**IEEE P802.15**

**Wireless Personal Area Networks**

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| Project | IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs) |
| Title | **Kookmin Suggested Hybrid rolling shutter signal for OCC system** |
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| Re: |  |
| Abstract | Suggested the Hybrid rolling shutter signal for OCC system |
| Purpose | Suggested the Hybrid rolling shutter signal for OCC system |
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# **Introduction**

C-OOK stands for Camera- On Off Keying, a communication mode within the IEEE 802.15.7-2018 Optical Wireless Communication standard. Particularly, C-OOK is within the PHY V layer of IEEE 802.15.7-2018 standard.

Orthogonal Frequency-Division Multiplexing (OFDM) is a digital multi-carrier modulation scheme that is employed in broadband wired and wireless communication as an effective solution with Inter-Symbol Interference (ISI) caused by a multipath channel. Rolling Shutter OFDM scheme was proposed to take advantage of OFDM waveform for OCC system.

Hybrid waveform will be proposed by combining two waveforms: C-OOK and OFDM for indoor applications. With this scheme, two waveforms will be decoded with just one rolling shutter camera.

# **System Architecture**



Reference architecture of Hybrid Rolling Shutter signal for Optical Camera Communication

The OFDM and the OOK waveforms can transmit via single LED via hybrid waveform. C-OOK scheme was shown as a candidate for the low-rate stream. The high-rate data stream, based on the OFDM waveform, was embedded into the C-OOK waveform in both the high period and the low period of the C-OOK scheme. With single camera, we can receive two signals from single LED via hybrid waveform.

# **Data packet structure**



Data frame structure of hybrid OFDM-OOK scheme. (a) OOK packet. (b) OOK data (c) hybrid signal (d) OFDM signal.

In each ‘high’ and ‘low’ period of C-OOK waveform, we can embed the high-frequency OFDM waveform to increase data rate of the system.

In the low data rate stream, we apply the C-OOK frame as the above figure. With high data rate stream, each period of C-OOK waveform will be put one OFDM frame to generate hybrid waveform.