IEEE P802.15

Wireless Personal Area Networks

Project	IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs)
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Purpose	[Draft]
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6. PHY specification

6.3.2a Packet Control field for MRFSK

The Packet Control field is 5 bits in length and is shown in Figure 27a. This field controls the data rate and modulation scheme for the remaining portion of the packet, the length of the FCS, whether FEC is used (note: maybe the FEC method also) and whether Data Whitening is used.

Bits				
1	**1**	**1**	**1**	**1**
Mode Switching	Reserved	FCS Option	FEC	Data Whitening

Figure 27a—Format of the Packet Control field for MRFSK

6.3.2a.1 Data Whitening subfield

The Data Whitening subfield is used to indicate if data whitening of the PSDU is enabled (subfield value set to 1) or disabled (subfield value set to 0). Data whitening shall never be applied to the SHR or PHR.

6.4.2 PHY PIB attributes

Table 31—PHY PIB attributes

Attribute	Identifier	Type	Range	Description
phyScramblePSDU		Boolean	TRUE or FALSE	A value of FALSE indicates that data whitening of the PSDU is disabled. A value of TRUE indicates that data whitening of the PSDU is enabled.

6.11.2.2 Data whitening

Support for data whitening is optional.

When data whitening is enabled at the transmitter, the Data Whitening subfield of the Packet Control field shall be set to 1 (see 6.3.2a.1) and the scrambled data shall be the exclusive or (XOR) of the PSDU with the PN9 sequence as described by Equation (1):

$$E_n = R_n \oplus PN9_n \tag{1}$$

where

E_n is the whitened bit

R_n is the data bit being whitened
$PN9_n$ is PN9 sequence

For each packet transmitted with data whitening enabled, R0 is the first bit of the PSDU and the index n increments for subsequent bits of the PSDU.

For packets received with the Data Whitening subfield of the Packet Control field set to 1 (see 6.3.2a.1), the receiver decodes the scrambled data as described by equation (2):

$$R_n = RE_n \oplus PN9_n \quad (2)$$

The PN generator is defined by the schematic in Figure 28.

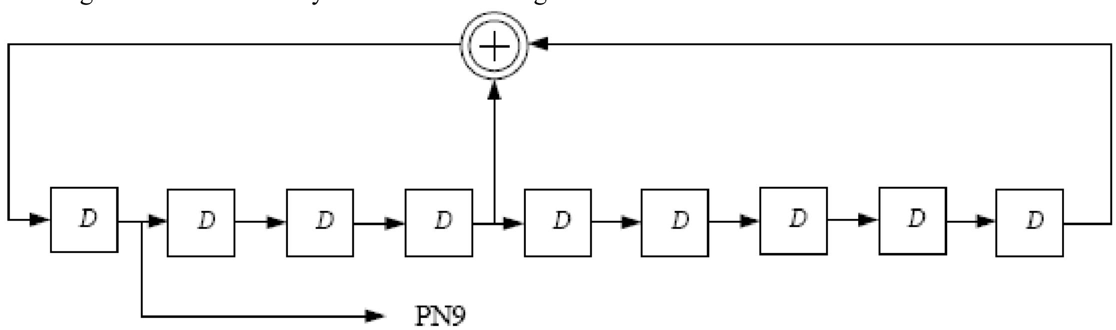

Figure 28—Schematic of the PN generator

The seed in the PN9 shall be all ones: "111111111". The PN9 shall be reinitialized to the seed after each packet (either transmit or receive).

The PN9 generator is clocked starting from the seed. For example, the first 30 bits out of the PN9, once it is enabled, would be as follows:

$PN9_n$= 0_0, 0_1, 0_2, 0_3, 1_4, 1_5, 1_6, 1_7, 0_8, 1_9, 1_{10}, 1_{11}, 0_{12}, 0_{13}, 0_{14}, 0_{15}, 1_{16}, 0_{17}, 1_{18}, 1_{19}, 0_{20}, 0_{21}, 1_{22}, 1_{23}, 0_{24}, 1_{25}, 1_{26}, 0_{27}, 1_{28}, 1_{29}

In the transmitter the bits after the PHR are obtained by an XOR function that has the PN9 at its first input and the data at its second input. The preamble, SFD, PHR and the output of the XOR function are applied to the FSK or GFSK modulator.

In the receiver the bits after the PHR are obtained by an XOR function that has the PN9 at its first input and the received bits from the FSK or GFSK demodulator at its second input. The preamble, SFD, PHR and the output of the XOR function are the received data.

