



## INTERNATIONAL JOURNAL FOR ENGINEERING APPLICATIONS AND TECHNOLOGY

### A REVIEW PAPER ON LI-FI TECHNOLOGY

Prasuk P. Narsing<sup>1</sup>, Vipul V. Bhaware<sup>2</sup>, Akash R. Chaware<sup>3</sup>

<sup>1</sup>Dept. of Electronics and Telecommunication Engineering, Dr.N.P.Hirani Institute of Polytechnic, Pusad, [prasuknarsing@gmail.com](mailto:prasuknarsing@gmail.com)

<sup>2</sup>Dept. of Electronics and Telecommunication Engineering, Dr.N.P.Hirani Institute of Polytechnic, Pusad, [vipulbhaware22@gmail.com](mailto:vipulbhaware22@gmail.com)

<sup>3</sup>Dept. of Electronics and Telecommunication Engineering, Dr.N.P.Hirani Institute of Polytechnic, Pusad, [akashchaware1997@gmail.com](mailto:akashchaware1997@gmail.com)

#### Abstract

Now-a-days, internet has become a major demand people are in search of Wi-Fi hot spots. Li-fi or Light Fidelity was invented by Professor Harald Hass of university of Edinburgh. This is the latest technology in present day communication system which makes the use of LEDs, Light Emitting Diodes that helps in the transmission of data much more faster and flexible than the data that can be transmitted through Wi-Fi. It is basically a 5G technology of visible light communication system which utilizes light emitting diodes as a medium of high speed communication in similar manner as Wi-Fi

**Keywords-Light:** Fidelity, Transmission, Wi-Fi

#### INTRODUCTION

Now-a-days, internet has become a major demand people are in search of Wi-Fi hot spots. Li-fi or Light Fidelity was invented by professor Harald Hass of university of Edinburgh. This is the latest technology in present day communication system which makes the use of LEDs, Light Emitting Diodes that helps in the transmission of data much more faster and flexible than the data that can be transmitted through Wi-Fi. It is basically a 5G technology of visible light communication system which utilizes light emitting diodes as a medium of high speed communication in similar manner as Wi-Fi.



**Fig-1: Illustration of Li-Fi tech**

#### DESIGN of Li-Fi

Li-Fi architecture consists of a number of LED bulbs or lamps including many wireless devices such as Mobile

Phones, Laptops and PDA. The following factors should be taken into concern while designing Li-Fi:

1. Presence of light.
2. Line of sight (LOS). For better performance use fluorescent light and LED.
3. A photo detector received data.

Hence all that is required is some LEDs and a controller that will code data into those LED switch

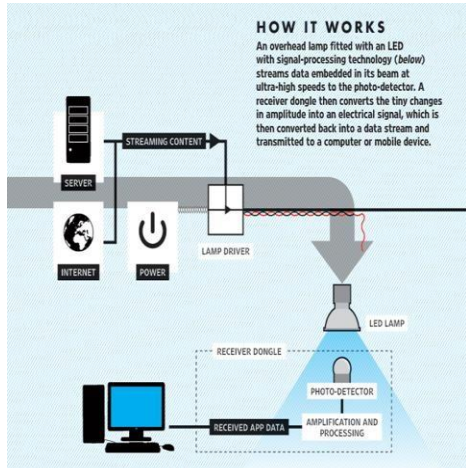
#### IMPLEMENTATION of Li-Fi

Li-Fi is typically implemented using white LED light bulbs at the downlink transmitter. The LEDs are used for illumination only on applying a constant current to them. However, by fast and subtle variations of the current, the optical output can be made to vary at extremely high speeds. This very property of optical current is used in Li-Fi technology setup. Its operation is very simple as when the LED is on then a logic "1" is transmitted and when the LED is off then a logic "0" is transmitted. This so happens at a very fast rate flickering of LED Implementation of Li-Fi given in the figure. In figure a internet connection is connected to the lamp driver. A switch with lamp driver and LED lamp also connected to this lamp driver through fiber optic cable. Now a receiving device, photo detector is used for receive signal and then to perform further processing, this device is then connected to PC's or Laptop's LAN port. On one end all the data will be streamed to a lamp driver when the LED is switched on the microchip converts the digital data or the logic data in light form.

The light detector receives the light signal and then convert it again into the original digital form. Hence we can retrieve the data or the information by using simple circuit of lifi

**VISIBLE LIGHT COMMUNICATION**

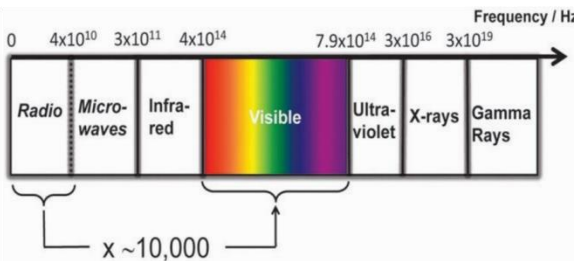
encoding a different data channel. Such advancements promise a theoretical speed of 10Gbps – meaning one can download a full high-definition film in just 30 seconds.



**Fig -2: Implementation of Li-Fi**

Infrared, can only be used with low power as for the sake of eye safety. Gamma rays cannot be used as they can prove to be dangerous. Ultraviolet light is good for place which is free from humans otherwise can be very harmful to the humans.

Since visible light has no harmful effects, it can be safe to use and is also having a larger bandwidth. VLC is a data communication medium, which uses visible light in the range of 400THz to 800THz as optical carrier for data transmission and illumination.



**g -3: Electromagnetic Spectrum of Light**

**APPLICATIONS**

With a wide use of data transmission these days, Li-Fi has proved to be more advantageous than the present day technology of Wi-Fi. There are many fields where Wi-Fi and many technologies have failed but Li-Fi has proved its excellence.

**Spectrum Relief:**

**Underwater Communication**

To use radio frequency in underwater communication can be impractical due to strong signal absorption in water. Li-Fi provides an undue advantage in this case.

**REPLACEMENT FOR OTHER TECHNOLOGIES**

Earlier, the radio waves were used but light’s frequency with each frequency they were expensive and less secure. detector receives the light signal and then convert it again into the original digital form.

This technology doesn’t use the radio frequency so it can be used in the places where the technologies like Bluetooth, Infrared, Wi-Fi etc. are banned. Li-Fi provides a best replacement for such technologies. It has various benefits such as of the range of With the increase of cell phone users, the electromagnetic spectrum. available bandwidth is insufficient and can 2Extremely high color fidelity.

**FEATURES**

**Bandwidth:**

The visible light spectrum is plentiful, much more than RF and also is free to use.

**Data Density:** Li-Fi can achieve 1000 times the data density of Wi-Fi, as visible light can be well contained in the light illumination but in case of RF it suffers from interference.

**COCLUSION**

With the ongoing increase in the cellular networks, the newest technology of Li-Fi has proven to be a milestone in communication systems. It uses the visible spectrum of light which is far better than the RF as it is prone to interference. With the use of LEDs the information can be transmitted at very high rates with just the simple turning on and off of the LEDs.

**REFERENCES**

- [1]. [www.lificonsortium.org](http://www.lificonsortium.org)
- [2]. <http://beyondweblogs.com/what-is-li-fi-is-this-replacing-Wi-Fi/>
- [3]. <http://en.wikipedia.org/wiki/Li-Fi>