8.17.12.1 Packet structure

IEEE 802.15.4 defines an on-the-air frame/packet that is different from what is used in Bluetooth Low Energy.

The following figure provides an overview of the physical frame structure and its timing.

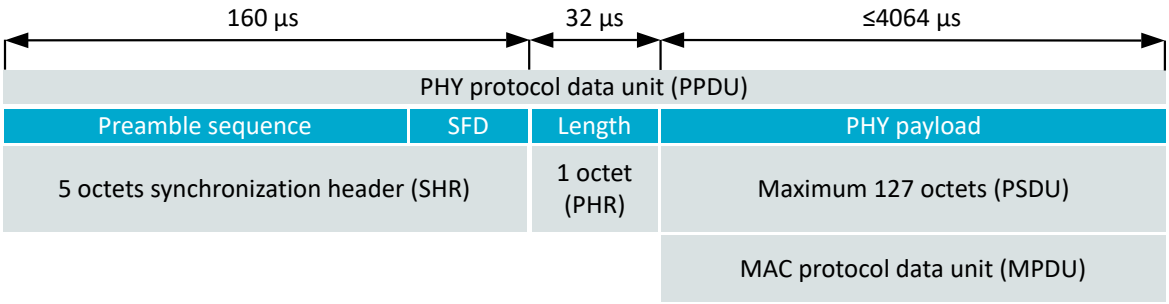

Figure 123: IEEE 802.15.4 frame format (PPDU)

The standard uses the term octet for an 8-bit storage unit within the PPDU. For timing, the value `symbol` is used, and it has a duration of 16 µs.

The total usable payload (PSDU) is 127 octets, but when CRC is in use, this is reduced to 125 octets of usable payload.

The preamble sequence consists of four octets that are all `0` and are used for synchronizing the RADIO peripheral's receiver. Following the preamble is the single octet start of frame delimiter (SFD), with a fixed value of `0xA7`. An alternate SFD can be programmed through the SFD register, providing an initial level of frame filtering when non-standard compliance is chosen. It is a valuable feature when operating in a congested or private network. The preamble sequence and the SFD are generated by RADIO and are not programmed by the user into the frame buffer.

Following the five octet synchronization header (SHR) is the single octet PHY header (PHR). The least significant seven bits of PHR denote the frame length of the following PSDU. The most significant bit is reserved and is set to `0` for frames that are standard compliant. RADIO reports all eight bits which can be used to carry additional information. The PHR is the first byte written to the frame data memory pointed to by PACKETPTR. Frames with zero length are discarded, and the FRAMESTART event is not generated in this case.

The next N octets carry the data of the PHY packet, where N equals the value of the PHR. For an implementation also using the IEEE 802.15.4 medium access control (MAC) layer, the PHY data is a MAC frame of N-2 octets, because two octets occupy a CRC field.

An IEEE 802.15.4 MAC layer frame consists of the following:

- A header, which is composed of the following:
  - The frame control field (FCF)
  - The sequence number
  - Addressing fields
- A payload
- The 16-bit frame control sequence (FCS)