**IEEE P802.15**

**Wireless Specialty Networks**

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| Project | IEEE P802.15 Working Group for Wireless Specialty Networks (WSNs) | |
| Title | **<IEEE802.15.13 Coexistence Assurance Document**> | |
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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 802.15.13-2019 and describes the coexistence properties of IEEE Std. 802.15.13. The standard document provides an overview of the standard operating in the light spectrum and its features which include:

* Star network and related topologies and architecture
* OWPAN management
* MAC with Beacon-enabled and Non-beacon enabled channel access
* Aggregation, Adaptive transmission, Multi-OFE feedback
* MAC frame formats and MAC services
* PHY layer specifications for PM PHY, LB PHY and HB PHY

This document will describe the 802.15.13 Media Access Control (MAC) sublayer and the three PHY layers and discuss their impact on coexistence.

# Background

**Excerpts from 802.15.13 PAR**

**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.

**5.5 Need for the Project:** Given the growing expectation of ubiquitous wireless connectivity in industrial environments, the need for unlicensed, high bandwidth, easy-to-use wireless communications technology, immune to radio frequency (RF) interference and which does not overload existing RF spectrum or necessarily require additional hardware, has never been greater. This standard specifically addresses these needs. In particular, optical wireless based solutions to this problem address a significant opportunity, extending to billions of existing 1 industrial devices, to provide secure, non RF based communications between industrial devices and/or between industrial devices and fixed infrastructure on a one to one, or one to many or many to one basis at acceptable data rates. Potential applications include control of mobile robots in manufacturing cells or on assembly lines, automated guided vehicle systems, small cell backhaul, security monitoring in petrochemical plants, secure communications in nuclear facilities and hospitals, etc.

**Excerpt from 802.15.13 CSD document (15-17-0075-01)**

1. *“*Will the WG create a CA document as part of the WG balloting process as described in Clause 13? (yes/no) Yes*”*

# TG13 Overview

Task Group 13 is drafting a proposed standard for Multi-Gbit/s Optical Wireless Communications with main applications in industrial and similar wireless applications which require secure, high performance, high data rate communications which are non-interfering with existing RF systems.

The TG13 efforts have been categorized into the following groups: Defining a new PHY layer which enables operation in three modes using pulsed modulation, low-bandwidth OFDM and high-bandwidth OFDM and a new MAC layer which allows operation in beacon-enabled (BE) and non-beacon-enabled (NBE) operation modes to cover simple design for both low- and high-profile applications.

# 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. In addition, the high directivity helps minimizing interference with neighboring networks.

Prior to starting a new OWPAN, coordinators are mandated to ensure that there are no overlapping OWC networks in operation by means of energy detection.

However, in case of alien technologies entering the coverage area of an IEEE 802.15.13 OWPAN, devices are able to signal detected interference to the coordinator, which may take further measures.

Finally, the IEEE 802.15.13 standard supports one PHY type also used by ITU-T recommendation G.9991 (G.vlc), which however uses a different MAC. Coexistence between both standards is possible through specific PHY frame types.

# Conclusion

The 802.15.13 task group believes that the proposed standard will enhance network performance optimize the use of the light medium.