAs. Given that HT STAs and VHT STAs are not allowed in the 6 GHz band then it is beneficial to remove the HT Capability and HT Operation element so that there is no redundant information carried in the 6 Ghz band. In addition, the existing method relies in an RX bitmask which is complicated, due to reliance on legacy settings that are not an issue for the greenfield band. Hence, a simpler and more efficient method to carry the min? MCS is proposed.

Two options are proposed for discussion:

Option 1 is to carry the disallowed low data rate in HE Operation element. The MCS, NSS combination that is lower than the disallowed low data rate is not allowed in the BSS.

Option 2 is do define the signaling of the low MCS, NSS at 20/40 MHz transmission and low MCS, NSS at 80/160/80+80MHz transmission.

Proposed change is tailored for the second option since it provides more flexibility.

Discussion 2:

In 2.4/5GHz band, when a TXOP is not protected by non-HT duplicate PPDU, the BW of a frame exchange can not be wider than the BW of the PPDU from initiating STA of the immediate previous frame exchange. In 6GHz band, once the TXOP\_Duration is not UNSPECIFIED, the BW of the first frame exchange of a TXOP can be used for the frame exchanges in the TXOP.

* Setting TXVECTOR parameters for an HE PPDU

**27.11.5 TXOP\_DURATION**

***TGax editor: Add the following paragraph at the end of 27.1.5:***

In the 6 GHz band, a TXOP holder shall not set the TXVECTOR parameter TXOP\_DURATION for a transmitted HE PPDU to UNSPECIFIED unless at least one of the following conditions is true:

----The BSS Color Disabled field is 1 in the HE Operation element transmitted within the BSS of which the TXOP holder is a member.

----The HE PPDU carries a PS-Poll frame.

**9.4.2.238 HE Operation element**

***TGax editor: Add one-byte Minimum Rate field at the and of the 6GHz Operation Information field***

***TGax editor: Add the following text at the end of 9.4.2.238***

The Minimum Rate field indicates the minimum rate with NSS no more than 3 and HE-MCS no more than 3 that is allowed for a STA to use in unit of 1 Mb/s.

**27.15.4.3 Additional rate selection constraints for HE PPDUs**

***TGax editor: Add the following text at the end of 27.15.4.3***

A STA that operates in the 6GHz band and receives a Minimum Rate field from its associated AP shall transmit an HE PPDU with an <HE-MCS, NSS> tuple whose data rate is not less that the data rate announced by the Lowest Rate field.

***TGax editor: Change the name of subclause 10.22.2.7 to “Multiple frame transmission in an EDCA TXOP in non-6 GHz bands”***

***TGax editor: Add a new subclause in clause 27:***

27.xx Multiple frame transmission in an EDCA TXOP in the 6GHz band

A STA that operates in the 6 GHz band and transmits multiple frames shall follow the rules defined in10.22.2.7 with the following exceptions listed below.

Within an obtained TXOP that includes no non-HT duplicate PPDUs and at least one HE PPDU whose TXOP field in HE-SIG-A is not set to UNSPECIFIED, the TXOP holder shall set the TXVECTOR parameter CH\_BANDWIDTH of a non-initial PPDU that is sent after the first HE PPDU whose TXOP field in HE-SIG-A is not set to UNSPECIFIED as follows:

— To be the same or narrower than the CH\_BANDWIDTH parameter in TXVECTOR of the first HE PPDU whose TXOP field in HE-SIG-A is not set to UNSPECIFIED in the same TXOP.

Additionally, if the first HE PPDU whose TXOP field in HE-SIG-A is not set to UNSPECIFIED is a DL HE MU PPDU with preamble puncture, then the TXOP holder shall use the 20 MHz channels for the non-initial PPDU that are within the set of 20 MHz channels where pre-HE modulated fields of the first HE PPDU whose TXOP field in HE-SIG-A is not set to UNSPECIFIED are located.

Within an obtained TXOP that does not include HE PPDUs whose TXOP field in HE-SIG-A is not UNSPECIFIED nor non-HT duplicate PPDUs, the TXOP holder shall set the TXVECTOR parameter CH\_BANDWIDTH of a non-initial PPDU to be the equal to or less than the TXVECTOR parameter CH\_BANDWIDTH of the preceding PPDU that was transmitted in the same TXOP, subject to the following constraints:

— If the preceding PPDU is a DL HE MU PPDU with preamble puncture, the TXOP holder shall set the TXVECTOR parameter CH\_BANDWIDTH of the non-initial PPDU to a value whose corresponding 20 MHz channels are within a set of 20 MHz channels where pre-HE modulated fields of the preceding PPDU are located.

— If the non-initial PPDU is a DL HE MU PPDU with preamble puncture, the TXOP holder shall set the TXVECTOR parameter RU\_ALLOCATION of the non-initial PPDU to a value whose corresponding RU is within a set of 20 MHz channels where pre-HE modulated fields of the preceding PPDU are located

**27.15 PPDU format, BW, MCS, NSS, and DCM selection rules**

**27.15.2 PPDU format selection**

***TGax editor: changesubcaluse 27.15.2 as follows (the text which is not shown is same as 11ax D3.1):***

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An HE STA shall send Control frames following the rules defined in 10.7.6 (Rate selection for Control frames)) with the following exceptions:

* A Control frame sent in response to an HE ER SU PPDU or HE SU PPDU that uses STBC shall be carried in the same PPDU format as the soliciting PPDU.
* A Control frame sent by the AP as a response to an HE TB PPDU may be carried in any PPDU format that is supported by the intended receiver(s).
* A Trigger frame that is not an MU-RTS Trigger frame(#13317) may be carried in any PPDU format that is supported by the intended receiver(s).
* A Control frame is carried in an HE TB PPDU if it is sent as a response to a PPDU that contains a Trigger frame that is not an MU-RTS Trigger frame or if it is sent as a response to a PPDU that contains a frame containing a TRS Control subfield(#13136)(#14137) (see 27.5.3 (UL MU operation)).(18/12r3)
* An Ack frame sent as a response to an HE ER SU PPDU or HE SU PPDU containing an FTM frame shall be sent in the same PPDU format as the soliciting PPDU except when the FTM frame is carried in HE SU PPDU and the most recent successfully received PPDU sent by the responding STA to the soliciting STA after association was an HE ER SU PPDU in which case the Control frame shall be carried in HE ER SU PPDU.
* A Control frame sent as a response to an HE ER SU PPDU shall be carried in an HE ER SU PPDU unless the most recently received PPDU(#11692) sent by the responding STA to the soliciting STA after association was not an HE ER SU PPDU in which case the Control frame shall be carried in non-HT PPDU.
* A Control frame sent as a response to an HE SU PPDU shall be carried in a non-HT PPDU unless the most recent received PPDU(#11692) sent by the responding STA to the soliciting STA after association was an HE ER SU PPDU in which case the Control frame shall be carried in an HE ER SU PPDU.
* A Control frame sent in the 6 GHz band as a response to an HE SU PPDU, HE MU PPDU, and that is not carried in HE TB PPDU, may be carried in an HE SU PPDU if the transmit time of HE SU PPDU is less than or equal to the PPDU duration of a non-HT PPDU containing the Control frame sent at the primary rate.

Note: The primary rate is defined in 10.6.6.5.2 (Selection of a rate or MCS).

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**27.16 HE BSS operation**

**27.16.1a** HE BSS functionality in 6 GHz band

***TGax editor: add the following paragraph in 27.16.1a***

An HE STA transmits Beacon frames as defined in 11.1 (Synchronization), following the rules defined in 10.6 (Multiple rate support) except that the Beacon frames may be sent in non-HT duplicate PPDUs.