

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

Submission Title: [Resolutions to Comments on CMS and Preambles]

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Abstract: [Resolutions to Comments on CMS and Preambles]

Purpose: [This document provides proposed resolution fro some comments on 802.15.3c/DF00]

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- **Comment 447, 463, 621:** Improve preamble/SFD/CES and coding of LR1 to get to 10m range with acceptable link margin
- **Resolution:**
 - SYNC: 96 repetitions of s128
 - SFD : [-1 -1 -1 1 -1 1 -1 -1] spread by s128
 - CES : \mathbf{a}_{pre} \mathbf{a}_{256} (8 times) \mathbf{a}_{pos} \mathbf{b}_{pre} \mathbf{b}_{256} (8 times) \mathbf{b}_{pos}
 - Spreading length = 64
 - \mathbf{a}_{64} and \mathbf{b}_{64} are used but not for 2 bits/symbol
 - FEC : RS(255,239) + Ham(12,8)
 - CCA : 6 microseconds

- Hamming Generator matrix

 $G = [$

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|----|
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 |
| 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0] |

- **Link Budget with improved CM:**
- **Assumptions**
 - NF = 10 dB,
 - GTx = GRx = 3dB, (antenna gains)
 - Propagation Loss Index = 2.5
- **Results**
 - Range = 10 m
 - Link Margin (including Shadow margin) = 8.2 dB

- **Comment 411, 412, 619, 623:** The use of preamble type bits needs to be clarified. In order for this to work in an interoperable manner, the transmitting station needs to understand what type of preamble the receiving station is expecting. The transmitting station can only change the preamble type after a frame has been ack'd. This can get very complicated, especially when multiple receiving stations and a block ack mechanism is used.
- Can we simplify the number of options in this preamble? This is too difficult to implement.

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- **Comments** 340, 346, 607, 608, 621:

SFD size & CES size, SYNC size

- **Resolution**

Common mode is used for signaling only
for data the number of preamble options is reduced
to two:

Medium preamble

SYNC = 32 repetitions of a₁₂₈

SFD = [-1 +1 +1 -1] spread by a₁₂₈ (low rate
header)

= [-1 -1 +1 +1] spread by a₁₂₈ (high rate
header)

CES = a_{pre} a₂₅₆(2 repetitions) a_{pos} b_{pre} b₂₅₆(2
repetitions) b_{pos}

Short preamble (assume high rate header)

SYNC = 8 repetitions of a₁₂₈

SFD = [-1 +1 -1 +1] spread by a₁₂₈

CES = a_{pre} a₁₂₈(1 repetition) a_{pos} b_{pre} b₁₂₈(1 repetition) b_{pos}

Beamforming effect: Default preamble & short preamble are used in beamforming

Header

The header uses a concatenation of RS & Ham(12,8)

Low rate header : spreading factor = 4

High rate header: spreading factor = 2

- CID 413
- How does a receiving station know which SYNC sequence to expect? Is it expected to receive frames using any of these?
- **Resolution:**
- Accept in principle: Resolve as indicated in CID 415.