**IEEE P802.15**

**Wireless Personal Area Networks**

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#### 5.2.1.2.3 PHY V

(Remove the following paragraph)

##### ~~MPM sequence number~~

~~The Sequence Number subfield for MPM contains a frame sequence number. The bit-length of the Sequence Number subfield is set as macMpmSnLength. In the case that bit-length of the Sequence Number subfield is set as variable length, the first bit of the Sequence Number subfield is used as the Last Frame Flag, which is set as 1 for the last frame and 0 for the other frame. Figure 68 shows how to determine the bit-length of the Sequence Number subfield, where SN is the bit length of the sequence number subfield and LFF is the last frame flag (the first bit of the sequence number subfield).~~

#### 5.2.1.8.3 PHY V

(Replace the following paragraph)

##### ~~MPM payload field (MSDU)~~

~~The bit-length of the MSDU payload field is calculated as macMpmMpduLength - macMpmSnLength.~~

##### MPM payload field

MPM uses only the frame payload. The bit-length of the payload is defined by *macDataLength*.

## 6.4.2 MAC PIB attributes

(Remove the following attributes from) Table 97 --- MAC PIB attribute

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Attribute** | **Identifier** | **Type** | **Range** | **Description** | **Default** |
| *~~macMpmSnLength~~* |  | ~~Integer~~ | ~~0x0-0xf~~ | ~~Indicates the bit-length of the Sequence Number subfield. Values from 0x0 to 0xe indicate the (fixed) bit-lengths. Value 0xf indicates that the bit-length is variable.~~ | ~~0xf~~ |
| *~~macMpmMpduLength~~* |  | ~~Integer~~ | ~~0x00-0xff~~ | ~~Indicates the bit-length of MPDU.~~ | ~~12~~ |

### 9.5.2 PHY PIB attributes

(Modify) Table 179--- PHY PIB attributes

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Attribute** | **Identifier** | **PLCP Center** | **Range** | **Description** |
| *phyMpmMode* |  | Integer | 0-1 | Indicates the MPM PHY mode.  0: PWM mode  1: PPM mode |
| *~~phyMpmPlcpHeaderMode~~* |  | ~~Integer~~ | ~~0x0-0xf~~ | ~~Indicates the PLCP Header subfield mode and the PLCP Footer subfield. See 14.4.2 and 14.4.5.~~ |
| *~~phyMpmPlcpCenterMode~~* |  | ~~Integer~~ | ~~0x0-0xf~~ | ~~Indicates the PLCP Center subfield mode. See 14.4.4.~~ |
| *phyMpmSequenceNumberLength* |  | Integer | 0x0-0xf | Indicates the bit-length of the Sequence Number subfield. |
| *phyMpmDynamicSequenceNumberLength* |  | Integer | 0-1 | Indicates the bit-length of the Sequence Number subfield is  0 : constant length  1 : variable length |
| *phyMpmPlcpHeaderSymbol* |  | Integer | 0x00-0xff | Indicates the base symbol value of the PLCP Header subfield. It is referred as *a*. |
| *phyMpmPlcpCenterSymbol* |  | Integer | 0x00-0xff | Indicates the base symbol value of the PLCP Center subfield. It is referred as *b*. |
| *phyMpmPlcpFooterSymbol* |  | Integer | 0x00-0xff | Indicates the base symbol value of the PLCP Footer subfield. It is referred as *c*. |
| *phyMpmSymbolSize* |  | Integer | 0x0-0xf | Indicates the number of symbols of the Payload subfield. 0x0 indicates variable. It is referred as *N*. |
| *phyMpmOddSymbolBit* |  | Integer | 0x0-0xf | Indicates the bit-length that is contained in each odd-numbered symbol of the Payload subfield. It is referred as *Modd*. |
| *phyMpmEvenSymbolBit* |  | Integer | 0x0-0xf | Indicates the bit-length that is contained in each even-numbered symbol of the Payload subfield. It is referred as *Meven*. |
| *phyMpmSymbolOffset* |  | Integer | 0x00-0xff | Indicates the offset value of symbols of the Payload subfield. It is referred as *W1*. |
| *phyMpmSymbolUnit* |  | Integer | 0x00-0xff | Indicates the unit value of symbols of the Payload subfield. It is referred as *W2*. |
|  |  |  |  |  |

(Replacement for the whole 14.5)

## 14.5 MPM

MPM PLCP adds the Sequence Number subfield and the Last Sequence Flag subfield to MPDU and converts them to the PLCP Header subfield, the Front Payload subfield, the PLCP Center subfield, the Back Payload subfield, and the PLCP Footer subfield as shown in Figure 268. MPM has two PHY modes, PWM mode and PPM mode, and *phyMpmMode* defines which mode shall be used.

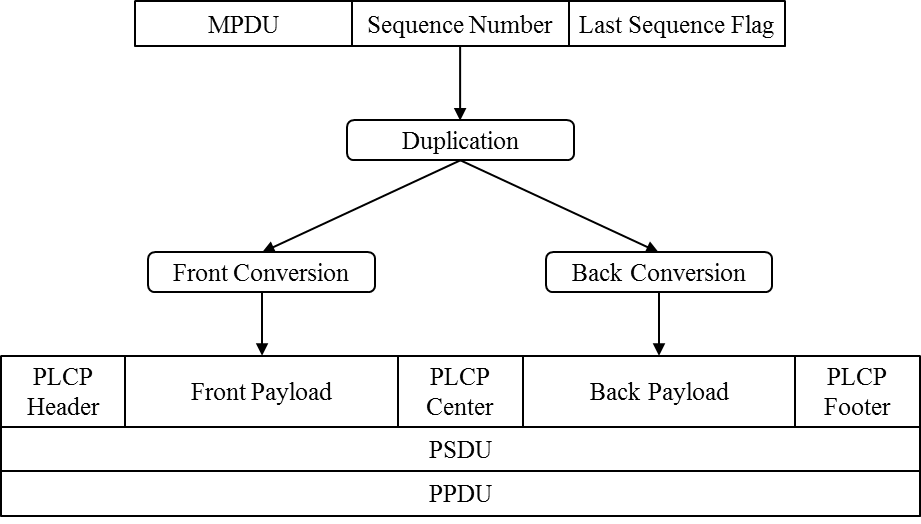


Figure 268 --- MPM PHY and PLCP

### 14.5.1 Sequence Number subfield

The Sequence Number subfield contains a sequence number, which is sent LSB first and starts from 0.

In the case that *phyMpmDynamicSequenceNumberLength* is 0, the bit-length of the Sequence Number subfield is a value of *phyMpmSequenceNumberLength*. Otherwise, it depends on the PPDU contains the last sequence or not, and the value of the last sequence number. In the case that the PPDU contains the last sequence, the bit-length of the Sequence Number subfield is a value of *phyMpmSequenceNumberLength*. That of the other PPDU is , where *L* is a value of the sequence number of the last PPDU.

### 14.5.2 Last Sequence Flag subfield

The Last Sequence Flag subfield is a 1 bit flag. The value is 1 when the PPDU contains the last sequence, and 0 otherwise.

In the case that *phyMpmDynamicSequenceNumberLength* is 0, the Last Sequence Flag subfield is not sent.

### 14.5.3 PLCP Header/Center/Footer subfields

In PWM mode, each of the PLCP Header subfield, the PLCP Center subfield, and the PLCP Footer subfield contains four symbols. Let *a* be *phyMpmPlcpHeaderSymbol*, *b* be *phyMpmPlcpCenterSymbol*, and *c* be *phyMpmPlcpFooterSymbol*, the symbols of the PLCP Header subfield are (*a*, *a* – 10, *a*, *a*), the symbols of the PLCP Center subfield are (*b*, *b* – 10, *b* – 10, *b*), and the symbols of the PLCP Footer subfield are (*c*, *c*, *c* – 10, *c*).

In PPM mode, each of the PLCP Header subfield, the PLCP Center subfield, and the PLCP Footer subfield consists of three symbols. The symbols of the PLCP Header subfield are (*a* + 10, *a*, *a*), the symbols of the PLCP Center subfield are (*b*, *b* + 10, *b*), and the symbols of the PLCP Footer subfield are (*c*, *c*, *c* + 10).

### 14.5.4 Front Payload subfield and Back Payload subfield

Each of the Front Payload subfield and the Back Payload subfield contains *N* symbols. Let *M*oddbe a bit-length contained in an odd-numbered symbol, *M*evenbe a bit-length contained in an even-numbered symbol, *W1* be a symbol value offset, and *W2* be a symbol value unit. *N, M*odd*, M*even*, W1,* and *W2* are defined in the PHY PIB in Table 179.

Input bit sequence, which consists of the MPDU, the Sequence Number subfield, and the Last Sequence Flag, (*x0, x1, x2, …*) are converted as follows. Let *yi* be calculated as

where

then the *i*th Symbol of the Front Payload subfield is calculated as

and the *i*th Symbol of the Back Payload subfield is calculated as

### 14.5.5 Waveform

Symbols shall be transmitted as two states of light intensity, the bright state and the dark state.

In PWM mode, symbol value corresponds to continuous time of a state in micro second. For example, the first symbol value corresponds continuous time of the first bright state and the second symbol value corresponds continuous time of the following dark state as shown in Figure 269. The first state can be dark state as well.

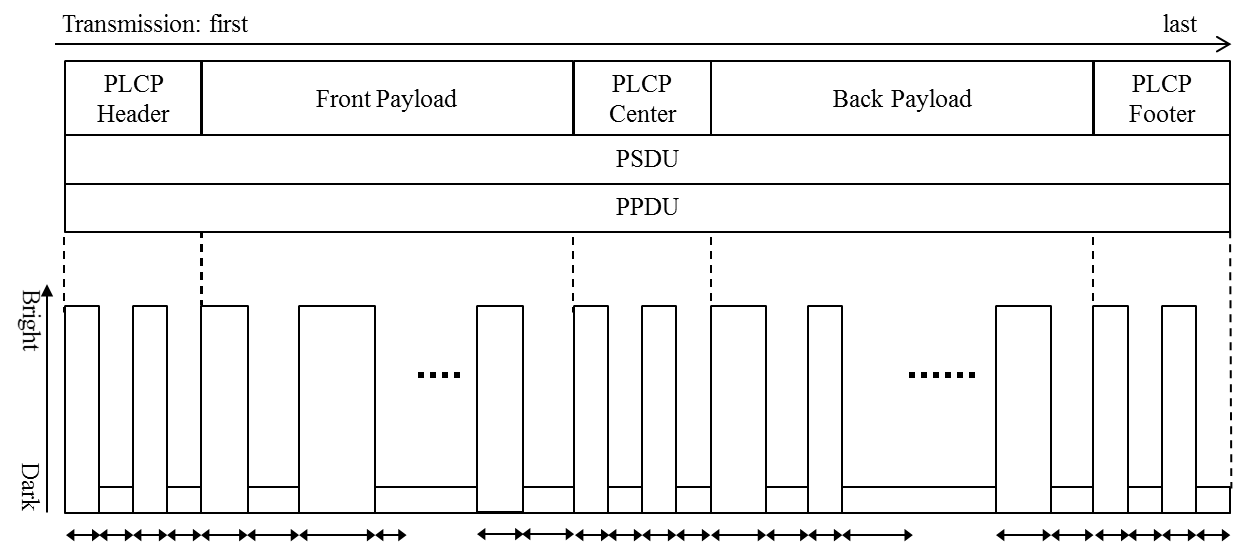


Figure 269 --- MPM PHY PWM mode waveform

In PPM mode, symbol value corresponds to duration time between the beginning of bright state and the beginning of the next bright state in micro second. The duration time of continuous bright state shall be shorter than 90% of the symbol value. Figure 270 shows an example waveform.

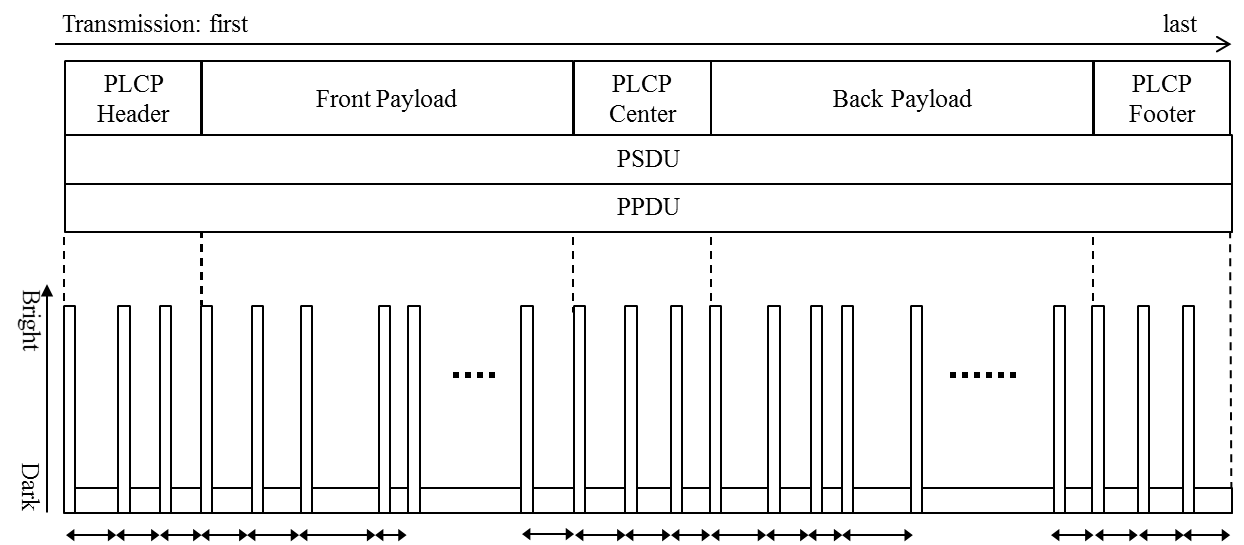


Figure 270 --- MPM PHY PPM mode waveform

For both modes, a transmitter can transmit only a part of the symbols, but all symbols of the PLCP Center subfield and at least *N* symbols from the Front Payload subfield and the Back Payload subfield must be transmitted.