**IEEE P802.15**

**Wireless Personal Area Networks**

|  |  |
| --- | --- |
| Project | IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs) |
| Title | **PHY PIB attributes - Resolution** |
| Date Submitted | [September 2017] |
| Source | Trang Nguyen, and Yeong Min Jang (Kookmin University) |
| Re: | D4 comments and resolutions |
| Abstract | PHY PIB attributes- table separation |
| Purpose | D4 comments and resolution |
| Notice | This document has been prepared to assist the IEEE P802.15. It is offered as a basis for discussion and is not binding on the contributing individual(s) or organization(s). The material in this document is subject to change in form and content after further study. The contributor(s) reserve(s) the right to add, amend or withdraw material contained herein. |
| Release | The contributor acknowledges and accepts that this contribution becomes the property of IEEE and may be made publicly available by P802.15. |

# #1: PHY PIB attributes update

## **Table 125—PHY PIB attributes**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute** | **Ident.** | **Type** | **Range** | **Description** |
| *phyCurrentChannel* | 0x00 |  |  | Existing in 2011 std. |
| *phyCCAMode* | 0x01 |  |  | Existing in 2011 std. |
| *phyDim* | 0x02 |  |  | Existing in 2011 std. |
| *phyUseExtendedMode* | 0x03 |  |  | Existing in 2011 std. |
| *phyColorFunction* | 0x04 |  |  | Existing in 2011 std. |
| *phyBlinkingNotification-*  *Frequency* | 0x05 |  |  | Existing in 2011 std. |
| phyOccEnable | 0x06 | Boolean | 0/1 | This attribute enables the PHY modes for OCC.  0: PHY I, II, and III  1: PHY IV, V, and VI. |
| phyOccMcsID | 0x07 | Int. | 0-15 | This attribute identifies the OCC modulation when phyOccEnable =1. The proper values for the modulation and coding identification of OCC modes are described in table 126 (new). |

## **Table 126 (new): OCC PHY modes identification**

|  |  |
| --- | --- |
| **phyOccMcsID** | **PHY OCC mode Description** |
| 0 | UFSOOK |
| 1 | Twinkle VPPM |
| 2 | S2-PSK |
| 3 | HS-PSK |
| 4 | Offset-VPPM |
| 5 | RS-FSK |
| 6 | CM-FSK |
| 7 | C-OOK |
| 8 | MPM |
| 9 | A-QL |
| 10 | Hidden A-QL (HA-QL) |
| 11 | VTASC |
| 12 | IDE |
| 13-15 | Reserved |

## **Table 127 (new): PHY PIB attributes for UFSOOK mode**

## **Table 128 (new): PHY PIB attributes for Twinkle mode**

## **Table 129 (new): PHY PIB attributes for S2-PSK mode**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute** | **Ident.** | **Type** | **Range** | **Description** |
| phyS2pskOpticalClockRate | - | Int. | 0-15 | The optical clock rate (or symbol rate) applied for S2-PSK.  0: 5 Hz  1: 10 Hz  2: 15 Hz  Others: Reserved |
| phyS2pskLineCode | - | Int. | 0-7 | This specifies the line coding for S2-PSK.  0: None  1: half rate line coding  Others: Reserved |
| phyS2pskFec | - | Int. | 0-7 | This attribute specifies FEC for S2-PSK.  0: None  1: RS(15,11)  Other values: Reserved |
| phyS2pskNumLightSources | - | Int. | 0-3 | The number of light sources used to modulate S2-PSK signal.  0: two light sources  1-3: Reserved |
| phyS2pskModulationRate | - | Int. | 0-7 | This attribute specifies the modulation frequency used for S2-PSK.  0: 200 Hz  1: 125 Hz  2: 1000 Hz  3-7: Reserved |
| phyS2pskPsduLength | - | Int. | 0-255 | This is to specify the length PSDU in byte. |

## **Table 130 (new): PHY PIB attributes for HS-PSK mode**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute** | **Ident.** | **Type** | **Range** | **Description** |
| phyHspskOpticalClockRate | - | Int. | 0-15 | The optical clock rate (or symbol rate) applied for HS-PSK.  0: 10 kHz  1: 50 kHz  others: Reserved |
| phyHspskLineCode | - | Int. | 0-7 | This specifies the line coding for HS-PSK  0: None  1: half-rate code for S2-PSK and none for DS8-PSK  Other values: Reserved |
| phyHspskFec | - | Int. | 0-7 | This attribute specifies FEC for HS-PSK modulation.  0: None for both S2-PSK and DS8-PSK  1: None for S2-PSK and RS (15, 11) for DS8-PSK  2: RS (15,11) for S2-PSK and RS (15, 7) for DS8-PSK  Other values: Reserved |
| phyHSpskNumLightSources | - | Int. | 0-7 | The number of light sources used to modulate HS-PSK signal.  0: two light sources, each consists of 8 LEDs.  1: two light sources, each consists of 10 LEDs.  1-7: Reserved |
| phyHSpskHighStreamMode | - | Int. | 0-7 | The modulation of high data stream.  0: DS8-PSK mode  1: DS10-PSK mode  2-7: Reserved |
| phyHSpskModulationRate | - | Int. | 0-7 | This attribute specifies the modulation frequency used for S2-PSK and DSM-PSK of HS-PSK.  0: 200Hz for S2-PSK and 80 kHz for DS8-PSK  1: 1 kHz for S2-PSK and 400 kHz for DS8-PSK  2-7: Reserved |
| phyHSpskLowDim | - | Int. | 0-500 | This attribute specifies the low dimming level of DS8-PSK |
| phyHSpskHighDim | - | Int. | 500-1000 | This attribute specifies the high dimming level of DS8-PSK |
| phyHSpskPsduLength | - | Int. | 0-255 | This is to specify the length in byte of the high-speed link of HS-PSK. |

## **Table 131 (new): PHY PIB attributes for Offset-VPPM mode**

## **Table 132 (new): PHY PIB attributes for RS-FSK mode**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute** | **Ident.** | **Type** | **Range** | **Description** |
| phyRsfskOpticalClockRate | - | Int. | 0-15 | The optical clock rate (or symbol rate) applied for RS-FSK. |
| phyRsfskFec | - | Int. | 0-7 | This attribute specifies FEC for NS-FSK modulation  0: XOR FEC  Other values: Reserved |
| phyNsfskNumFrequency |  | Int | 0-3 | This attribute specifies the number of frequencies used to modulate data in NS-FSK.  0: NS-FSK-C8  1: NS-FSK-C16  2-3: Reserved |
| phyNsfskInvFrequencyGap |  | int | 0-3 | Indicates the frequency differences between the frequency sets. This is represented by the inverse of frequency gap. i.e. the time difference in seconds.  0: 3.75e-4  1-2: Reserved  3: Use the value specified in phyOccCustomOpticalClockRate |
| phyNsfskCustomInvFrequencyGap |  | float |  | Custom inverse frequency gap, used when phyNsfskInvFrequencyGap = 3 |
| phyNsfskGroupCount |  | int | 0-7 | Indicates the maximum sequence number. i.e., how many frequency sets exist.  N: n+1 frequency set |
| phyNsfskFEC |  | int | 0-7 | Indicates the number of data symbols protected by one XOR FEC symbol.  N: n+1 symbols |
| phyNsfskSplitterSymbolEnable |  | boolean | T/F | Indicates whether the device uses SSs or not. |
| phyNsfskSplitterFrequency |  | int | 0-3 | Indicates the splitter frequency. This is represented as a ratio of the splitter frequency to the preamble frequency. If the SS is already in used, it will use the original phyNsfskSplitterFrequency until next cycle.  0: 1.4  1-2: Reserved  3: Custom |
| phyNsfskCustomSplitterFrequency |  | float |  | Custom splitter frequency, used when phyNsfskSplitterFrequency = 3­ |
| phyNsfskSplitterDuration |  | int | 0-7 | Indicates the duration of the SS. This is represented as a ratio of symbol duration to splitter duration in integer.  0: 15  1: 30  2: 60  3: 120  4-7: Reserved |
| phyNsfskSymbolDurationExp |  | int | 0-7 | Indicates the duration of a data symbol in the PSDU. This is represented as a ratio of the symbol duration to 1/30 second in the base 2 exponentiation. For example, if the symbol duration is 1/120 second, then the exponent would be -2. Note that this does not affect the duration of the preamble field and the optional field.  0: 0  1: 1  2: 2  3: -1  4: -2  5-6: Reserved  7; Custom |
| phyNsfskEndSymbolEnable |  | boolean | T/F | Indicates whether the device uses end symbol or not. |

## **Table 133 (new): PHY PIB attributes for CM-FSK mode**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute** | **Ident.** | **Type** | **Range** | **Description** |
| phyCmfskOpticalClockRate | - | Int. | 0-15 | The optical clock rate (or symbol rate) applied for CM-FSK  0: 5 Hz  1: 10 Hz  2: 15 Hz  Others: Reserved |
| phyCmfskFec | - | Int. | 0-7 | This attribute specifies FEC for CM-FSK modulation.  0: None  1: RS(15,11) as an outer FEC.  Other values: Reserved |
| phyCmfskAb | - | Int. | 0-1 | This attribute specifies the number of asynchronous bits (Ab) used to insert to the pack of data bits in prior to mapping a frequency in CM-FSK.  0: 1 Ab is used to support the asynchronous communication  1: 2 Ab(s) is used to support the detection of missing symbols during reception. |
| phyCmfskNumFrequency | - | Int. | 0-3 | This attribute specifies the number of frequencies used to modulate data in CM-FSK.  0: 32-FSK  1: 64-FSK  2-3: Reserved |
| phyCmfskFrequencySeparation | - | Int. | 0-7 | This attribute specifies the frequency separation in CM-FSK.  0: 50 Hz  1: 100 Hz  2-7: Reserved |
| phyCmfskNumPhase | - | Int. | 0-3 | This attribute specifies the number of phases used to modulate data in CM-FSK.  0: None  1: 2-PSK  2-3: Reserved |
| phyCmfskPreamble | - | Int. | 0-3 | This attribute specifies the frequency value of the first preamble (fSF) in CM-FSK.  0: 200Hz  1-3: Reserved |
| phyCmfskSplitterEnable | - | Boolean | T/F | This attribute enables whether the splitter usage in between frequency symbols in CM-FSK.  FALSE: Disable (Default)  TRUE: Enable |
| phyCmfskPsduLength | - | Int. | 0-255 | This is to specify the length of PSDU in byte. |

## **Table 134 (new): PHY PIB attributes for C-OOK mode**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute** | **Ident.** | **Type** | **Range** | **Description** |
| phyCookOpticalClockRate | - | Int. | 0-15 | The optical clock rate (or symbol rate) applied for C-OOK  0: 2.2 kHz  1: 4.4 kHz  Others: Reserved |
| phyCookRLLCode | - | Int. | 0-7 | This specifies the RLL coding for C-OOK modulation, the RLL coding options include  0: Manchester  1: 4B6B coding  Other values: Reserved |
| phyCookFec | - | Int. | 0-7 | This attribute specifies FEC for C-OOK modulation,  0: None  1: Inner FEC: Hamming (8/4)  2: Inner FEC: Hamming (15/11)  3: Inner FEC: Hamming (8/4), outer FEC: RS(15,11)  4: Inner FEC: Hamming (15/11), outer FEC: RS(15,11)  Other values: Reserved |
| phyCookSubPacketRate | - | Int. | 0-7 | This attribute specifies the Data Sub-packet rate (denoted as DS rate) of C-OOK.  0: 60 sub-packet/sec  1: 100 sub-packet/sec  2-7: Reserved |
| phyCookPacketRate | - | Int. | 0-7 | This attribute specifies the Data Packet rate of C-OOK.  0: 5 packet/sec  1: 10 packet/sec  2: 15 packet/sec  3-7: Reserved |
| phyCookPreambleSymbol | - | Int. | 0-7 | This attribute specifies the preamble symbol of PSDU of C-OOK.  0: 6B symbol (preamble =011100)  1: 10B symbol (preamble =0011111000)  2-3: Reserved |
| phyCookAb | - | Int. | 0-3 | This attribute specifies the amount of Asynchronous bit (Ab) per data sub-frame of C-OOK.  0: 1 bit  1: 2 bit  2-3: Reserved |
| phyCookPsduLength | - | Int. | 0-255 | This is to specify the length of PSDU in byte. |

## **Table 135 (new): PHY PIB attributes for MPM mode**

## **Table 136 (new): PHY PIB attributes for A-QL mode**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute** | **Ident.** | **Type** | **Range** | **Description** |
| phyAqlOpticalClockRate | - | Int. | 0-15 | The optical clock rate (or symbol rate) applied for A-QL mode.  0: 5 Hz  1: 10 Hz  2: 15 Hz  Others: Reserved |
| phyAqlFec | - | Int. | 0-7 | This attribute specifies FEC in case of A-QL modulation,  0: None  1: CC(1/4) as inner FEC  2: CC(1/3) as inner FEC; RS(15,11) as outer FEC  3: CC(1/4) as inner FEC; RS(15,7) as outer FEC  Other values: Reserved |
| phyAqlNumCells | - | Int. | 0-7 | The number of individual cells on Tx in A-QL mode.  0: 16x16 cells  1-7: Reserved |
| phyAqlCellSize | - | Int. | 0-1000 | This attribute specifies the size of cells (in pixels) to generate the A-QL code. |
| phyAqlBolderSize | - | float |  | This attributes specifies the ratio between the size of the bolder and the size of the cell. |
| phyAqlNumCellReference | - | Int. | 0-3 | The number of cells per each of four reference corners in A-QL mode.  0: 1 cell reference  1: 2x2 cell reference  2-3: Reserved |
| phyAqlByteOrientedEnable | - | Boolean | T/F | The enabler of byte-oriented mode in A-QL mode.  FALSE: Disable (bit-oriented)  TRUE: Enable (byte-oriented) |
| phyAqlColorSelection | - | Int. | 0-15 | The selection of color bands used in A-QL mode.  0: Grey mapping  1-9: valid combination of colors available in table 107-Valid color band combinations for CSK. |
| phyAqlPsduLength | - | Int. | 0-255 | This is to specify the length of PSDU in byte. |

## **Table 137 (new): PHY PIB attributes for HA-QL mode**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute** | **Ident.** | **Type** | **Range** | **Description** |
| phyHAqlOpticalClockRate | - | Int. | 0-15 | The optical clock rate (or symbol rate) applied for HA-QL  0: 5 Hz  1: 10 Hz  2: 15 Hz  Others: Reserved |
| phyHAqlLineCode |  | Int | 0-7 | In case of HA-QL modulation, the RLL coding is  0: None  1: half-rate code  Others: Reserved |
| phyHAqlFec | - | Int. | 0-7 | This attribute specifies FEC for HA-QL modulation,  0: None  1: CC(1/3) as inner FEC; RS(15,11) as outer FEC  2: CC(1/4) as inner FEC; RS(15,7) as outer FEC  Other values: Reserved |
| phyHAqlNumCells | - | Int. | 0-7 | The number of individual cells on Tx in HA-QL mode.  0: 8x8 cells  1: 16x16 cells  2-7: Reserved |
| phyHAqlNumCellReference | - | Int. | 0-3 | The number of cells per each of four reference corners in HA-QL mode.  0: 1 cell reference  1: 2x2 cell reference  2-3: Reserved |
| phyHAqlByteOrientedEnable | - | Boolean | T/F | The enabler of byte-oriented mode in HA-QL mode.  FALSE: Disable (bit-oriented)  TRUE: Enable (byte-oriented) |
| phyHAqlAb |  | int | 0-7 | This attributes specifies the number of Ab bits embedded into a block of data to be carried by a HA-QL code. |
| phyHAqlIntensity | - | float | 0-1 | This specifies the intensity level of the modulated intensity. 0 means the intensity of the original image does not change; and 1 means the intensity of the original image is inversed. |
| phyHAqlPsduLength | - | Int. | 0-255 | This is to specify the length of PSDU in byte. |

## **Table 138 (new): PHY PIB attributes for VTASC mode**

## **Table 139 (new): PHY PIB attributes for IDE mode**