**IEEE P802.15**

**Wireless Specialty Networks**

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| Project | IEEE P802.15 Working Group for Wireless Specialty Networks (WSNs) | |
| Title |  | |
| Date Submitted | [14 Jan. 2020] | |
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| Re: | [IEEE 802.15 TG13 Coexistence Assurance Document]] | |
| Abstract | [IEEE 802.15 TG13 Coexistence Assurance Document] | |
| Purpose | [Fulfillment of Commitment to the TG13 CSD] | |
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# Introduction

This document is supplemental to IEEE Std 802.15.13 and describes the coexistence properties of IEEE Std. 802.15.13, a standard operating in the optical spectrum. The main features related to coexistence are the management of the optical wireless network, medium access (MAC) layer operation in beacon-enabled and non-beacon-enabled mode, and the use of three physical (PHY) layers denoted as pulsed modulation (PM) PHY, low bandwidth (LB) PHY and high bandwidth (HB) PHY. While the standard describes the MAC and PHY layers, the focus of this document is on coexistence.

# Background

**Excerpts from 802.15.13 PAR (doc. 15-17/0076r2)**

**Title:** IEEE Standard for Information Technology - Telecommunications and Information Exchange Between Systems – Local and Metropolitan Area Networks - Specific Requirements - Part 15.13: Multi-Gigabit per Second Optical Wireless Communications (OWC) with Ranges up to 200 meters

**5.2 Scope:** This standard defines a Physical (PHY) and Media Access Control (MAC) layer using light wavelengths from 10,000 nm to 190 nm in optically transparent media for optical wireless communications. The standard is capable of delivering data rates up to 10 Gbit/s at distances in the range of 200 meters unrestricted line of sight. It is designed for point to point and point to multi point communications in both non-coordinated and coordinated topologies. For coordinated topologies with more than one peer coordinator there will be a master coordinator. The standard includes adaptation to varying channel conditions and maintaining connectivity while moving within the range of a single coordinator or moving between coordinators.

**5.4 Purpose:** The purpose of this standard is to define OWC specifications in optically transparent media enabling high data rate transfer among end points at rates up to 10 Gbit/s and ranges up to 200 meters unrestricted line of site and which are capable of meeting the needs of industrial and similar classes of applications requiring, secure, high performance, high data rate communications which are non-interfering with existing RF systems.

# Coexistence of 802.15.13 with other standards.

Light does not interfere with RF communication but operates in an orthogonal part of the electromagnetic spectrum.

The propagation of light is confined within the illuminated area, typically spanning a few meters diameter of illuminated area. In addition, the directivity of light helps minimizing interference with neighboring networks.

Prior to starting a new network, coordinators are mandated to ensure that there are no overlapping OWC networks in operation.

The currents standards in the light spectrum are

* Remote controls
  + Remote controls are narrowband and their modulation spectrum is not relevant for 802.15.13 which operates at higher modulation frequencies on all its PHYs.
* IrDA in various variants up to GigaIR
  + IrDA has found mass market adoption in 1990s was IrDA, operating in the infrared. Modern devices replaced IrDA by Bluetooth and 802.11. Given the rapid replacement of mobile devices in the market, it can be concluded that IrDA is no longer relevant in the market, i.e. there is no need to consider coexistence by 802.15.13.
* IEEE 802.15.7-2018
  + 802.15.7-2018 defined wireless communication in the optical spectrum. It can be operated in PHY I-PHY III with photodiode receivers and in PHY IV, V and VI using optical cameras. PHY I and PHY IV-VI operate at lower modulation frequencies, which are not relevant for 802.15.13. PHY II and PHY III were never adopted by the market. Hence, there is no need to consider coexistence by 802.15.13.
* ITU-T G.9991
  + Coexistence between the two systems can be ensured by spatial separation or by using different optical wavelengths.
* IEEE P802.11bb
  + Coexistence between the two systems can be ensured by spatial separation or by using different optical wavelengths.

# Conclusion

The 802.15.13 task group believes that the standard will be able to coexist with G.9991, which is the only relevant standard in the field of optical wireless communications so far. Appropriate means to coexist are to use dedicated wavelength and spatial separation.