

**IEEE P802.15
Wireless Personal Area Networks**

Project	IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs)	
Title	Proposed Text on Stuff Chips	
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Re:		
Abstract	IEEE 802.15 Task Group TG3c Comment Resolution for CID 338 and 615	
Purpose	Proposed Text on Stuff Chips	
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12.2.2.2.4 Stuff Bits Chips

Stuff bits chips shall be added to the end of the encoded and spread data prior to modulation in order to apply some of modulation schemes or to form sub-blocks if the number of encoded and spread data chips is not an integer multiple of the number of bits per sub-block after encoding and/or spreading (N_{DBES}), the number of bits per symbol (N_{NBPS}), and the length of the data sub-block (sub-block excluding the pilot symbols chips) (N_{NLSB}), respectively.

Let N_{OCTETS} be the number of payload octets transferred from MAC layer. The number of RS is LDPC blocks is given by

$$N_{FEC} = \begin{cases} \text{ceil}\left(\frac{N_{OCTETS}}{239}\right) & \text{for RS} \\ \text{ceil}\left(\frac{N_{OCTETS} * 8}{672 * R_{FEC}}\right) & \text{for LDPC} \end{cases}$$

Let N_{ebits} be the number of encoded bits. This can be computed as follows:

$$N_{FEC} = \begin{cases} N_{OCTETS} * 8 + N_{FEC} * 16 * 8 & \text{for RS} \\ N_{OCTETS} * 8 + N_{FEC} * 672 * (1 - R_{FEC}) & \text{for LDPC} \end{cases}$$

The number of BPSK (QPSK) symbols after constellation mapping, $N_{B(Q)PSK}$ is:

$$N_{B(Q)PSK} = \frac{N_{ebits}}{N_{NBPS}}$$

where N_{NBPS} is the number of bits per symbol. The total number of chips, N_{chips} , after spreading is given by:

$$N_{chips} = N_{B(Q)PSK} * SF$$

where SF is the spreading factor as specified in 12.2.2.3. The total number of sub-blocks, $N_{sub-blocks}$, can be computed as:

$$N_{sub-block} = \text{ceil}\left(\frac{N_{chips}}{N_{burst} - N_{pw}}\right).$$

Finally, the number of stuff chips, N_{stuff} , is:

$$N_{stuff} = N_{sub-block} * (N_{burst} - N_{pw}) - N_{chips}.$$

The stuff bits ~~chips~~ may be set to either zero or one ~~shall be set to zero~~ and shall be ignored when the frame is received. Note that the stuff bits ~~chips~~ are not a part of either the HCS or FCS calculation. ~~A compliant PHY shall add enough stuff bits so that the payload data plus stuff bits is an integer multiple of all the $NDBES$, $NNBPS$, and $NNLSB$.~~