International Research Journal of Innovations in Engineering and Technology (IRJIET)

ISSN (online): 2581-3048

Volume 3, Issue 11, pp 58-60, November - 2019

An Empirical Study on Li-Fi Technology

Mr. Faizan Hussain, Mr. Suraj Khupse, Mr. Mohammad Rafi Saheb Khan

[1,2]MCA-III, Department of Research and PG Studies in Science & Management, Vidyabharati Mahavidyalaya, Amravati, India
[3]Vidyabharati Mahavidyalaya, Amravati, India

***Abstract* - Nowadays, the internet has become a major demand people are in search of Wi-Fi hot spots. Today every person is using the internet so it can easily say that this is the era of technology which works on wireless methods. When people in large numbers are accessing the internet for their requirements such as wireless networks, due to this the speed and security of the network get decrease. To improve that thing we are accomplished with WI-FI. To improve these things German physicist "Harald Hass" at TED GLOBAL talk march 2011 introduces new technology Light Fidelity (LI-FI). Where he introduces the idea of "WIRELESS DATA FROM EVERY LIGHT". For the transmission, LI-FI used the LED lamps of visible light. In this paper, we focus on how LI-FI replaces the WI-FI. WI-FI (wireless fidelity) use for wireless coverage within building while LI-FI deals with high speed, security, feasibility. Li-Fi refers to visible light communication (VLC) that uses great speed similar to WI-FI. This provides great speed, bandwidth, security, efficiency than WI-FI.**

Keywords: Li-Fi, WI-Fi, VLC, visible light communication, LED, light-emitting diode, RF, radio frequency.

I. Introduction

Harald Haas was developed Li-Fi and promoted Li-Fi in his 2011 TED Global talk by giving a presentation of an LED light bulb to transmit data with the speed 10 times faster. As the speed of light is very high so the data transmission speed via the light is also high. Transfer of data from one place to another is one of the most important day-to-day activities. When the multiple devices are connected to the current wireless networks that connect us to the internet are very slow. As the number of devices increasing internet access, the fixed bandwidth which is available makes it more and more difficult to utilize high data transfer rates and connect to a network. But, radio waves are just a small part of the spectrum available for data transfer. A solution to this problem is the use of the proposed system.

Li-Fi stands for the Light-Fidelity. Li-Fi is a transmission of data through light by sending data through an LED bulb that varies in intensity faster than the human eye can follow and the faster data transmission speed. The working of the Li-Fi is very simple if the LED is ON, the sign transmitted is a computerized 1 while if it is OFF, and the signal transmitted is a digital 0. By changing the rate at which the LEDs flash, we can encode different data and send it.

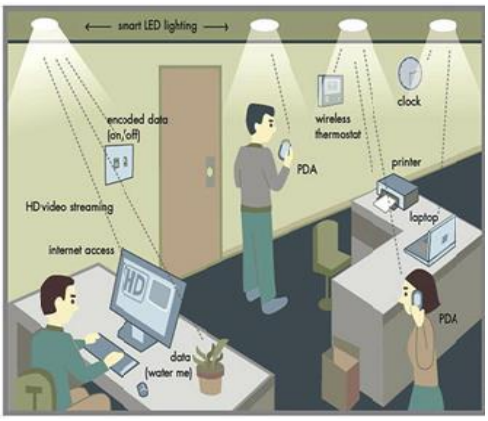

Figure 1: Li-Fi Environment

II. Working Technology of Li-Fi

This idea was showcased by Harald Haas from the University of Edinburgh, in his TED Global talk on VLC. He explained, "Very simple that if the LED is on then a digital '1' is transmitted in case the LED is off then a digital '0' is transmitted. The LEDs can be switched on and off very quickly, which gives a great opportunity for sending data". The modulator modulates the signal and the photo detector detects the signal at the receiver and it into the original signal. This method uses visible light for transmission of data wirelessly refers to visible light communication (VLC).

Figure 2: The connection between Cell phone And LED's

International Research Journal of Innovations in Engineering and Technology (IRJIET)

ISSN (online): 2581-3048

Volume 3, Issue 11, pp 58-60, November - 2019

Li-Fi uses the parallel transmission of data using an array of LEDs, can separate the transmission of data. Data rates of LIFI are greater than 100 Mbps and provide large security which acquires high speed in multiplexing of data.

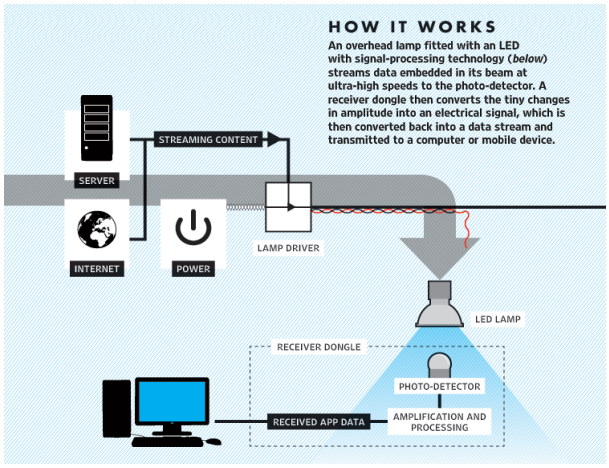

Figure 3: Actual working of Li-Fi system

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 the optical current is used in the Li-Fi technology setup. Its operation is very simple as when the LED is on then logic "1" is transmitted and when the LED is off then logic "0" is transmitted. This so happens at a very fast rate flickering of LED which is not visible to the human eye.

Further enhancements can be made in this method, like using an array of LEDs for parallel data transmission, or using mixtures of red, green and blue LEDs to alter the light's frequency with each frequency encoding a different data channel. Such advancements promise a theoretical speed of Li-Fi is 10Gbps meaning one can download a full high-definition movie in just 30 seconds.

Implementation of Li-Fi given in the figure 3. In the figure, an internet connection is connected to the lamp driver. A switch with a lamp driver and LED lamp also connected to this lamp driver through fiber optic cable. Now a receiving device, the photo detector is used to receive a 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 converts it again into the original digital form. Hence we can retrieve the data or the information by using a simple circuitry of Li-Fi.

III. Comparison between Li-Fi and Wi-Fi

Li-Fi is the name given to describe visible light communication technology applied to access high-speed wireless data communication. It derived this name by similarity to Wi-Fi. Wi-Fi works radio frequency and generally wireless coverage within buildings, and Li-Fi is ideal for high-density wireless data coverage inside a confined area or room and for relieving radio signal interference issues.

TABLE 1
Comparison between Li-Fi and Wi-Fi

S. No	Parameter	LI-FI (Light Fidelity)	WI-FI (Wireless Fidelity)
1.	Speed	High	Less as compare to Li-Fi
2.	Security	High	Less
3.	Data rate	High	Low
4.	Power availability	High	Less
5.	Range	Low	Medium
6.	Reliability	Medium	Medium
7.	Bandwidth	High due to broad Spectrum	Low
8.	Transmitter/Receiver power	High	Medium
9.	Device to Device Connectivity	High	High
10.	Data Transfer	Using light	Using radio
11.	Network Topology	Point to Point	Point to Multi-Point

IV. Applications of Li-Fi

- High-speed Data Transmission.
- Li-Fi uses light rather than radio frequency signals.
- In the Aircraft VLC is used for safety.
- In the medical sector, we can easily use it because it does not deal with radio waves.
- We can use the LI-FI Underwater in the sea Where Wi-Fi does not work.
- Security is another benefit because li-fi cannot go through walls.
- By implementing technology worldwide every street lamp would be a free Internet access point.
- Li-Fi may solve issues such as the shortage of radio frequency bandwidth.
- We can use Li-Fi in sensitive areas like the Petrochemical area.

International Research Journal of Innovations in Engineering and Technology (IRJIET)

ISSN (online): 2581-3048

Volume 3, Issue 11, pp 58-60, November - 2019

V. Future Applications of Li-Fi

- Security applications
- Smart city applications
- Smart home application for various appliances
- Wireless solutions for enterprise and offices
- Smart transport
- Hospitals and healthcare
- Most important data communication option for future 5G and IoT networks

VI. Conclusion

In wireless communication, LI-FI is a big achievement for accessing the faster speed of data. This is the alternative method by using the LEDs blub in case of radio wave frequency for data carriers. This technology is used every LEDs blubs as WI-FI hotspot for transmission of data and provide much security and brighter future without radio wave because it creates many harmful effects to human beings.

If this technology might be put into practical utilize, every bulb can supply something like a Wi-Fi hotspot to help transmit wireless data and we will proceed toward the solution, greener, safer and better future.

REFERENCES

[1] Haas Harald (July 2011). "Wireless data from every light bulb". *TED Global. Edinburgh*, Scotland.

[2] National Conference on Innovations in Micro-electronics, Signal Processing and Communication Technologies (V-IMPACT-2016) February 2016 || ISSN: 2349-6010.

[3] Compressed Sensing in Li-Fi and Wi-Fi Networks by Malek Banslama, Hadj Batatla, and Mokhatri Hatem.

[4] Principles of LED light communications-Towards Networked LI-FI. By Harald Haas.

[5] http://en.wikipedia.org/wiki/Li-Fi.

[6] https://www.lifi.eng.ed.ac.uk/

[7] https://www.lifi-centre.com/about-li-fi/applications/

Citation of this Article:

Mr. Faizan Hussain, Mr. Suraj Khupse, Mr. Mohammad Rafi Saheb Khan, Dr B P Mahesh, "An Empirical Study on Li-Fi Technology" Published in *International Research Journal of Innovations in Engineering and Technology (IRJIET)*, Volume 3, Issue 11, pp 58-60, November 2019.

****

