IEEE P802.11
Wireless LANs

|  |
| --- |
| 30.9.2.2.7 OFDM TRN Subfield Definition  |
| Date: 2017-11-06 |
| Author(s): |
| Name | Affiliation | Address | Phone | email |
| Sunwoong Yun | LG Electronics | Seocho LG R&D Lab, Korea |  | sunwoong.yun@lge.com |
| SungJin Park | LG Electronics |  |  | allen.park@lge.com |
| Saehee Bang | LG Electronics |  |  | saehee.bang@lge.com |
| Jinmin Kim | LG Electronics |  |  | jinmin1230.kim@lge.com |
| Jinsoo Choi | LG Electronics |  |  | js.choi@lge.com |
| Sanggook Kim | LG Electronics | San Diego/California/US |  | sanggook.kim@lge.com |

Abstract

This document proposes specification text for subcluase 30.9.2.2.7 of the spec describing OFDM TRN Subfield Definition

9.4.2.250 EDMG Capabilities element

9.4.2.250.1 General

A non-AP or non-PCP EDMG STA declares that it is an EDMG STA by transmitting the EDMG Capabilities element. The element is present in Announce, Association Request, Association Response, Reassociation Request, Reassociation Response, Probe Request and Probe Response frames and can be present in DMG Beacon, Information Request, and Information Response frames.

The format of the EDMG Capabilities element is shown in Figure 19. The EDMG Capabilities element contains a fixed length Core Capabilities field, which may be followed by one or more variable length Extended Capabilities fields.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Element ID | Length | Element ID Extension | Core Capabilities | Extended Capabilities 1 | … | Extended Capabilities N |
| Octets: | 1 | 1 | 1 | 3 | Variable | … | Variable |

Figure 19—EDMG Capabilities element format

The Element ID, Length and Element ID Extension fields are defined in 9.4.2.1.

The Core Capabilities field is defined in Figure 20.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | B0 B6 | B7 B20 | B21 B22 | B23 |
|  | A-MPDU Parameters | TRN Parameters | Supported MCS | Reserved |
| Bits: | 7 | 14 | 2 | 1 |

Figure 20—Core Capabilities field format

The A-MPDU Parameters field is defined in Figure 21. The definition of the subfields of the A-MPDU Parameters field is shown in Table 1.

|  |  |  |
| --- | --- | --- |
|  | B0 B3 | B4 B6 |
|  | Maximum A-MPDULength Exponent | Minimum MPDUStart Spacing |
| Bits: | 4 | 3 |

Figure 21—A-MPDU Parameters field format

1. —A-MPDU Parameters field definition

|  |  |  |
| --- | --- | --- |
| Subfield | Definition | Encoding |
| Maximum A-MPDU Length Exponent | Indicates the maximum length of A-MPDU that the STA can receive. | This subfield is an integer in the range 0 to 9.The length defined by this subfield is equal to:2(13 + Maximum A-MPDU Length Exponent) – 1 octets. |
| Minimum MPDU Start Spacing | Determines the minimum time between the start of adjacent MPDUs within an A-MPDU that the STA can receive, measured at the PHY SAP. | Set to 0 for no restrictionSet to 1 for 8 nsSet to 2 for 16 nsSet to 3 for 32 nsSet to 4 for 64 nsSet to 5 for 128 nsSet to 6 for 256 nsSet to 7 for 512 ns |

The TRN Parameters field is defined in Figure 22.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | B0 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 | B10 | B11 | B12 | B13 |
|  | TP0 | TP1 | TP4 | TN2 | TN4 | TN8 | RP0 | RP1 | RP4 | RN2 | RN4 | RN8 | Short TRN | Long TRN |
| Bits: | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

Figure 22—TRN Parameters field format

The TP0 subfield indicates that the STA is capable of transmitting an EDMG PPDU with TXVECTOR parameter EDMG\_TRN\_P equal to 0.

The TP1 subfield indicates that the STA is capable of transmitting an EDMG PPDU with TXVECTOR parameter EDMG\_TRN\_P equal to 1.

The TP4 subfield indicates that the STA is capable of transmitting an EDMG PPDU with TXVECTOR parameter EDMG\_TRN\_P equal to 4.

The TN2 subfield indicates that the STA is capable of transmitting an EDMG PPDU with TXVECTOR parameter EDMG\_TRN\_N equal to 2.

The TN4 subfield indicates that the STA is capable of transmitting an EDMG PPDU with TXVECTOR parameter EDMG\_TRN\_N equal to 4.

The TN8 subfield indicates that the STA is capable of transmitting an EDMG PPDU with TXVECTOR parameter EDMG\_TRN\_N equal to 8.

The RP0 subfield indicates that the STA is capable of receiving an EDMG PPDU with RXVECTOR parameter EDMG\_TRN\_P equal to 0.

The RP1 subfield indicates that the STA is capable of receiving an EDMG PPDU with RXVECTOR parameter EDMG\_TRN\_P equal to 1.

The RP4 subfield indicates that the STA is capable of receiving an EDMG PPDU with RXVECTOR parameter EDMG\_TRN\_P equal to 4.

The RN2 subfield indicates that the STA is capable of receiving an EDMG PPDU with RXVECTOR parameter EDMG\_TRN\_N equal to 2.

The RN4 subfield indicates that the STA is capable of receiving an EDMG PPDU with RXVECTOR parameter EDMG\_TRN\_N equal to 4.

The RN8 subfield indicates that the STA is capable of receiving an EDMG PPDU with RXVECTOR parameter EDMG\_TRN\_N equal to 8.

The Short TRN subfield is set to one to indicate that the STA is capable of receiving TRN subfields based on short Golay sequences (see 30.9.2.2.6) in SC mode or short TRN subfields (see 30.9.2.2.7) in OFDM mode, otherwise it is set to 0.

The Long TRN subfield is set to one to indicate that the STA is capable of receiving TRN subfields based on long Golay sequences (see 30.9.2.2.6) in SC mode or long TRN subfields (see 30.9.2.2.7) in OFDM mode, otherwise it is set to 0.

Table 24—EDMG-Header-A field structure and definition for a SU PPDU

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Number of bits** | **Start bit** | **Description** |
| TRN Subfield Sequence Length | 2 | 88 | For EDMG SC mode PPDU, this field is reserved if the value of the EDMG TRN Length field is 0. Otherwise, this field indicates the length of the Golay sequence used to transmit the TRN subfields present in the TRN field of the PPDU and is set as follows: * Set to 0 to indicate normal sequence length of 128× *NCB*
* Set to 1 to indicate long sequence length of 256× *NCB*
* Set to 2 to indicate short sequence length of 64× *NCB*
* Value 3 is reserved

*NCB* represents the integer number of contiguous 2.16 GHz channels over which the TRN subfield is transmitted and 1 ≤ *NCB* ≤ 4.For EDMG OFDM mode PPDU, this field is reserved if the value of the EDMG TRN Length field is 0. Otherwise, this field indicates the number of basic TRN subfield repetition used to transmit the TRN subfields present in the TRN field of the PPDU and is set as follows* Set to 0 to indicate normal TRN subfield composed of 2 repetition of basic TRN subfield
* Set to 1 to indicate long TRN subfield composed of 4 repetition of basic TRN subfield
* Set to 2 to indicate short TRN subfield composed of 1 repetition of basic TRN subfield
* Value 3 is reserved
 |

**30.9.2.2.7 OFDM TRN subfield definition**

*Editor: add subclause 30.9.2.2.7 in D0.5, shift the rest of subclauses by one*

The basic TRN subfield waveform for the *iTX*-th transmit chain in time domain shall be defined at the OFDM sampling rate *Fs* equal to *NCB*\*2.64 GHz and sample time duration *Ts* = 1/*Fs* ns as follows:



where



The normal TRN subfield, short TRN subfield and long TRN subfield are defined as follow:







where:

*  is the total number of active tones
*  is the TRN mapping matrix defined below
*  is the number of OFDM symbols in TRN subfield for given total number of transmit chains *NTX* defined below
*  is a matrix element from *m*-th row and *n*-th column
*  is window function applied to smooth the transitions between consecutive OFDM symbols, it’s definition is implementation specific
*  is a time sample index
* is duration of basic TRN subfield

If Maximum OFDM MCS subfield in PHY capability field is set to greater than 0, an EDMG STA shall support 2 repetition of basic TRN subfield. Other repetitions are optional and support is indicated in the STA’s EDMG Capabilities element.

The OFDM TRN mapping matrix for *NTX* = 1 is defined as follows:



The OFDM TRN mapping matrix for *NTX* = 2 is defined as follows:



The OFDM TRN mapping matrix for *NTX* = 3 is defined as follows:



The OFDM TRN mapping matrix for *NTX* = 4 is defined as follows:



The OFDM TRN mapping matrix for *NTX* = 5, 6 is defined as follows:



The OFDM TRN mapping matrix for *NTX* = 7, 8 is defined as follows:



**References:**

1. Draft P802.11ay\_D0.8