**IEEE P802.15**

**Wireless Personal Area Networks**

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# #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 III1: 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 HzOthers: 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 sources1-3: Reserved |
| phyS2pskModulationRate | - | Int. | 0-7 | This attribute specifies the modulation frequency used for S2-PSK.0: 200 Hz1: 125 Hz2: 1000 Hz3-7: 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 kHz1: 50 kHzothers: 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 mode1: DS10-PSK mode2-7: 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-PSK1: 1 kHz for S2-PSK and 400 kHz for DS8-PSK2-7: 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-C81: NS-FSK-C162-3: 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-41-2: Reserved3: 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: 1.41-2: Reserved3: 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: 151: 302: 603: 1204-7: 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: 01: 12: 23: -14: -25-6: Reserved7; 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-FSK0: 5 Hz1: 10 Hz2: 15 HzOthers: 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 communication1: 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-FSK1: 64-FSK2-3: Reserved |
| phyCmfskFrequencySeparation | - | Int. | 0-7 | This attribute specifies the frequency separation in CM-FSK.0: 50 Hz1: 100 Hz2-7: Reserved |
| phyCmfskNumPhase | - | Int. | 0-3 | This attribute specifies the number of phases used to modulate data in CM-FSK.0: None1: 2-PSK2-3: Reserved |
| phyCmfskPreamble | - | Int. | 0-3 | This attribute specifies the frequency value of the first preamble (fSF) in CM-FSK.0: 200Hz1-3: 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-OOK0: 2.2 kHz1: 4.4 kHzOthers: 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/sec1: 100 sub-packet/sec2-7: Reserved |
| phyCookPacketRate | - | Int. | 0-7 | This attribute specifies the Data Packet rate of C-OOK.0: 5 packet/sec1: 10 packet/sec2: 15 packet/sec3-7: 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 bit1: 2 bit2-3: 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 Hz1: 10 Hz2: 15 HzOthers: 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 cells1-7: 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 reference1: 2x2 cell reference2-3: 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 mapping1-9: 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-QL0: 5 Hz1: 10 Hz2: 15 HzOthers: 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 cells1: 16x16 cells2-7: Reserved |
| phyHAqlNumCellReference | - | Int. | 0-3 | The number of cells per each of four reference corners in HA-QL mode.0: 1 cell reference1: 2x2 cell reference2-3: 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**