

**P802. Project: IEEE 15 Working Group for Wireless Personal Area Networks (WPANs)**

**Submission Title:** [VLC Application: Optical Wireless LAN]

**Date Submitted:** [7 May 2009]

**Source:** [(1)Tom Matsumura, VLCC]

Address [(1)2-15-9 Nishigotanda Shinagawa-ku Tokyo 141-0031 Japan]

Voice:[(1)81-3-5437-5120]

E-Mail:[(1) tom@gci.co.jp]

**Re:** []

**Abstract:** [VLC Application for Optical Wireless LAN discussed in VLCC Japan.]

**Purpose:** [Contribution to IEEE 802.15 TG7]

**Notice:** This document has been prepared to assist the IEEE P802.15. It is offered as a basis for discussion and is not binding on the contributing individual(s) or organization(s). The material in this document is subject to change in form and content after further study. The contributor(s) reserve(s) the right to add, amend or withdraw material contained herein.

**Release:** The contributor acknowledges and accepts that this contribution becomes the property of IEEE and may be made publicly available by P802.15.

# VLC Application: Optical Wireless LAN

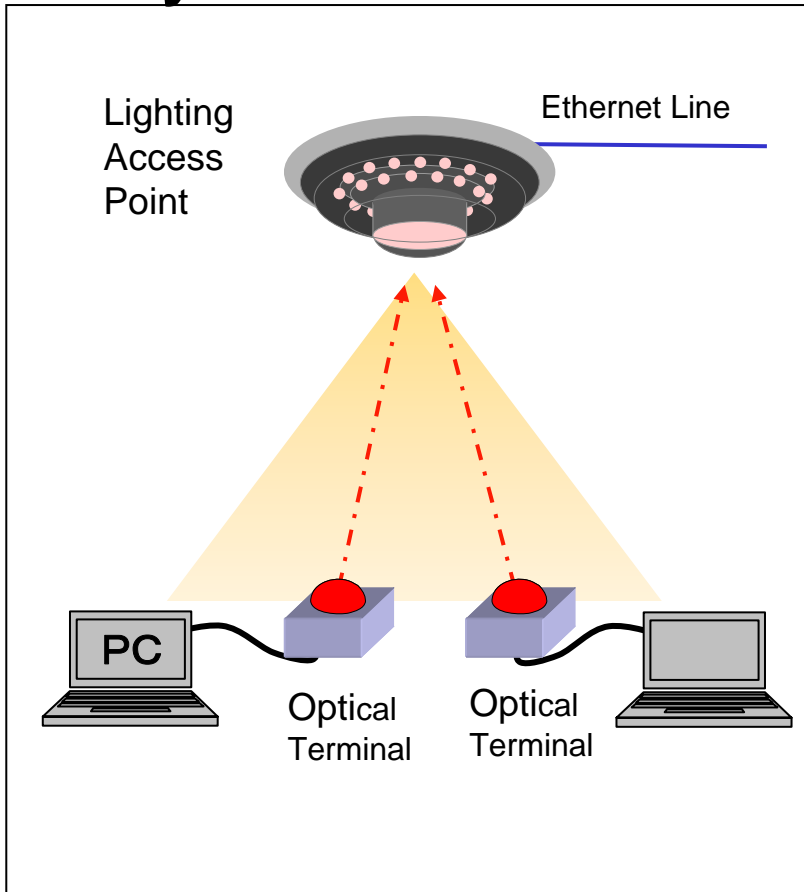
Tom Matsumura  
Executive Director

Visible Light Communications Consortium  
(Visible Light LAN WG)

Tokyo, Japan

# Optical Wireless LAN System (VLCC + ICOSA)

## System



## Features

- point to multipoint Wireless LAN through lighting access point
- Connect to Ethernet Line
- Based on ARIB (Association of Radio Industries and Businesses) STD-T50

[http://www.icsa.gr.jp/english/2007/e\\_article\\_030.htm](http://www.icsa.gr.jp/english/2007/e_article_030.htm)

# Optical Wireless LAN Specification

feature, type \ Trans. Speed	10M b p s	100M b p s
Transmission Topology	point to point, or point to multipoint	
Access Control	support CSMA/CD method network configuration	
Data Rate	10M b p s	100M b p s
Type of Trans. Signal	1 0 B A S E – T (Manchester encoding)	1 0 0 B A S E – F X (4B/5B encoding)
Transmitting Function	In case of available on signal data, transmit predefined signal type. Other case, hold idling signal or similar signal.	
Receiving Function	Predefined trans. signal is received, idling signal is sent back when no reception. Sensitivity is shown by $\mu\text{W} / \text{cm}^2$ or $\text{dBm}$	
Others	Loop back, collision detection and link confirmation function	

Specification of PHY Layer

item \	10M b p s	100M b p s
Optical media	assuming 400 ~ 1600nm, or other W.L. is available	
Optical device	LED or LD for trans. Device, PD or APD for receiving device	
Safety Regulation	Class 1 or Class 1M , defined by IEC60825-1	
Transmission area	1 ~ m	1 m ~ 3-4 km
Use environment	building/establishment	Indoor and overlooking area outside

Specification of Optical Transmission System

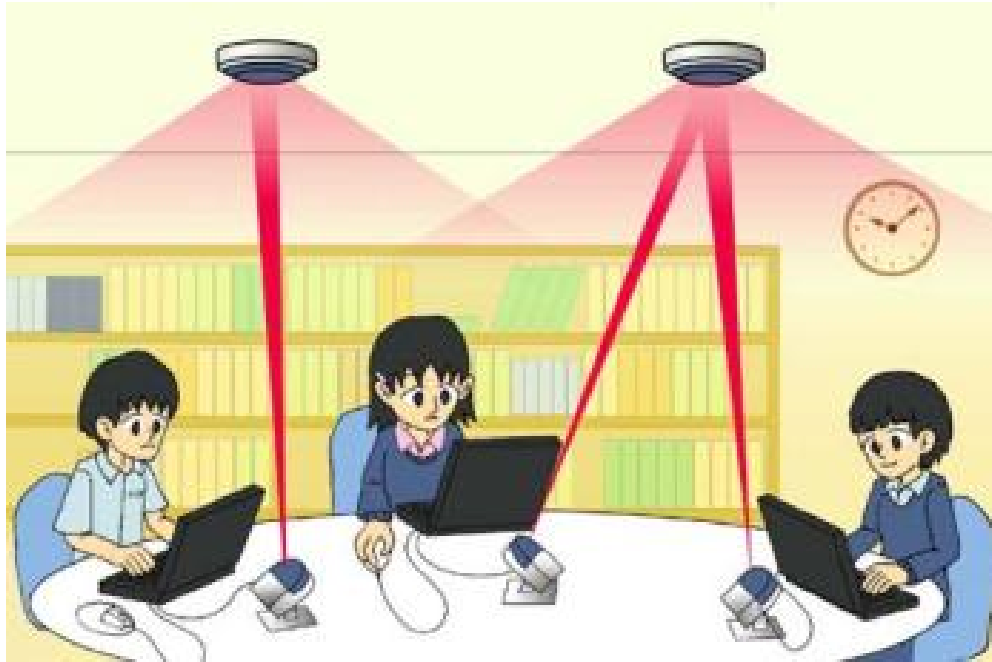
# Optical Wireless LAN application in office



## Feature

- The layout change and the movement are free because there is no cable.
- It is safe because there is no cable..
- The influence of the electromagnetic radiation is not received.
- It need not be do wiring work, and is inexpensive in the installation at time.
- The high-speed communications are more possible than the electric wave methods.
- The increase is easy.

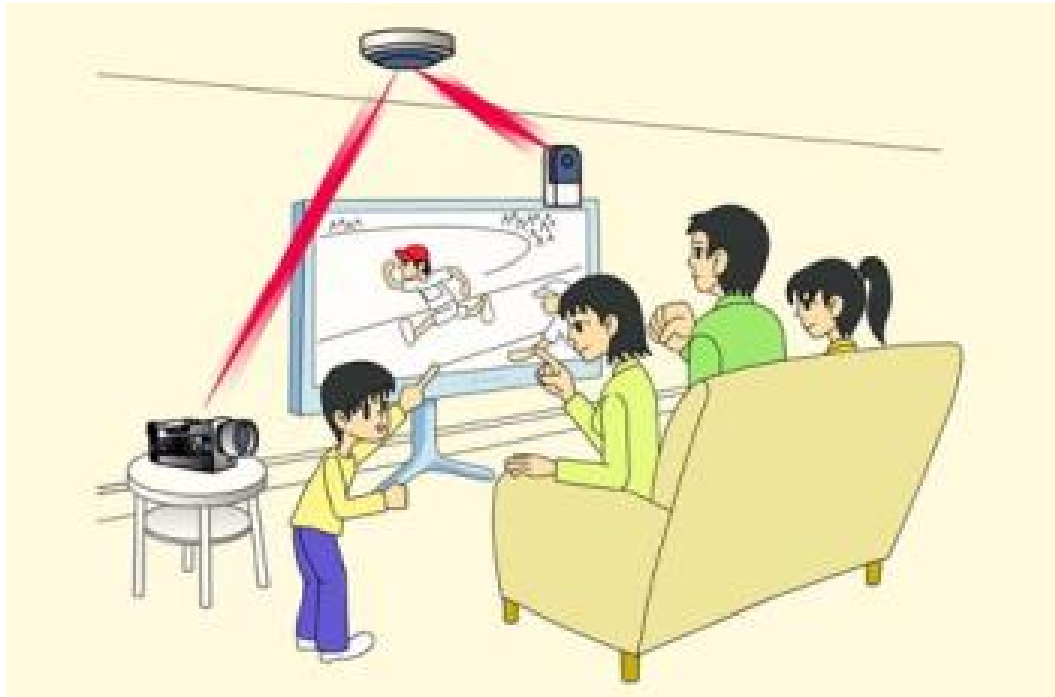
# Optical Wireless LAN application in school



## Feature

- The carrying of the personal computer is free.
- It is the Internet in freedom anytime and anywhere
- The influence of the electromagnetic radiation is not received.
- It need not be do wiring work, and is inexpensive in the installation at time.
- The high-speed communications are more possible than the electric wave methods.

# Optical Wireless LAN application in home



## Feature

- It has the personal computer and the Internet in freedom also in study and the living room.
- Because there is no cable, patterned changing of the room is easy and is also free.
- It is safe because there is no information leakage.
- The connection for the video appreciation of the athletic meet and the travel is easy.
- It doesn't influence medical equipment easily...

# Optical Wireless LAN application in hospital



## Feature

- It is safe because there is no cable.
- Because there is no cable, patterned changing of the room is easy and is also free.
- It doesn't influence medical equipment easily.



# Radio Wave vs Optical Beam

Description	Radio Wave	Optical Beam
Mobile	⊙	×
Low cost	○	△
Strong for interception	⊙	×
Cross talk	×	○
Broadband and high speed	△	⊙
Directivity and security	△	⊙
Immunity for electric noise	△	⊙