

VLC

(Visible Light Communication)



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Now that the World is becoming aware of wonderful technology it is up to us to start delivering new products. **Prof. Harald Haas** leads the EPSRC-funded D-LIGHT project at the School of Electronics and Engineering at the University of Edinburgh. According to his project and referring other articles, hereafter I am going to unfold about the Visible Light Communication (VLC).

Wireless communication using visible light will change how we live, how we work, and how we communicate. It offers users virtually unlimited communication capability.

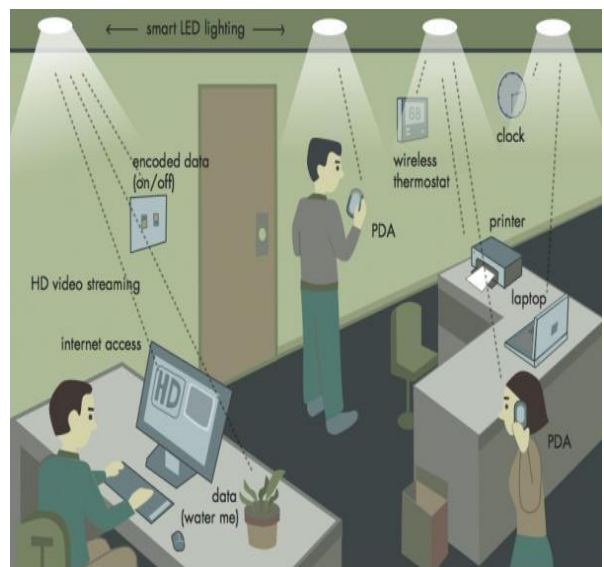
The advent of high-intensity, solid state LEDs (Light Emitting Diodes) are the foundation of this technology, and they allow to provide wireless communication solutions with virtually unlimited bandwidth within the visual light spectrum. Modulating light signals that communicate with lamps and equipment are embedded within the visible light generated by LED lamps. In addition to using less energy than conventional lighting, these devices, when placed throughout a building or geographic area, form a comprehensive wireless communication network which provides many services including illumination, communications, and security functions.



Prof Harald Haas demonstrates high definition video transmitted by the light from a table lamp at TED Global 2011 how we communicate

Most wireless communications today are produced from radio waves (RF) generated from electronic equipment. “WI-FI”, “3G Networks” and “Bluetooth” are examples of this applied technology. Even the fastest of these RF data transmission networks cannot compete with the potential of visible light transmission speeds. The fastest networks today are equipped with fiber optic cabling and equipment. The next generation of wireless networks will use light as its transmission medium because of these superior attributes

By replacing or retrofitting existing lighting fixtures and electronic devices with VLC technology. It will help construct the nation’s next generation wireless communication network that will transform our everyday experiences.



Visible light communication involves two-way communication using the medium of light. Photons, which can be seen by the human eye, carry an embedded signal, which is unseen.



A significant attribute of LEDs is their ability to switch on and off thousands of times per second. No other lighting technology has this capability. This switching occurs at ultra-high speeds, so far beyond what the human eye can detect, that the light appears to be constantly on. Amazingly, the technology can transmit a signal even when the light appears off. These embedded signals are emitted from the LEDs in the form of binary code; 'off' equals zero and 'on' equals one. When VLC equipment and devices are placed throughout a building or geographical area, a comprehensive wireless communication network can be created.

Using the visible light spectrum, which is free and less crowded than other frequencies, wireless services can be piggy-backed over existing lighting installations. With this leading edge technology, data including video and audio, internet traffic, etc..., can be transmitted at high speeds using LED light.

VLC technology has the potential to deliver data transfer rates in excess of hundreds of megabits per second. Light radiation neither constitutes nor suffers from electromagnetic interference (EMI) making VLC a very attractive technology in places/environments where electromagnetic interference (EMI) is an issue, such as in hospitals and in aircraft. In addition, where security of local communication is important, D-Light technology offers a secure medium for communication in an office/building environment.

VLC Applications:

A wide range of applications would benefit from using novel visible light communications:

- **WiFi Spectrum Relief** - Providing additional bandwidth in environments where licensed and/or unlicensed communication bands are congested
- **Smart Home Network** – Enabling smart domestic/industrial lighting; home wireless communication including media streaming and internet access
- **Commercial Aviation** – Enabling wireless data communications such as in-flight entertainment and personal communications

- **Hazardous Environments**- Enabling data communications in environments where RF is potentially dangerous, such as oil & gas, petrochemicals and mining
- **Hospital and Healthcare** – Enabling mobility and data communications in hospitals
- **Defence and Military Applications** – Enabling high data rate wireless communications within military vehicles and aircraft
- **Corporate and Organisational Security** – Enabling the use of wireless networks in applications where (WiFi) presents a security risk
- **Underwater Communications** – Enabling communications between divers and/or remote operated vehicles
- **Location-Based Services** – Enabling navigation and tracking inside buildings.

Reference

<http://visiblelightcomm.com>