International Standard

ISO/IEC/IEEE 8802-15-7

First edition
2025-09

Information technology — Telecommunications and information exchange between systems — Local and metropolitan area networks — Specific requirements —

Part 15-7: Short-range optical wireless communications

Télécommunications et échange entre systèmes informatiques — Exigences pour les réseaux locaux et métropolitains —

Partie 15-7: Communications optiques sans fil à courte portée

Reference number
ISO/IEC/IEEE 8802-15-7:2025(en)

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Published in Switzerland

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IEEE Std 802.15.7™-2018
(Revision of
IEEE Std 802.15.7-2011)

IEEE Standard for Local and metropolitan area networks—

Part 15.7: Short-Range Optical Wireless Communications

Sponsor

LAN/MAN Standards Committee
of the
IEEE Computer Society

Approved 5 December 2018

IEEE-SA Standards Board

Abstract: A physical layer (PHY) and medium access control (MAC) sublayer for short-range optical wireless communications (OWC) in optically transparent media using light wavelengths from 10 000 nm to 190 nm are defined. The standard is capable of delivering data rates sufficient to support audio and video multimedia services and also considers mobility of the optical link, compatibility with various light infrastructures, impairments due to noise and interference from sources like ambient light, and a MAC sublayer that accommodates the unique needs of visible links as well as the other targeted light wavelengths. It also accommodates optical communications for cameras where transmitting devices incorporate light-emitting sources and receivers are digital cameras with a lens and image sensor. The standard adheres to applicable eye safety regulations.

Keywords: IEEE 802.15.7™, laser diode, LD, LED, light-emitting diode, OCC, optical camera communications, OWC, short-range optical wireless communications, visible light, visible-light communication, VLC

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PDF: ISBN 978-1-5044-5431-5 STD23483
Print: ISBN 978-1-5044-5432-2 STDPD23483

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Introduction

This introduction is not part of IEEE Std 802.15.7-2018, IEEE Standard for Local and metropolitan area networks—Part 15.7: Short-Range Optical Wireless Communications.

This edition is a revision of IEEE Std 802.15.7-2011 and broadens the standard's scope to include more optical wireless communications (OWC) technologies. This revision adds new clauses for physical layer (PHY) types IV, V, and VI (see Clause 13, Clause 14, and Clause 15) and several related annexes (see Annex G through Annex N).

In OWC, data is transmitted by intensity modulating optical sources, such as light-emitting diodes (LEDs) and laser diodes (LDs), faster than the persistence of the human eye. OWC merges lighting and data communications in applications such as area lighting, signboards, streetlights, vehicles, traffic signals, status indicators, displays, LED panel, and digital signage. This standard describes the use of OWC for optical wireless personal area networks (OWPANs) and covers topics such as network topologies, addressing, collision avoidance, acknowledgment, performance quality indication, dimming support, visibility support, colored status indication, and color stabilization.

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IEEE Standard for
Local and metropolitan area networks—

Part 15.7: Short-Range
Optical Wireless Communications

1. Overview

1.1 Scope

This standard defines a physical layer (PHY) and medium access control (MAC) sublayer for short-range optical wireless communications (OWC) in optically transparent media using light wavelengths from 10 000 nm to 190 nm. The standard is capable of delivering data rates sufficient to support audio and video multimedia services and also considers mobility of the optical link, compatibility with various light infrastructures, impairments due to noise and interference from sources like ambient light, and a MAC sublayer that accommodates the unique needs of visible links as well as the other targeted light wavelengths. It also accommodates optical communications for cameras where transmitting devices incorporate light-emitting sources and receivers are digital cameras with a lens and image sensor. The standard adheres to applicable eye safety regulations.

1.2 Purpose

This standard provides a global standard for short-range OWC. The standard provides the following:

— Access to several hundred terahertz of unlicensed spectrum.
— Immunity to electromagnetic interference and noninterference with radio frequency systems.
— For visible light systems, additional security by allowing the user to see the communication channel.
— Communication augmenting and complementing existing services (e.g., illumination, display, indication, decoration).

2. Normative references

The following referenced documents are indispensable for the application of this document (i.e., they must be understood and used; therefore, each referenced document is cited in text, and its relationship to this document is explained). For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments or corrigenda) applies.

ANSI/INCITS 373: Fiber Channel Framing and Signaling Interface (FC-FS).[1]

IEEE Std 802.15.4™-2015, IEEE Standard for Information technology—Telecommunications and information exchange between systems—Local and metropolitan area networks—Specific requirements—Part 15.4: Wireless Medium Access Control (MAC) and Physical Layer (PHY) Specifications for Low-Rate Wireless Personal Area Networks (LR-WPANs).[2,3]

ITU-T I.432.1, Series I: Integrated Services Digital Network, ISDN user-network interfaces—Layer 1RecommendationsB-ISDN user-network interface—Physical layer specification: General characteristics, http://www.itu.int/rec/T-REC-I.432.1-199902-I/en.[4]

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