**IEEE P802.15**

**Wireless Personal Area Networks**

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| Project | IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs) | |
| Title | Comments on Low Rate PD of | |
| Date Submitted | [July 13, 2015] | |
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| Abstract |  | |
| Purpose |  | |
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1. **Definition**
2. **General Guidelines**
3. **Introduction**
4. **Optical Wireless Communication**

# Image Sensor Receiver

# High-speed Photodiode Receiver

# Low Speed Photodiode Receiver

## Applications/Use cases

The following Low Speed Photodiode Receiver applications/use cases were presented in response to TG7r1 Call for Applications.

C1 Underwater/Seaside Communication [8]

C2 secure point-to-(multi)point communication [5, 8, 9]

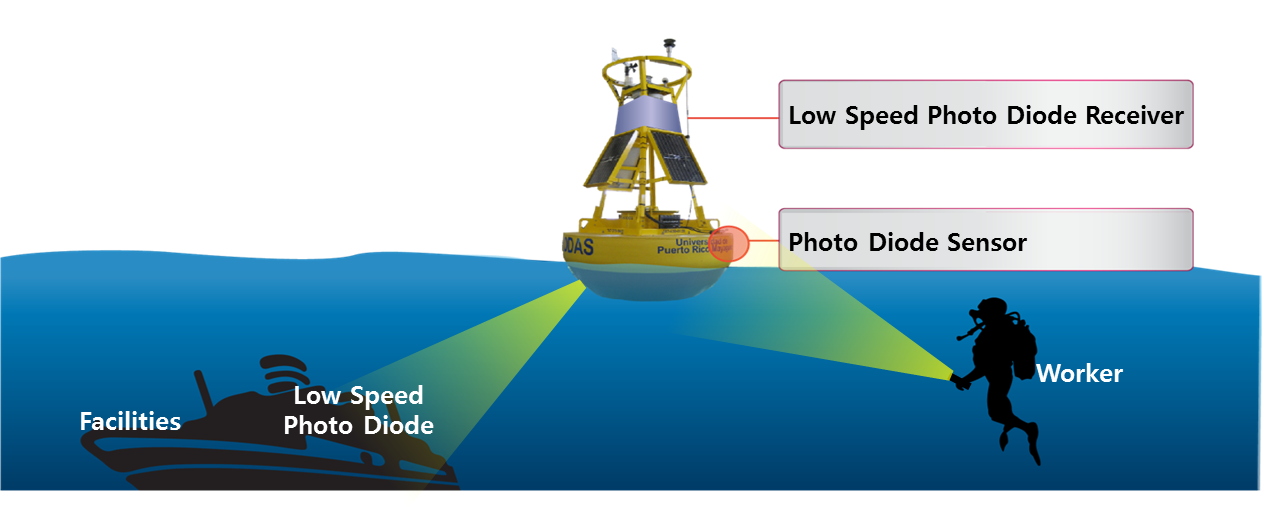
C3 Digital signage [5, 8, 17]

C4 D2D/IoT [5, 9]

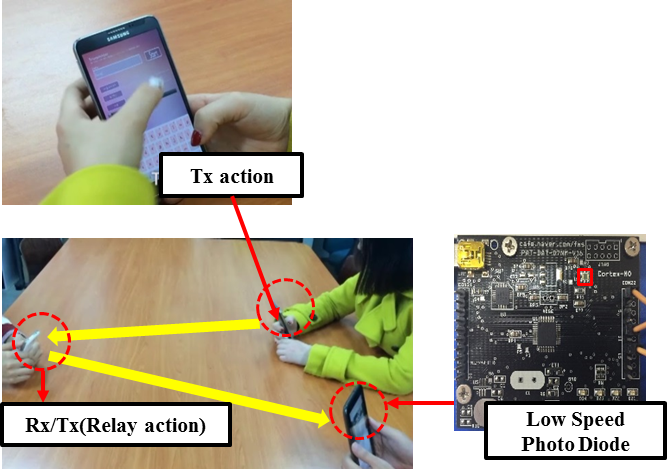
C5 LOS Authentication [5, 17]

C6 Identification based service [20, 21]

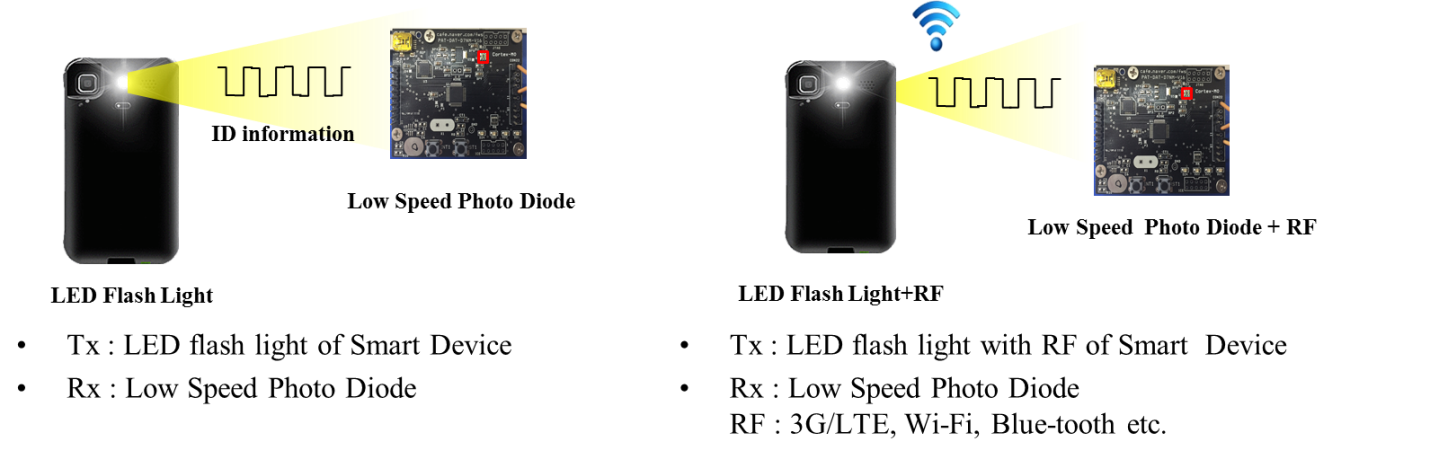
The standard will consist of multiple PHY/MAC modes to meet the following variety of Low Speed Photodiode Receiver requirements where the receiver consists of photodiode.



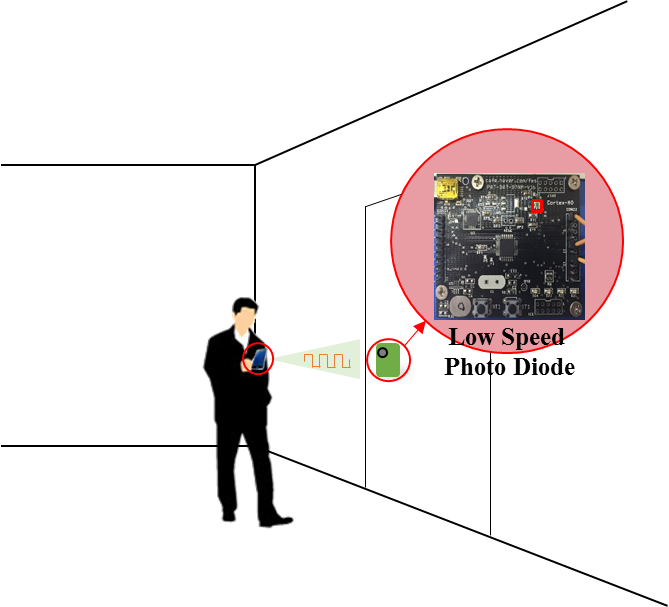
C1 : Underwater/Seaside Communication

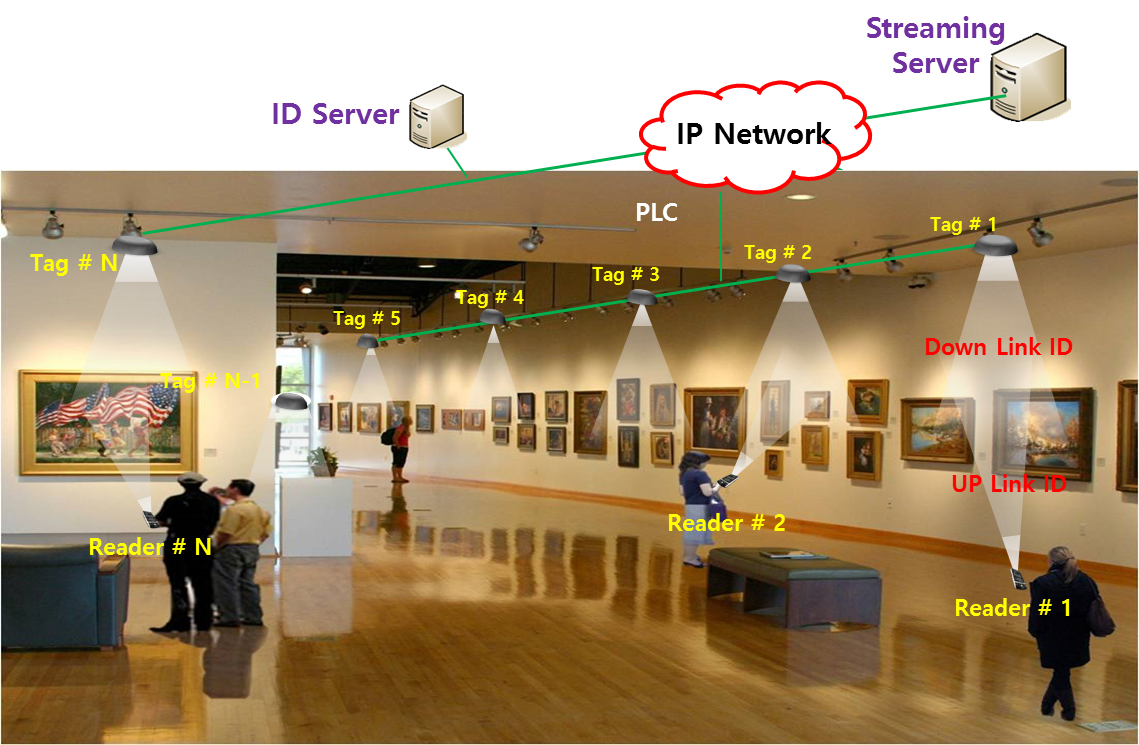
C2 : Secure point-to-(multi)point communication C3 : Digital signage



C4 : D2D/IoT



C5 : LOS Authentication



C6: Identification based service

## Transmitter

The standard should support the LED Tags, Smart Phone Flash lights, Lighting source, etc. for various applications.

|  |  |
| --- | --- |
| **Device** | **Applications/Use cases** |
| Smart Device Flash light | C2, C4, |
| Lighting source | C1, C3,C5,C6 |

## Receiver

The standard will support Low Speed Photodiode Receiver. It measures intensity of visible light, IR and/or near UV, as receiver.

## Carrier Wavelength

Carrier wavelength will be limited in visible light, IR and near UV frequency band.

## Transfer mode

The standard may provide multiple PHY/MAC modes that allow the optimal use of the available optical bandwidth on a given luminaire for C1 – C6.

**D2D/IoT data transmission and Relay mode** with ID information with PHY/ MAC frame for applications C2, C3, C4, C5 and C6.

**Uni/Bi-directional data transfer mode** for applications C1 – C6..

## Eye safety and Flicker

The modulated light will be safe for human eye in the aspects of frequency and intensity of light. And the modulated light will not stimulate sickness such as photosensitive epilepsy.

The standard will support at least one flicker free PHY mode, in which the modulation is imperceptible for human eye, for application C1 – C6. The standard may allow flicker PHY mode for application C1 – C6.

## Dimming Control

The standard will support dimming control for all of applications

## Communication Range

The communication range depends on multiple external factors (signal magnification, signal collimation, source power, etc.). These are implementation aspects and these numbers are provided as guidelines only.

## Handover, link recovery and Interference Coordination

The standard may provide mechanisms to support handover between LED light sources, allowing the users to maintain a continuous network connection.

The standard may provide mechanisms that can be used to develop and deliver interference coordination techniques by higher layers.

The standard may support link recovery mechanism to maintain connection in unreliable channel for reducing the connection delay.

## Localization

The standard may provide mechanisms to support indoor positioning algorithms from Identification of LEDs system.

## Coexistence with Ambient Light

The standard will co-exist with ambient light that may be reflected on a surface of a transmitter and with existing 15.7 PHY modes.

## Coexistence with Other Lighting Systems

The standard will co-exist with other lighting systems.

## Identification of Transmitter

The standard will support a scheme to identify transmitters’ ID information. A receiver can trace a transmitter identification (ID) using Low Speed Photodiode Receiver system.

# Referes.nces

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