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**IEEE P802.11  
Wireless LANs**

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**Bit field finalization of HE-SIG-A in HE PPDU formats**

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**Abstract**

This submission proposes finalization of bit field ordering of HE-SIG-A in HE SU PPDU, HE extended range SU PPDU, HE MU PPDU, and HE Trigger-based PPDU.

Revisions:

- Rev 0: Initial version of the 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.*

**Changes to D0.2**

*TGax Editor: Delete Table 26-19 (Fields in the HE-SIG-A for an HE SU PPDU and HE Extended Range SU PPDU)  
Replace Table 26-20 (Fields in the HE-SIG-A for an HE SU PPDU and HE Extended Range SU PPDU) with the following table:*

**Table 26-20 – Fields in the HE-SIG-A for an HE SU PPDU and HE Extended Range SU PPDU**

Two parts of HE-SIG-A	Bits	Field	# of bits	Description
HE-SIG-A1	<u>B0</u>	Format	1	Differentiate between an HE SU PPDU and HE trigger-based PPDU. Set to 0 for HE trigger-based PPDU Set to 1 for HE SU PPDU. This field is reserved <u>and set to 1</u> for an HE Extended range SU PPDU.
	<u>B1</u>	Beam Change	1	Set to 1 to indicate that the pre-HE STF portion of the SU PPDU is spatially mapped differently from HE-LTF1. Set to 0 to indicate that the pre-HE STF portion of SU PPDU is spatially mapped the same way as HE-LTF1 on each tone.
	<u>B2</u>	UL/DL	1	Indicates whether the PPDU is sent UL or DL. Set to 0 for DL Set to 1 for UL. This field indicates DL for TDLS.
	<u>B3:B6</u>	MCS	4	<u>For HE SU PPDU</u> <u>Set to n for MCSn, where n = 0, 1, 2, ..., 11.</u> <u>Values 12 - 15 are reserved</u>  <u>For HE Extended Range SU PPDU</u> <u>If bandwidth = 0 (242-tone RU)</u> <u>Set to n for MCSn, where n = 0, 1, 2, ... Values 3 – 15 are reserved.</u> <u>If bandwidth = 1 (right 106-tone RU in P20)</u> <u>Set to 0 for MCS 0. Values 1 – 15 are reserved.</u>
	<u>B7</u>	DCM	1	Set to 1 to indicate that the payload of the SU PPDU is modulated with dual sub-carrier modulation for the MCS. Set to 0 indicates that the payload of the PPDU is not modulated with dual sub-carrier for the MCS. DCM is only applicable to MCS0, MCS1, MCS3, and MCS4. DCM is only applicable to 1 and 2 spatial streams. DCM is not applicable to STBC.
	<u>B8:B13</u>	BSS Color	6	The BSS Color field is an identifier of the BSS
	<u>B14</u>	Reserved	1	<u>Reserved and set to 1</u>
	<u>B15:B18</u>	Spatial Reuse	4	“SR_allowed” signaling indicates whether SR operation is allowed or not. <ul style="list-style-type: none"> <li><u>Set to 0 to indicate SR is disallowed</u></li> <li>The conditions to disallow SR are TBD</li> </ul> Other details are TBD

				Notes: this part needs further development.
	<u>B19:B20</u>	Bandwidth	2	For HE SU PDU Set to 0 for 20 MHz Set to 1 for 40 MHz Set to 2 for 80 MHz Set to 3 for 160/80+80 MHz  <u>For HE Extended Range SU PDU</u>  <u>Set to 0 for 242-tone RU</u> <u>Set to 1 for right 106-tone RU within the primary 20 MHz</u>
	<u>B21:B22</u>	LTF + CP	2	Indicates LTF size and guard interval duration  Set to 0 for 1x HE-LTF + 0.8 us Set to 1 for 2x HE-LTF + 0.8 us Set to 2 for 2x HE-LTF + 1.6 us Set to 3 for 4x HE-LTF + 3.2 us
	<u>B23:B25</u>	Nsts	3	Indicates the number of spatial streams. For HE SU PDU Set to n for n+1 space time stream, where n = 0, 1, 2,.....,7.  <u>For HE Extended Range PDU</u> <u>Set to 0 for 1 space time stream. Value 1 is TBD</u> <u>Values 2 - 7 are reserved</u>
HE-SIG-A2	<u>B0:B6</u>	TXOP Duration	7	Indicates the remaining time in the current TXOP. Details TBD.
	<u>B7</u>	Coding	1	Indicates whether BCC or LDPC is used. Set to 0 for BCC Set to 1 for LDPC (#11-16/0610-04)
	<u>B8</u>	LDPC Extra Symbol Segment	1	Indicates presence of extra OFDM symbol segment for LDPC Set to 0 for LDPC extra symbol segment is not present Set to 1 for LDPC extra symbol segment is present. <u>NOTE- This field is reserved and set to 1 when Coding field is set to 0</u>
	<u>B9</u>	STBC	1	Set to 1 if STBC is used Set to 0 otherwise
	<u>B10</u>	Tx BF	1	Set to 1 if a Beamforming steering matrix is applied to the waveform in an SU transmission Set to 0 otherwise
	<u>B11:B12</u>	A-factor	2	Indicates the “a-factor” as defined in Table 26-44 (a-facotr subfield encoding)
	<u>B13</u>	PE Disambiguity	1	Indicates PE Disambiguity as defined in 26.3.11 (Packet Extension)
	<u>B14</u>	Reserved	1	<u>Reserved and set to 1</u>
	<u>B15</u>	Doppler	1	Set to 0 if Doppler mode is not used Set to 1 if Doppler mode is used
	<u>B16:B19</u>	CRC	4	CRC of bits 0 - 41 in HE-SIG-A (see 22.3.9.7.3 (CRC computation)). The first bit to be transmitted is bit C7 as explained in 20.3.9.7.3 (CRC computation).

	<u>B20:B25</u>	Tail	6	Used to terminate the trellis of the convolution decoder. Set to 0.
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**NOTE- Integer fields are transmitted in unsigned binary format, LSB first, where the LSB is in the lowest numbered bit position.**

*TGax Editor: Delete Table 26-21 (Fields in the HE-SIG-A for an HE MU PPDU)*

*Replace Table 26-22 (Fields in the HE-SIG-A for an HE MU PPDU) with the following table:*

**Table 26-22 – Fields in the HE-SIG-A for an HE MU PPDU**

Two parts of HE-SIG-A	Bits	Field	# of bits	Description
HE-SIG-A1	<u>B0</u>	UL/DL	1	Indicates whether the PPDU is sent UL or DL. Set to 0 for DL Set to 1 for UL. This field indicates DL for TDLS.
	<u>B1:B3</u>	SIGB MCS	3	Indicates MCS of HE-SIG-B Set to n for MCSn, where n = 0, 1, 2, ..., 5      Values 6 - 7 are reserved
	<u>B4</u>	SIGB DCM	1	Set to 1 indicates that the HE-SIG-B is modulated with dual sub-carrier modulation for the MCS.  Set to 0 indicates that the HE-SIB-B is not modulated with dual sub-carrier modulation for the MCS. <u>DCM is only applicable to MCS0, MCS1, MCS3, and MCS4.</u>
	<u>B5:B10</u>	BSS Color	6	BSS Color field is an identifier of the BSS
	<u>B11:B14</u>	Spatial Reuse	4	“SR allowed” signaling indicates whether SR operation is allowed or not. <ul style="list-style-type: none"> <li>• <u>Set to 0</u> to indicate SR is disallowed</li> <li>• The conditions to disallow SR are TBD</li> </ul> Other details are TBD Notes: this part needs further development.
	<u>B15:B17</u>	Bandwidth	3	Set to 0 for 20 MHz Set to 1 for 40 MHz Set to 2 for 80 MHz Set to 3 for 160/80+80 MHz
	<u>B18:B21</u>	SIGB Number of Symbols/Number of MU-MIMO Users	4	When SIGB compression field=0, indicates the number of HE-SIG-B symbols. Set to n for n+1 HE-SIG-B symbol, where n = 0, 1, 2, ..., 15 When SIGB compression field=1, <u>indicates the number of MU-MIMO users minus 1.</u>
	<u>B22</u>	SIGB Compression	1	Set to 1 for full BW MU-MIMO. Set to 0 otherwise.
	<u>B23:B24</u>	LTF and CP	2	<u>Set to 0 for Reserved</u> Set to 1 for 2x HE-LTF + 0.8 us Set to 2 for 2x HE-LTF + 1.6 us Set to 3 for 4x HE-LTF + 3.2 us
	<u>B25</u>	Doppler	1	Set to 0 if Doppler mode is not used Set to 1 if Doppler mode is used

HE-SIG-A2	<a href="#">B0:B6</a>	Txop Duration	7	Indicates the remaining time in the current TXOP. Details TBD.
	<a href="#">B7</a>	Reserved	1	<a href="#">Reserved and set to 1</a>
	<a href="#">B8:B10</a>	Number of HE-LTF symbols	3	Indicates the number of HE-LTF symbols. Set to 0 for 1 HE-LTF symbol Set to 1 for 2 HE-LTF symbols Set to 2 for 4 HE-LTF symbols Set to 3 for 6 HE-LTF symbols Set to 4 for 8 HE-LTF symbols Values 5 to 7 are reserved
	<a href="#">B11</a>	LDPC Extra Symbol Segment	1	Indicates presence of extra OFDM symbol segment for LDPC Set to 0 for LDPC extra symbol segment is not present Set to 1 for LDPC extra symbol segment is present.
	<a href="#">B12</a>	STBC	1	In an HE MU PPDU where each RU includes no more than 1 user, set to 1 to indicate all RUs are STBC encoded in the payload. Set to 0 to indicate all RUs are not STBC encoded in the payload. STBC is not applied in MU-MIMO RUs. STBC doesn't apply to HE-SIG-B.
	<a href="#">B13:B14</a>	A-factor	2	Indicates the "a-factor" as defined in Table 26-44 (a-factor subfield encoding)
	<a href="#">B15</a>	PE Disambiguity	1	Indicates PE Disambiguity as defined in 26.3.11 (Packet Extension)
	<a href="#">B16:B19</a>	CRC	4	CRC of bits 0 - 41 in HE-SIG-A. See 22.3.9.7.3 (CRC computation)). The first bit to be transmitted is bit C7 as explained in 20.3.9.7.3 (CRC computation).
	<a href="#">B20:B25</a>	Tail	6	Used to terminate the trellis of the convolution decoder. Set to 0.

**NOTE- Integer fields are transmitted in unsigned binary format, LSB first, where the LSB is in the lowest numbered bit position.**

**TGax Editor: Replace Table 26-23 (Fields in the HE-SIG-A for an HE trigger-based PPDU) with the following table:**

Two parts of HE-SIG-A	Bits	Field	# of bits	Description
HE-SIG-A1	<a href="#">B0</a>	Format	1	Differentiate between an HE SU PPDU and an HE trigger-based PPDU. Set to 0 for HE trigger-based PPDU Set to 1 for HE SU PPDU
	<a href="#">B1:B6</a>	BSS Color	6	BSS Color field is an identifier of the BSS
	<a href="#">B7:B22</a>	Spatial Reuse	16	"SR_allowed" signaling indicates whether SR operation is allowed or not. <ul style="list-style-type: none"> <li>• <a href="#">Set to 0 to</a> indicate SR is disallowed</li> <li>• The conditions to disallow SR are TBD</li> </ul> Multiple SR fields ( $\geq 2$ ) are signalled, where each SR field corresponds to a different subband of the PPDU. Other details are TBD. Notes: this part needs further development.

	<a href="#">B23</a>	Reserved	1	<a href="#">Reserved and set to value indicated in the Trigger frame</a>
	<a href="#">B24:B25</a>	Bandwidth	2	Set to 0 for 20 MHz Set to 1 for 40 MHz Set to 2 for 80 MHz Set to 3 for 160/80+80 MHz
HE-SIG-A2	<a href="#">B0:B6</a>	Txop Duration	7	Indicates the remaining time in the current TXOP. Details TBD.
	<a href="#">B7:B15</a>	Reserved	9	<a href="#">Reserved and set to value indicated in the Trigger frame</a>
	<a href="#">B16:B19</a>	CRC	4	CRC of bits 0 - 41 in HE-SIG-A. See 22.3.9.7.3 (CRC computation). The first bit to be transmitted is bit C7 as explained in 20.3.9.7.3 (CRC computation).
	<a href="#">B20:B25</a>	Tail	6	Used to terminate the trellis of the convolution decoder. Set to 0.

[NOTE- Integer fields are transmitted in unsigned binary format, LSB first, where the LSB is in the lowest numbered bit position.](#)

### References:

1. IEEE P802.11ax<sup>TM</sup>/D0.2, June 2016.