IEEE P802.11
Wireless LANs

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| TGah D0.1 Comment Collections 9 Resolutions on 24.3.8 Sections |
| Date: 2013-07-15 |
| Author(s): |
| Name | Affiliation | Address | Phone | Email |
| Eugene Baik | Qualcomm Technologies, Inc.  | 5775 Morehouse Dr. San Diego, CA 92122 | 858-658-2568 | eugeneb@qti.qualcomm.com |

Abstract: This document contains proposed resolutions for the following CIDs from TGah D0.1 Comment Collection 9:

* ***Clause 24.3.8:*** 145, 270, 271, 272, 273, 298, 299, 880

##### CIDs for Clause 24.3.8

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| CID | Commenter | Section | Page | Line | Comment | Proposed Change | Resolution |
| 270 | Kenichi Mori | 24.3.8.2.2.1.2 | 239 | 16 | Maybe, section 24.3.8.2.2.1.2 is typo because this section indicates itself. | Maybe, correct section is "24.3.8.2.1.2". | Accepted |
| 271 | Kenichi Mori | 24.3.8.3.2 | 253 | 52 | The section 3.2.1.2 of the SFD indicates "[0.5, -1, 1, -1, -1, -0.5]x(1+j)x╬│where ╬│ is a normalization factor- ╬│ = 2.4 for MCS0 rep2, 1.7 otherwise" but this explanation is different. Should be revised as the SFD. | [0.5, -1, 1, -1, -1, -0.5]x(1+j)x ╬│ where ╬│ is a normalization factor,╬│ = 2.4 for MCS0 rep2, 1.7 otherwise. | Rejected. The existing notation is equivalent and more accurate in context of the overall STF equation, in that the sum power of the populated tones is 6 (and equal to the number of populated tones) |
| 272 | Kenichi Mori | 24.3.8.3.2 | 253 | 52 | k=[[-12:4:-4:4:4:12] seems to be wrong because duplicated tone numbers are written in this vector and it is different value from the section 3.2.1.2 of the SFD. | Correct vector is k=[-12 -8 -4 4 8 12]. | Accepted, original text notation is technically correct, but proposed change is easier to read |
| 273 | Kenichi Mori | 24.3.8.3.3 | 254 | 12 | The sentence "The generation of the time domain D-LTF symbols...."should be removed because D-LTF is prepared for S1G greater than or equal to 2MHz long format and this section is for 1MHz PHY. | The sentence should be removed. | Revised,The text should be fixed to say “generation of time domain LTF symbols” because D-LTF is only for 2MHz Long preambles. Referenced figure is still the right Tx flow. |
| 298 | Li Chia Choo | 24.3.8.2.2.2.4 | 250 | 40 | Typographical error in the description of the 4 MHz verwsion of the parameter D(u)k,2 in 24.3.8.2.2.2.4 SIG-B definition | Change line 40 to: "For a 4 MHz transmission,". | Accepted |
| 299 | Li Chia Choo | 24.3.8.3.4 | 255 | 46 | The figure reference to the 6 symbol SIGfield is missing in 24.3.8.3.4 SIG definition. | Change line 46 to "The structure of the 6 symbol SIG field (which carries 6 information bits per symbol) is shown in Table 24-18 (Structure of the 6 symbol SIG field of S1G 1MHz PPDU). Note that" | Accepted |
| 145 | Bo Sun | 24.3.8.2.2.1.4 | 240 | 45 | the B13 in Figure 24-31 should be doppler field | modify it | Accepted |
| 880 | Yongho Seok | 24.3.8.2.2.2.4 | 249 | 3 | Bit allocation of fields in the SIG-B is not correct.For example, Tail bits shall be located in B20-B25. | Fix the bit allocation of the SIG-B. Assign the comment to me. | Accepted |

*TGah Editor: Please make the following changes on Page 239-242 for clause 24.3.8.2.2.1.2 and 24.3.8.2.2.1.4, changes highlighted in yellow:*

* **STF definition**

The STF field for 2 MHz, 4 MHz, 8 MHz and 16 MHz are the same as the STF field in short preamble as specified in 24.3.8.2.1.2 (STF definition). (Fix hyperlink)

The time domain representation of the STF signal at transmit chain  shall be as specified in Equation (24-22).

*

where

is defined in Table 24-4 (Timing-related constants)

 is defined by Equation (24-5) ~ Equation (24-8).

is defined in Table 24-4 (Timing-related constants)

has the value given in Tone scaling factor and guard interval duration values for PHY fieldsTable 24-7 (Tone scaling factor and guard interval duration values for PHY fields)

 is as defined in 24.3.7 (Mathematical description of signals).

* **SIG-A definition**

The SIG-A field of the long preamble carries information required to interpret S1G format PPDUs sent using the long preamble. The structure of the SIG-A field is different for SU PPDUs and MU PPDUs. The structure of the SIG-A field for SU PPDUs for the first symbol (SIG-A1) is shown in Table 24-30 (SIG-A-1 structure for SU PPDU) and for the second symbol (SIG-A2) is shown in Table 24-31 (SIG-A-2 structure for SU PPDU). The structure of the SIG-A field for MU PPDUs for the first symbol (SIG-A1) is shown in Table 24-32 (SIG-A-1 structure for MU PPDU)and for the second symbol (SIG-A2) is shown in Table 24-33 (SIG-A-2 structure for MU PPDU).

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| B0 | B1 | B2 | B3 B4 | B5 B6 | B7B 15 | B16 | B17 B18 | B19 B22 | B23 |
| MU/SU | STBC | reserved | BW | Nsts | PAID | SGI | Coding | MCS | Beam-change Indication |
| * **SIG-A-1 structure for SU PPDU**
 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| B0 | B1 B9 | B10 B11 | B12 B13 | B14 B17 | B18 B23 |
| Aggregation | Length | ACK Indication | reserved | Doppler | CRC | Tail |
| * **SIG-A-2 structure for SU PPDU**
 |

Use this figure above instead of crossed out figure below

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ~~B0~~ | ~~B1 B9~~ | ~~B10 B11~~ | ~~B12 B13~~ | ~~B14 B17~~ | ~~B18 B23~~ |
| ~~Aggregation~~ | ~~Length~~ | ~~ACK~~ ~~Indication~~ | ~~reserved~~ | ~~CRC~~ | ~~Tail~~ |
| * **~~SIG-A-2 structure for SU PPDU~~**
 |

*TGah Editor: Please make the following changes on Page 250 for clause 24.3.8.2.2.2.4, changes highlighted in yellow:*

* SIG-B definition

If the SU/MU indication subfield in SIG-A field is set to 0 (SU), then SIG-B field is one symbol that is identical to the first D-LTF field (D-LTF1). In this case, the time domain representation of the SIG-B field at transmit chain  shall be as specified in Equation (24-26) with *n=0*.

If the SU/MU indication subfield in SIG-A field is set to 1 (MU), then SIG-B field is one symbol and contains 26 bits in a 2 MHz PPDU, 27 bits in a 4 MHz PPDU and 29 bits in 8 MHz and 16 MHz PPDUs for each user. The fields in the SIG-B field are listed in Table 24-16 (Fields in the SIG-B field).

|  |
| --- |
| * Fields in the SIG-B field
 |
| **Field** | **Bit Allocation (number of bits)** | **Description** |
| **2 MHz** | **4 MHz** | **8 MHz** | **16 MHz** |
| **MCS** | B0-B3 (4) | B0-B3 (4) | B0-B3 (4) | B0-B3 (4) | Per-user MCS in MU-MIMO |
| **Reserved** | B4-B11 (8) | B4-B12 (9) | B4-B14 (11) | B4-B14 (11) | All 1s |
| **CRC** | B12-B19 (8) | B13-B20 (8) | B15-B22 (8) | B15-B22 (8) |   |
| **Tail** | B20-25 (6) | B21-B26 (6) | B23-B28 (6) | B23-B28 (6) | All 0s |
| **Total # bits** | **26** | **27** | **29** | **29** |   |

In this case, the padding, encoding, interleaving and modulation flow for the data subcarriers of SIG-B field in 2 MHz, 4 MHz, 8 MHz and 16 MHz are identical to those specified for 20 MHz, 40 MHz, 80 MHz and 160 MHz, respectively, as shown in 22.3.8.2.6 (VHT-SIG-B definition). Different from the VHT-SIG-B field defined in clause 22, the pilot subcarriers of SIG-B field is mapped by the first column of *P*HTLTF matrix to *N*STS, total space-time streams, and the pilot polarity of the SIG-B symbol is *p2* instead of *p3*. The time domain representation for SIG-B field signal at transmit chain  shall be as specified in :



where

  is defined in Table 24-4 (Timing-related constants)

 represents the cyclic shift for space-time stream *m* with a value given in Table 24-13 (Per space-time-stream cyclic shift values of S1G

 2MHz long preamble PPDU)

 is defined by Equation (24-5) ~ Equation (24-8)

 is defined in Table 24-4 (Timing-related constants)

, , , and  are defined in Table 24-6 (Frequently used parameters)

 is defined in Equation (20-27) in 20.3.9.4.6 (HT-LTF definition)

 is defined in 18.3.5.10 (OFDM modulation)

 is defined in 22.3.10.10 (Pilot Subcarriers)

 has the value given in Tone scaling factor and guard interval duration values for PHY fieldsTable 24-7 (Tone scaling factor and guard interval duration values for PHY fields).

For a 2 MHz transmission,

* 

* 

For a 4 MHz ~~VHT~~ transmission,

* 



For an 8 MHz transmission,

* 
* 

For a 16 MHz transmission 

*



*TGah Editor: Please make the following changes for clause 24.3.8.3.2 - 24.3.8.3.4, changes highlighted in yellow:*

* STF definition

The STF field in 1MHz preamble is repeated with 4 OFDM symbols, i.e. twice the duration of the STF fields in greater than or equal to 2MHz preambles.

The time domain representation of the STF signal at transmit chain  shall be as specified in Equation (24-36).

* 

where

  is defined in Table 24-4 (Timing-related constants)

 represents the cyclic shift for space-time stream *m* with a value given in Table 24-17 (Cyclic shift values of S1G 1MHz PPDU)

 is defined in Table 24-4 (Timing-related constants)

 is defined in Table 24-6 (Frequently used parameters)

 is defined in Equation (20-27) in 20.3.9.4.6 (HT-LTF definition)

 has the value given in Tone scaling factor and guard interval duration values for PHY fieldsTable 24-7 (Tone scaling factor and guard interval duration values for PHY fields).

 has non-zero values $[0.5, -1, 1, -1,-1,-0.5]×(1+j)×\sqrt{2/3}$ on tones $k=[-12, -8, -4, 4, 8, 12]$ respectively.

 is an MCS dependent scaling factor, with the following value

 

* LTF definition

The duration of the first LTF (LTF1) field in 1MHz preamble is of 4 OFDM symbols with repetitions, i.e. twice the duration of the LTF1 fields in greater than or equal to 2MHz preambles. The first two repetitions have the same structure as the LTF1 field in greater than or equal to 2MHz preambles, i.e. they consist of two periods of the long training symbol, preceded by a double length (16 *u*s) cyclic prefix. Each of the last two repetitions of LTF1 field consists one period of the long training symbol preceded by a normal length (8 *us*) cyclic prefix. The duration of the each of the remaining LTFs in 1MHz preamble is of one OFDM symbol.

The placement of the first and subsequent LTFs in a 1MHz format PPDU is shown in Figure 24-22 (S1G 1MHz format).

The generation of the time domain ~~D-LTF~~ LTF symbols is the same as Table 24-25 (Generation of LTF symbols).

The time domain representation of the first two repetitions of the LTF1 field, and the last two repetitions of the LTFs field shall be as specified in Equation (24-37) and Equation (24-38), respectively

* 
* 

where

 and  are defined in Table 24-4 (Timing-related constants)

 represents the cyclic shift for space-time stream *m* with a value given in Table 24-17 (Cyclic shift values of S1G 1MHz PPDU)

 is defined by Equation (24-5) ~ Equation (24-8)

 is defined in Table 24-4 (Timing-related constants)

 is defined in Table 24-6 (Frequently used parameters)

 has the value given in Tone scaling factor and guard interval duration values for PHY fieldsTable 24-7 (Tone scaling factor and guard interval duration values for PHY fields).

 is defined in Equation (24-39).

* 

where

 is the subcarrier indices for the fixed pilot tones. For a 1 MHz transmission, .

is the first column of the *PHTLTF* matrix.

={0 0 0 1 -1 1 -1 -1 1 -1 1 1 -1 1 1 1 0 -1 -1 -1 1 -1 -1 -1 1 -1 1 1 1 -1 0 0}

NOTE – This LTF sequence is chosen to be orthogonal to both halves of the 2MHz LTF sequence in order to facilitate classification between 1MHz and 2MHz preambles. The orthogonality metric between two equal length sequences {A} and {B} is defined as with k=1,2,3,..16,18,19,..31 skipping the 1MHz DC location on k=17.

NOTE—This definition results in a BPSK modulation on the last two symbols of LTF1 field, to facilitate the differentiation from the greater than or equal to 2MHz preambles.

The time domain representation of the LTF2~LTFNLTF signals at transmit chain shall be as specified in Equation (24-40).

* 

where

 and  are defined in Table 24-4 (Timing-related constants)

 represents the cyclic shift for space-time stream *m* with a value given in Table 24-13 (Per space-time-stream cyclic shift values of S1G

 2MHz long preamble PPDU)

 is defined in Table 24-4 (Timing-related constants)

 is defined in Table 24-6 (Frequently used parameters)

 is defined in Equation (24-39)

 has the value given in Tone scaling factor and guard interval duration values for PHY fieldsTable 24-7 (Tone scaling factor and guard interval duration values for PHY fields).

* SIG definition

The SIG field carries information required to interpret 1MHz S1G format PPDUs sent with a short preamble. The structure of the 6 symbol SIG field (which carries 6 information bits per symbol) is shown in Table 24-18 (Structure of the 6 symbol SIG field of S1G 1MHz PPDU). Note that unlike other SIG field structures the indexing of the bits incorporates all the SIG symbols. i.e., B0-B5 denote the first symbol, B6-B11 the second, and so on.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| B0 B1 | B2 | B3B4 | B5 | B6 | B7 B10 | B11 | B12 B20 | B21 B22 | B23 | B24 | B25 | B26 B29 | B30 B35 |
| Nsts | SGI | Coding | STBC | reserved | MCS | Aggregation | Length | ACK Indication | Smoothing | NDP Indication | Doppler | CRC | Tail |
| * Structure of the 6 symbol SIG field of S1G 1MHz PPDU
 |

The SIG field of S1G 1MHz PPDUs contains the fields listed in Table 24-19 (Fields in the SIG field of 1MHz PPDU).

|  |
| --- |
| * Fields in the SIG field of 1MHz PPDU
 |
| Symbol | Bit | Field | Number of bits | Description |
| SIG-1 | B0-B1 | NSTS | 2 | Set to 0 for 1 space time streamSet to 1 for 2 space time streamsSet to 2 for 3 space time streamsSet to 3 for 4 space time streams |
| B2 | Short GI | 1 | Set to 0 if short guard interval is not used in the Data field.Set to 1 if short guard interval is used in the Data field. |
| B3-B4 | Coding | 2 | B3 set to 0 for BCC and 1 for LDPCIf B3 is 1, B4 is set to 1 if the LDPC PPDU encoding process (of an SU PPDU), results in an extraOFDM symbol (or symbols) as described in 22.3.10.5.4 (LDPC coding), otherwise set to 0.If B3 is 0, B4 is reserved and set to 1. |
| B5 | STBC | 1 | Set to 1 if all spatial streams havespace time block coding and set to 0 if no spatial streams has space time block coding. |
| SIG-2 | B6 | Reserved | 1 | Reserved. Set to 1. |
| B7-B10 | MCS | 4 | MCS Index |
| B11 | Aggregation | 1 | Set to 1 when aggregation is ON (AMPDU), and 0 otherwise.Note: S1G PPDUs shall be transmitted with aggregation ON whenever PHY payload size is greater than 511 bytes |
| SIG-3 and SIG-4 | B12-B20 | Length | 9 | Denotes the length of PPDU in number of symbols when aggregation bit is set to 1, and in number of bytes when aggregation bit is set to 0. |
| B21-22 | ACK Indication | 2 | This field indicates the presence and type of frame a SIFS time after the current frame transmission.Set to 0 for ACK; Set to 1 for Block ACK; Set to 2 for No ACK; Set to 3 for a frame not ACK, BA or CTS |
| B23 | Smoothing | 1 | A value of 1 indicates that channel smoothing is recommended.A value of 0 indicates that channel smoothing is not recommended. |
| SIG-5 | B24 | NDP Indication | 1 | Used to indicate that frame is a Control NDP frame. If set to 1, then the SIG field contents follow the description in 8.3.4a (NDP MAC frames) |
| B25 | Doppler | 1 | Set to 1 to indicate travelling pilots usage in packet. Otherwise 0 to indicate regular pilot tone locations. |
| B26-B29 | CRC | 4 | CRC calculated as in 24.3.8.2.1.5 (CRC calculation for S1G SIGA fields).  |
| SIG-6 | B30-B35 | Tail | 6 | Used to terminate the trellis of the convolutional decoder.Set to 0. |

NOTE—Integer fields are represented in unsigned binary format with the least significant bit in the lowest numbered bit position.

The SIG field of 1MHz format is composed of six OFDM symbols, SIG-1 ~ SIG-6, each containing 6 data bits, as shown in Table 24-19 (Fields in the SIG field of 1MHz PPDU). SIG-1 is transmitted first and SIG-6 is the last. The SIG symbols shall be BCC encoded at rate, R = 1/2, and repeated two times for the encoded bits within each OFDM symbol, interleaved, mapped to a BPSK constellation, and have pilots inserted, following the steps for MCS10 transmission flow described in Clause 24.3.9 (Data field). The stream of 144 complex numbers generated by these steps (before pilot insertion) is divided into six groups of 24 complex numbers , , where  respectively. All the 144 complex numbers are BPSK modulated. The first 24 complex numbers form the first symbol of SIG; and the second rotated 24 complex numbers form the second symbol of SIG, and so forth.

The time domain waveform for the SIG field in a 1MHz format PPDU at transmit chain  shall be as specified in Equation (24-41).

* 

where

 is defined in 18.3.5.10 (OFDM modulation), and  is defined in 22.3.10.10 (Pilot Subcarriers).

 represents the cyclic shift for space-time stream *m* with a value given in Table 24-17 (Cyclic shift values of S1G 1MHz PPDU)

 is defined in Table 24-4 (Timing-related constants)

 is defined in Table 24-4 (Timing-related constants)

 is defined in Table 24-6 (Frequently used parameters)

 is defined in Equation (20-27) in 20.3.9.4.6 (HT-LTF definition)

 has the value given in Tone scaling factor and guard interval duration values for PHY fieldsTable 24-7 (Tone scaling factor and guard interval duration values for PHY fields).

* 

where

 is defined in Equation (24-53)

* 

*TGah Editor: Please make the following changes for clause 24.3.8.2.2.2.4, changes highlighted in yellow:*