**IEEE P802.15**

**Wireless Personal Area Networks**

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| 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 |
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# Annex J.7

(Normative)

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

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

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