

Project: IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs)

Submission Title: [Preamble Comments Resolution]

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Abstract: [SC & HSI preambles resolution]

Purpose: [Solve comments related to SC & HSI preambles]

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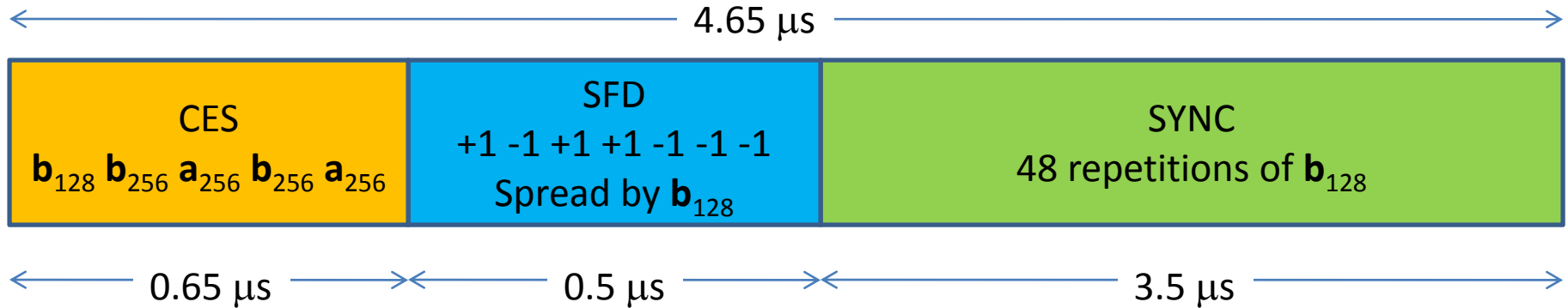
Comments Related To

- Preambles
- Header
- Pilot word length

Golay Codes

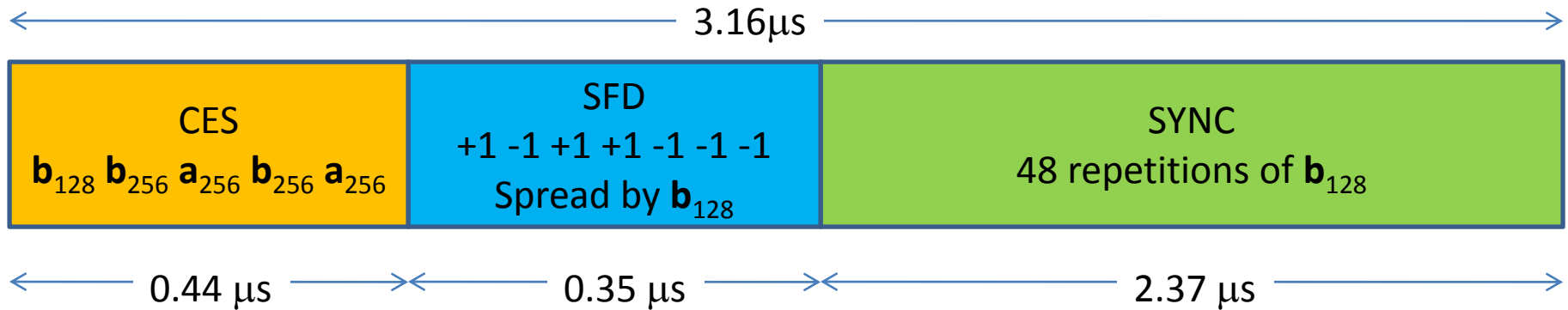
- Length 8 codes
 - a8 = EB (B first in time B = 1 0 1 1 (right is lsb and is first in time))
 - b8 = D8
- Length 64 codes
 - a64 = 63AF05C963500536
 - b64 = 6CA00AC66C5F0A39
- Length 128 codes
 - a128 = 0536635005C963AFFAC99CAF05C963AF
 - b128 = 0A396C5F0AC66CA0F5C693A00AC66CA0
- Length 256 codes
 - a256 = [a128 b128]
 - b256 = [a128 not(b128)] (not \Leftrightarrow 0 becomes 1 and 1 becomes 0)

CMS Preamble



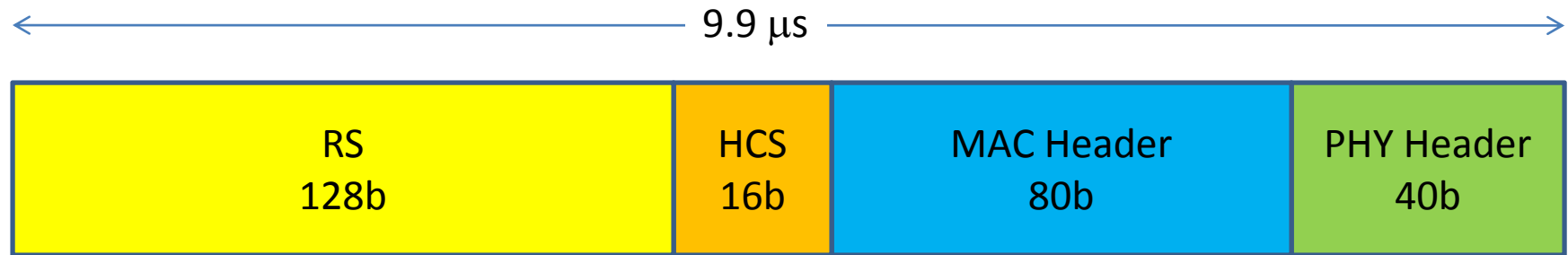
- SYNC = 48 repetitions of \mathbf{b}_{128}
- SFD = $[+1 -1 +1 +1 -1 -1 -1]$ (right transmitted first) spread by \mathbf{b}_{128}
 - SFD = $[+1 +1 +1 -1 -1 +1 -1]$ is used in CAP to indicate HR SC transmission with MR header
- CES = $[\mathbf{b}_{128} \mathbf{b}_{256} \mathbf{a}_{256} \mathbf{b}_{256} \mathbf{a}_{256}]$ (\mathbf{a}_{256} first in time)
- Overall preamble length \Leftrightarrow 64 Golay code \mathbf{b}_{128}
- Preamble duration = 4.6545 μs
- Designed for multipath 10ns r.m.s. delay spread with
 - Detection probability = 99.99%
 - False alarm probability = 1%

HSI MCS0



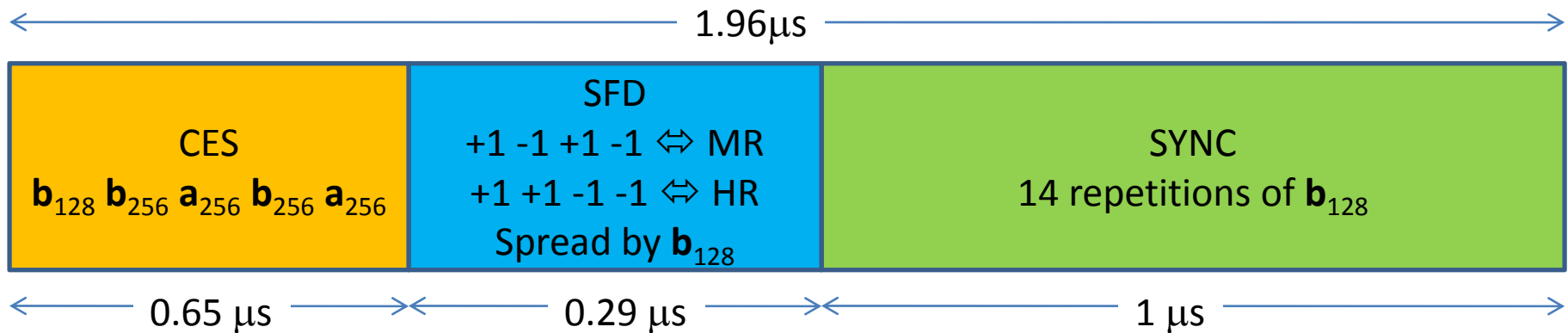
- Total duration
- Sample rate is unchanged: 2592 MHz

CMS Header (No change)



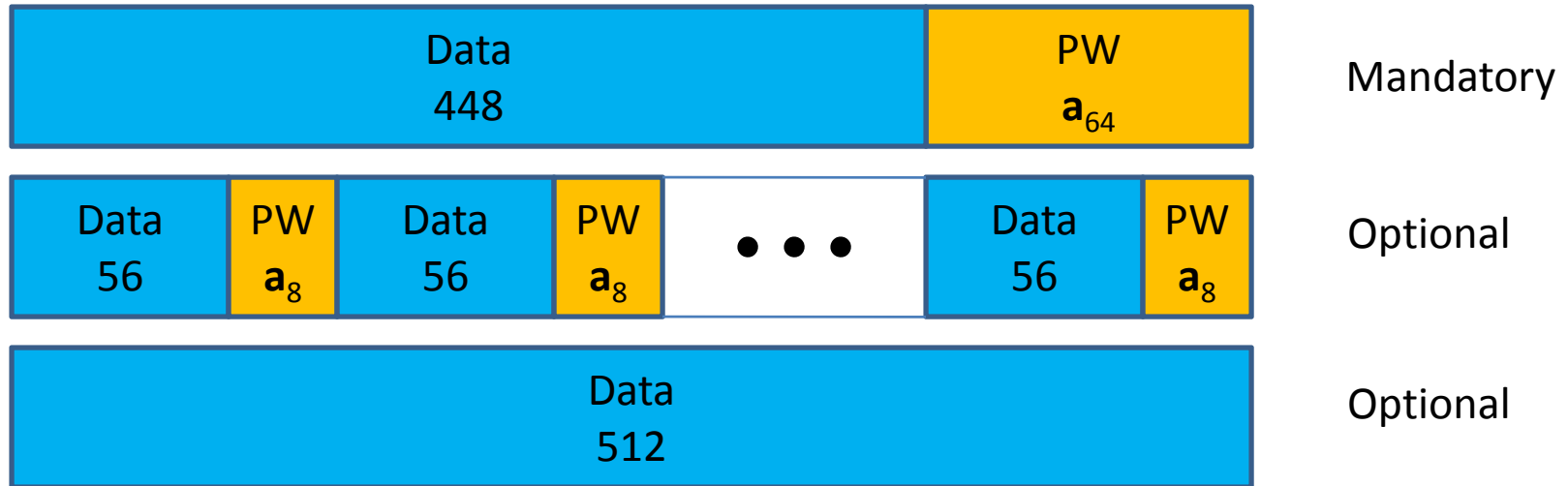
- CMS header is too long to be used for HR data packets in CAP.
- If we were to use CMS preamble for all transmissions in CAP than it is better to define an extra field (we are not adopting this):
 - Duration 8b (in μs)
 - Header mode 2b (00 ⇔ CMS, 01 ⇔ MR, 10 ⇔ HR),
 - CRC 1 bit
 - Encoding Ham(15,11)
 - Spreading with \mathbf{a}_{64}

High Data Rate Preamble (SC & HSI)



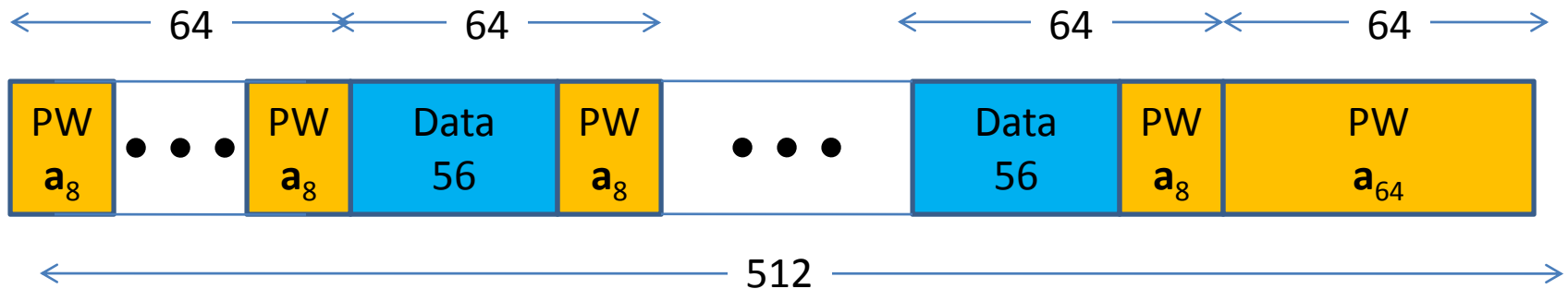
- SFD = $[+1 -1 +1 -1]$ (-1 first in time) means MR (medium rate) header
- SFD = $[+1 +1 -1 -1]$ (-1 first in time) means HR (high rate) header
- Durations shown are for SC (not HSI)

Sub-block with $PW = 8$



- The first 2 options have the same data rate
 - Option 1 is for long delay spread
 - Option 2 is for low power near-LOS
 - Option 3 is for pure LOS
 - 2 bits in the PHY header to indicate the modes
 - Receive status field should be 2 bits
 - Add it as well to capability IE

SC High Rate Header



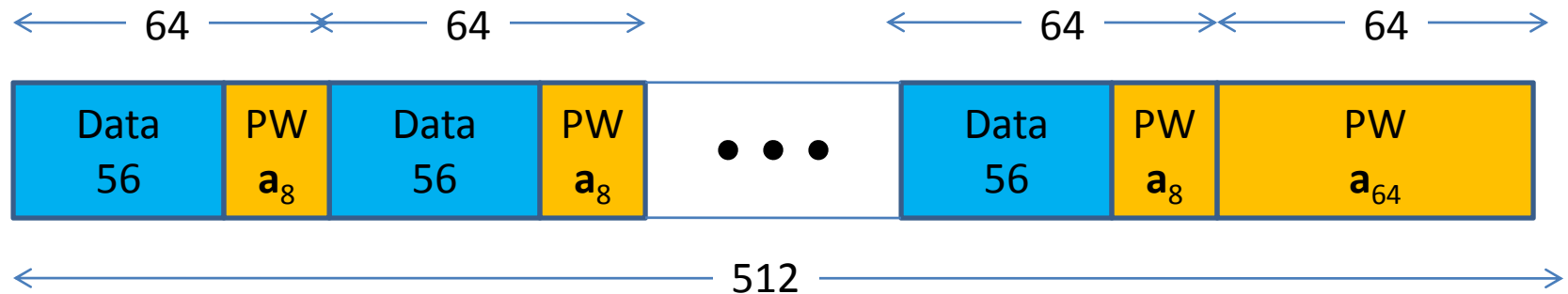
- MR (Medium Rate) header
 - Spreading factor = 6
 - Number of occupied sub-blocks = 5
 - Number of stuff bits = 16 bits (96 chips)
 - Header rate = 181.5 Mbps
- HR (High Rate) header
 - Spreading factor = 2
 - Number of occupied sub-blocks = 2
 - Number of stuff bits = 72 bits (144 chips)
 - Header rate = 453.75 Mbps

CAP rules

- SC in regular & directional CAPs
 - CMS preamble
 - SFD = [+1 -1 +1 +1 -1 -1 -1] \Leftrightarrow CMS frame
 - SFD = [+1 +1 +1 -1 -1 +1 -1] \Leftrightarrow MCS > 0
 - MCS > 0
 - MR header
 - MCS = 0
 - CMS header

- HSI in regular & directional CAPs
 - MCS0 preamble
 - SFD = [+1 -1 +1 +1 -1 -1 -1] \Leftrightarrow MCS0 frame
 - SFD = [+1 +1 +1 -1 -1 +1 -1] \Leftrightarrow MCS > 0
 - Any MCS

Appendix



- This works (with FDE) if $a_8 =$ first 8 bits of a_{64}
- However we want to keep it simple and for the header it does not buy anything