

# L-LENGTH Equation Update

Date: 2015-11-08

## Authors:

| Name                       | Affiliations                       | Address   | Phone           | email  |
|----------------------------|------------------------------------|---|-----------------|--|
| Hongyuan Zhang<br>Lei Wang | Marvell                            | 5488 Marvell<br>Lane, Santa<br>Clara, CA 95054      |                 | <a href="mailto:hongyuan@marvell.com">hongyuan@marvell.com</a><br><a href="mailto:leileiw@marvell.com">leileiw@marvell.com</a> |
| Li Hsiang Sun              | InterDigital<br>Communication Inc. | 2 Huntington<br>Quadrangle<br>Melville, NY<br>11747 | +1 631.622.4125 | Lihsiang.Sun@interdigital.com  |
| Hanqing Lou                |                                    |   | +1 631.622.4012 |  |
| Frank La Sita              |                                    |   | +1 631.622.4042 |  |
| Oghenekome Oteri           |                                    |   | +1 858.210.4826 |  |
| Joseph Levy                |                                    |   | +1 631.622.4139 |  |

# Current L-LENGTH Equation in SFD [1]

$$L\_LENGTH = \left\lceil \frac{TXTIME - 20}{4} \right\rceil \times 3 - 3 + m, \quad m = 1 \text{ or } 2$$

$$TXTIME = T_{L\_PREAMBLE} + T_{HE\_PREAMBLE} + T_{HE\_DATA} + T_{PE}$$

$$T_{HE\_DATA} = T_{HE\_SYM} \times N_{SYM} = (12.8 + T_{GI}) \times N_{SYM}$$

## Issues

- 11ax “spoofs” the legacy Non-HT/HT/VHT devices as if an 11a/g PPDU.
- According to Clause 18, it is desirable to make legacy devices assuming the number data symbols in non-HT PPDU as:

$$N_{SYM, Non-HT} = \left\lceil \frac{8 \cdot L\_LENGTH + 16 + 6}{24} \right\rceil = \left\lceil \frac{TXTIME - 20}{4} \right\rceil$$

- With current 11ax L-LENGTH equation, we get (desired NSYM)

$$N_{SYM, Non-HT} = \left\lceil \frac{8 \cdot \left( \left\lceil \frac{TXTIME - 20}{4} \right\rceil \times 3 - 3 + m \right) + 16 + 6}{24} \right\rceil$$

$$= \left\lceil \left[ \frac{TXTIME - 20}{4} + \frac{m}{3} - 0.08 \right] + 1, \text{ for } m = 1 \text{ or } 2 \right\rceil$$

## Proposed Change

- Propose to change the L-LENGTH equation to

$$L\_LENGTH = \left\lceil \frac{TXTIME - 20}{4} \right\rceil \times 3 - 3 - m, \quad m = 1 \text{ or } 2$$

**RX:**

$$N_{SYM} = \left\lceil \frac{\left( \frac{L\_LENGTH + m + 3}{3} \times 4 - T_{HE\_PREAMBLE} \right)}{T_{SYM}} \right\rceil - b_{PE\_Disabbiquty}$$

$$T_{PE} = \left\lceil \frac{\left( \frac{L\_LEGNTH + m + 3}{3} \times 4 - T_{HE\_PREAMBLE} \right) - N_{SYM} \times T_{SYM}}{4} \right\rceil \times 4$$

- Therefore at legacy devices

$$N_{SYM, Non-HT} = \left\lceil \left\lceil \frac{TXTIME - 20}{4} \right\rceil - \frac{m}{3} - 0.08 \right\rceil = \left\lceil \frac{TXTIME - 20}{4} \right\rceil$$

## Straw Poll

- Do you agree to make the following changes **in red**, on the equations in Section 3.3.5 of TGax SFD?

$$L\_LENGTH = \left\lceil \frac{TXTIME - 20}{4} \right\rceil \times 3 - 3 - \mathbf{m}, m = 1 \text{ or } 2$$

$$TXTIME = T_{L\_PREAMBLE} + \mathbf{T_{HE\_PREAMBLE}} + T_{HE\_DATA} + T_{PE}$$

$$N_{SYM} = \left\lceil \frac{\left( \frac{L\_LENGTH + \mathbf{m} + 3}{3} \times 4 - T_{HE\_PREAMBLE} \right)}{T_{SYM}} \right\rceil - \mathbf{b_{PE\_Disambiguity}}$$

$$T_{PE} = \left\lceil \frac{\left( \frac{\mathbf{L\_LENGTH} + \mathbf{m} + 3}{3} \times 4 - T_{HE\_PREAMBLE} \right) - N_{SYM} \times T_{SYM}}{4} \right\rceil \times 4$$

## References

- [1] 11-15-0132-09-00ax-spec-framework