**IEEE P802.15**

**Wireless Personal Area Networks**

|  |  |  |
| --- | --- | --- |
| Project | IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs) | |
| Title | **J.7 HA-QL Decoding guidance** | |
| Date Submitted | September 2017 | |
| Source | Trang Nguyen, Thanh Luan Vu, Yeong Min Jang (Kookmin University) |  |
| Re: | D4 comment resolution | |
| Abstract | Provide additional text for Annex decoding guidance (Normative text) | |
| Purpose | D4 comment and resolution | |
| Notice | This document has been prepared to assist the IEEE P802.15. It is offered as a basis for discussion and is not binding on the contributing individual(s) or organization(s). The material in this document is subject to change in form and content after further study. The contributor(s) reserve(s) the right to add, amend or withdraw material contained herein. | |
| Release | The contributor acknowledges and accepts that this contribution becomes the property of IEEE and may be made publicly available by P802.15. | |

# Annex J.7

(Normative)

**J.7 HA-QL decoding method**

|  |
| --- |
| Trang’s note:   * Black text: No update * Red text and the second figure: are to add |

### J.7.1 Rx Oversampling requirement

Rx with frame rate no less than three times the optical clock rate is used to demodulate HA-QL code. The Rx extracts the code area and then it extracts the m×n matrix of intensity with the number of hidden cells m×n is read from the PHY PIB attribute *phyHAqlNoCells*.

The matrix of intensity is extracted by comparing a data embedded image to its adjacent reference image (see Figure TBD1)



Figure TBD1- Illustration of a reference image and a data-embedded image

### J.7.2. Downsampling method using Ab

Assume that the Rx frame rate is N times the Tx optical clock rate. The Ab subtraction between two samplings is applied for the downsampling process as follows:

∆Ab(i) = Sampling(i) – sampling(i-N) applied for all samplings

Based on the sign of Ab subtraction, the downsampling decision is made (see Figure TBD2).



Figure TBD2- Illustration of the downsampling process for HA-QL