IEEE P802.11
Wireless LANs

|  |
| --- |
| Missing Header Fields for MU PPDU Transmission |
| Date: 2018-06-14 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Artyom Lomayev | Intel | Turgeneva 30, Nizhny Novgorod 603024, Russia | +7 (831) 2969444 | artyom.lomayev@intel.com |
| Alexander Maltsev | Intel  |  |  | alexander.maltsev@intel.com |
| Claudio da Silva | Intel |  |  | claudio.da.silva@intel.com |
| Carlos Cordeiro | Intel  |  |  | carlos.cordeiro@intel.com |
|  |  |  |  |  |

Abstract

This document provides a review of the missing header fields for MU PPDU transmission and proposes the additional fields for the EDMG-Header-A and EDMG-Header-B to the existing ones.

**MU-MIMO missing fields**

Comparing to the SU case, the MU MIMO misses the following parameters, which can be transmitted in the EDMG-Header-A and EDMG-Header-B:

1. TRN Subfield Sequence Length – 2 bits
2. Number of Transmit Chains – 3 bits
3. EDMG Beam Tracking Request – 1 bit (10.39.7)
4. EDMG Beam Tracking Request Type – 1 bit

The proposal is to add the missing fields into the EDMG-Header-A and EDMG-Header-B and introduce the modifications as shown below.

The Differential EDMG-MCS2 field is redundant, because the MCSs for two streams can be signaled using Base MCS and Differential EDMG-MCS. The Base MCS defines the code rate for both spatial streams and modulation type for the first spatial stream. The Differential EDMG-MCS defines the possible modulation change for the second spatial stream relative to the first one.

*Editor: introduce the changes as below, in Table 44 and Table 46*

Table 44 —EDMG-Header-A field structure and definition for a MU PPDU

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Number of bits** | **Start bit** | **Description** |
| SU/MU Format | 1 | 0 | See Table 42 |
| Channel Aggregation | 1 | 1 | See Table 42 |
| BW | 8 | 2 | See Table 42 |
| Primary Channel Number | 3 | 10 | See Table 42 |
| SS Descriptor Set 0 | 9 | 13 | Describes the SS assignment to the first STA addressed within the MU PPDU. This field is formatted as described in Table 45. |
| SS Descriptor Set 1 | 9 | 22 | Describes the SS assignment to the second STA addressed within the MU PPDU. This field is formatted as described in Table 45. |
| SS Descriptor Set 2 | 9 | 31 | Describes the SS assignment to the third STA addressed within the MU PPDU. This field is formatted as described in Table 45. |
| SS Descriptor Set 3 | 9 | 40 | Describes the SS assignment to the fourth STA addressed within the MU PPDU. This field is formatted as described in Table 45. |
| SS Descriptor Set 4 | 9 | 49 | Describes the SS assignment to the fifth STA addressed within the MU PPDU. This field is formatted as described in Table 45. |
| SS Descriptor Set 5 | 9 | 58 | Describes the SS assignment to the sixth STA addressed within the MU PPDU. This field is formatted as described in Table 45. |
| SS Descriptor Set 6 | 9 | 67 | Describes the SS assignment to the seventh STA addressed within the MU PPDU. This field is formatted as described in Table 45. |
| SS Descriptor Set 7 | 9 | 76 | Describes the SS assignment to the eight STA addressed within the MU PPDU. This field is formatted as described in Table 45. |
| EDMG TRN Length | 8 | 85 | See Table 42 |
| RX TRN-Units per Each TX TRN-Unit | 8 | 93 | See Table 42 |
| EDMG TRN-Unit P | 2 | 101 | See Table 42 |
| EDMG TRN-Unit M | 4 | 103 | See Table 42 |
| EDMG TRN-Unit N | 2 | 107 | See Table 42 |
| TRN Subfield Sequence Length | 2 | 109 | See Table 42 |
| Reserved | 1 | 111 |  |
| CRC | 16 | 112 | Header Check sequence. Calculation of the header check sequence is defined in 20.3.7. |

Table 46 - EDMG-Header-B field structure and definition

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Number of bits** | **Start bit** | **Description** |
| Scrambler Seed | 7 | 0 |  |
| PSDU Length | 22 | 7 | Length of the PSDU field in octets in the range 1 – 4194303. |
| Base MCS | 5 | 29 | Generated from TXVECTOR parameter EDMG\_MCS. Indicates the lowest index of the modulation and coding scheme that is used to define the modulation and coding scheme of the spatial streams. |
| DifferentialEDMG-MCS | 2 | 34 | Generated from TXVECTOR parameter EDMG\_MCS. The Base MCS field defines the modulation and coding scheme for the spatial stream 1.The Differential EDMG-MCS field defines the possible modulation level change for the spatial stream 2 relative to the Base MCS.All spatial streams have the same code rate defined by the Base MCS field.The differential MCS subfield is set as follows:* 0: indicates the same MCS as the Base MCS subfield
* 1: indicates one level higher order modulation than the Base MCS subfield with the same code rate
* 2: indicates two levels higher order modulation than the Base MCS subfield with the same code rate
* 3: indicates three levels higher order modulation than the Base MCS subfield with the same code rate

If the number of spatial streams is 1 (per user), then the Differential EDMG-MCS field is reserved. |
|  |  |  |
| Superimposed Code Applied | 1 | 36 | Corresponds to TXVECTOR parameter LDPC\_SUPERIMPOSED. If the LDPC code rate is 7/8 and this field is set to zero, it indicates puncturing code with codeword length 624 or 1248 is applied.If the LDPC code rate is 7/8 and this field is set to one, it indicates that superimposed code with codeword length 672 or 1344 is applied.In all other cases, this field is reserved. |
| Short/Long LDPC | 1 | 37 | See Table 42 |
| STBC Applied | 1 | 38 | See Table 42 |
| NUC Applied | 1 | 39 | Corresponds to the TXVECTOR parameter NUC\_MOD. If this field is set to 1, π/2-64-NUC is applied at the transmitter for the MCSs indicated by the Base MCS, Differential EDMG-MCS1 and Differential EDMG-MCS2 fields, if supported. If an indicated MCS does not support π/2-64-NUC, then π/2-64-QAM uniform constellation is applied for this particular MCS.If set to 0, π/2-64-QAM uniform constellation is applied for MCSs signalled in the Base MCS, Differential EDMG-MCS1 and Differential EDMG-MCS2 fields.  |
| π/2-8-PSK Applied | 1 | 40 | See Table 42 |
| Spoofing Error Length Indicator | 1 | 41 | If set to 0 in an EDMG OFDM PPDU, indicates that the spoofing error, defined as the difference between the PPDU duration calculated based on L-Header and the actual PPDU duration, is smaller than TOFDM-SYM, where TOFDM-SYM = TDFT + TGI, TDFT is the OFDM IDFT/DFT period and TGI is the guard interval duration, which is determined by bits B2 and B3 of the Last RSSI field within the L-Header of the PPDU. Otherwise, if set to 1 in an EDMG OFDM PPDU, indicates that the spoofing error is greater than or equal to TOFDM-SYM. For an EDMG SC PPDU, this field is reserved. |
| Beamformed | 1 | 42 | See Table 42 |
| Number of Transmit Chains | 3 | 43 | See Table 42 |
| EDMG Beam Tracking Request | 1 | 46 | See Table 42 |
| EDMG Beam Tracking Request Type | 1 | 47 | See Table 42 |
|  |  |  |  |
| CRC | 16 | 48 | Header Check sequence. Calculation of the header check sequence is defined in 20.3.7.  |

**SP:**

Do you agree to accept the changes proposed in (11-18-1083-00-00ay Missing Header Fields for MU PPDU Transmission) to the spec draft?

**References:**

1. Draft P802.11ay\_D1.2