

A Review Paper on Light-Fidelity (Li-Fi)

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Abstract— Li-Fi that is light fidelity is one of the future technologies in wireless communication sector. It is a bidirectional, with a very high speed and is a fully networked communication which is wireless technology similar to Wi-Fi. It was developed by the German Physicist Harald Hass who has come up with an idea of sending and receiving data through LED (Light Emitting Diode) light bulb that varies the intensity faster than the human eye. According to Hass, one can use this technology in mobile phones, tablets & laptops and it would be highly secured that is if you can't see the light that you can't access the data. It uses light instead of radio waves to transmit information. Instead of Wi-Fi Modems, LI-Fi uses transceiver which has fitted led lamps which can glow a room as well as send and receive information. It is 100 times faster than Wi-Fi reaching at a speed of 224 gigabits per second.

Key words: Light-Fidelity, Transmission, Wi-Fi

I. INTRODUCTION

As we know, now a day's internet has become a major demand. People are roaming here and there for WI-FI hot spots. Light Fidelity technology uses light rays instead of radio waves to transmit information. The other name given to it is Optical Version of Wi-Fi .It is one of the latest technology in the present time related to technology that uses, LEDs .It is a 5G technology of visible light communication system. It provides us better efficiency, bandwidth, Security & availability then WI-FI. He predict a future where the data for smart cell phones, laptops and tablets is transmitted and received through the light in a room & it would be highly secured that is if you can't see the light, you can't access the data. It can be used in high security military areas.

II. DESIGN OF LI-FI

LI-FI is fast and cheap version of WI-FI. It is based on Visible Light Communication which uses light between 780 nm and 375 nm as optical carrier for data transmission and illumination.

The main components of LI-FI systems are as follows:

- 1) High brightness white LED'S which act as a transmitter
- 2) Silicon photodiode which act as a receiver.

Also, factors like Presence of light & Line of sight (LOS) are very much essential.

III. IMPLEMENTATION OF LI-FI

The idea behind Li-fi is implemented by using white LED light bulbs at the downlink Transmitter. For illumination, a constant current is applied to LEDs. The optical output can be made to vary at very high speeds, by fast variations of the input current. It works as, when the LED is on then the logic "1" is transmitted and when the LED is off then the logic 0 is given. LED's flickering occurs at a very fast rate and which is not visible to the human eye. In this method much advancement could be possible by use of an array of LEDs for parallel data transmission. These types of advancements promises a speed of 10Gbps – that is one can download a full HD film in just 30 seconds

Internet connection, switch and LED lamp are all connected to the lamp driver through optical fiber cable. Photo detector receives the signal and performs further operations. Detector is further connected to PC's, Laptops or LAN port. When the LED is ON, the conversion of the digital data into the light form is done by microchip. On receiving the light signal the Light detector converts it again into the original digital form.

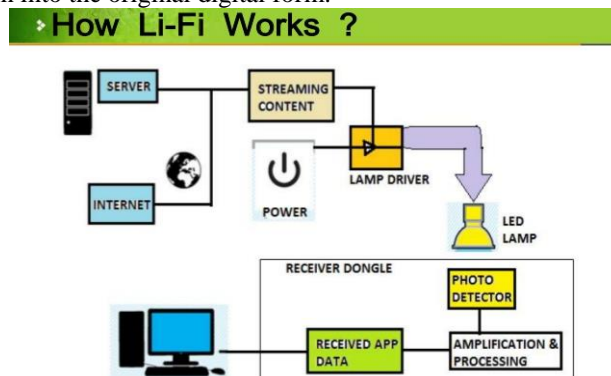


Fig. 1: Working of Li-Fi

IV. WHY VLC?

The radio waves are costly and very less safe. The use of Infrared can be done with power which is low for eye safety. Gamma rays cannot be used as they are dangerous. UV rays can be used at places where humans are not found otherwise they can be harmful. Now visible light is safe to use that is no harmful effects and it also have a larger bandwidth.

Visible Light Communication (VLC) is a medium, that use light which is visible that is 400 THz – 800 THz of range, as optical carrier for data transmission and illumination.

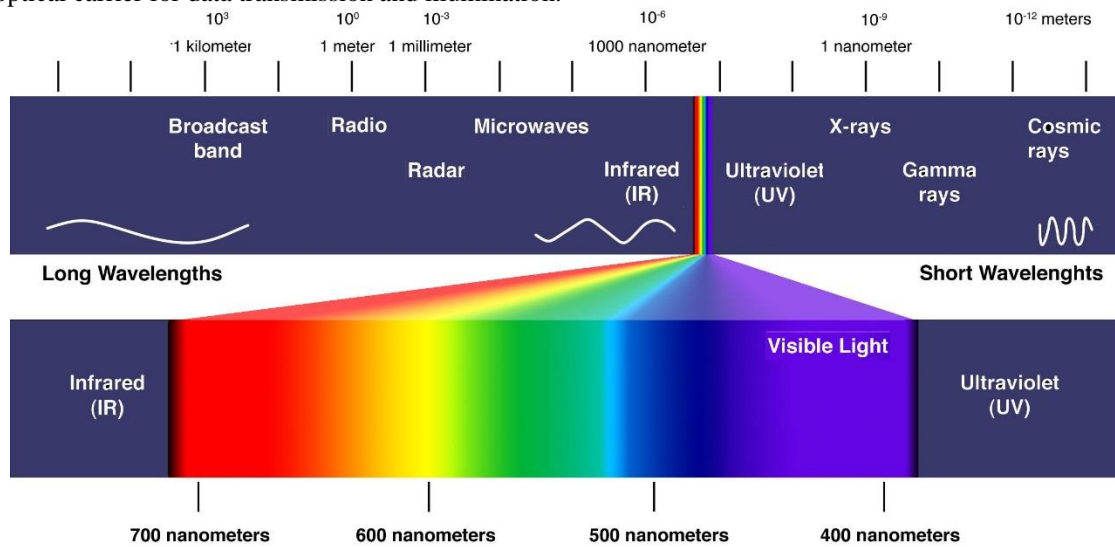


Fig. 2: Electromagnetic Spectrum

V. APPLICATIONS

The Wi-Fi network is becoming more complex due to the number of users have incremented because of lesser bandwidth. There are many fields where WI-FI and other technologies have failed but LI-FI is doing well and getting 100% result.

A. Mobile Conductivity:

Devices like laptops, mobile phones can be connected together directly by using LI-FI. The data rates are very high and it is highly secured.

B. Underwater Communication:

Radio waves in underwater communication cannot be used due to signal absorption in water, whereas Li-Fi technology can be easily used without any disturbance.

VI. CONCLUSION

As the number of internet users are increasing per day, this concept is very much efficient and reliable alternative to RF communication. The visible spectrum of light is used that is better than the radio frequency, also prone to interference. By using this technology information can be transmitted and received at very high rates with simply turning on and off of the LEDs. This technology is much secured compared to Wi-Fi.

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