Review on Li-Fi Technology

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***Abstract*— Now a days as we see that many people are using internet to accomplish their task through wired or wireless network. As no of users get increased in wireless network speed decreases proportionally. Though Wi-Fi gives us speed up to 150mbps as per IEEE 802.11n, it is still insufficient to accommodate no of desired users. To remedy this limitation of Wi-Fi, we are introducing concept of Li-Fi. As per germen phycist Harald Haas data through illumination‖ taking the fibber out of fiber optic by sending data through an LED light bulb that varies in intensity faster than the human eye can follow. It's the same idea band behind infrared remote controls but far more powerful. Haas says his invention, which he calls D-LIGHT, can produce data rates faster than 10 megabits per second, which is speedier than your average broadband connection.**

Keywords*— *Wireless-Fidelity(Wi-Fi), Light-Fidelity (Li-Fi), Light Emitting Diode (LED), Line of Sight(Los) Visible Light Communication (VLC).

INTRODUCTION

Li-Fi comprises a wide range of frequencies and wavelengths, from the infrared through visible and down to the ultraviolet spectrum. It also includes sub-gigabit and gigabit-class communication speeds for short, medium and long ranges, and unidirectional and bidirectional data transfer using line-of-sight or diffuse links, reflections and much more. It is not limited to that LED or laser beam In simple terms, LI-FI can be thought of as a WI-FI based on light as it uses light instead of radio waves to transmit information.

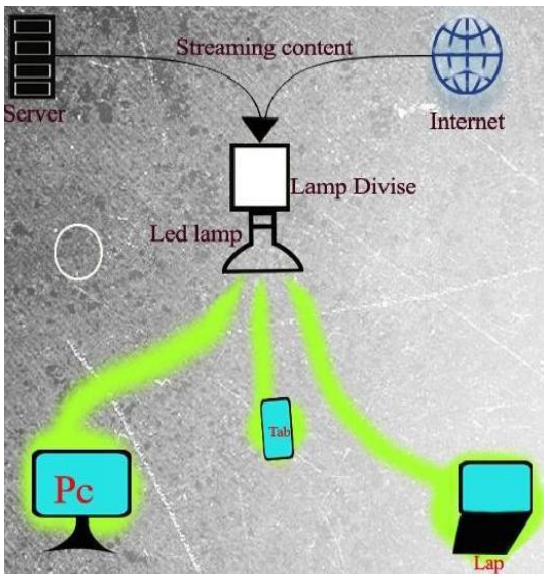
This technology uses a visible light communication spectrum and has not major ill effect as we know that the light is very much part of our life. Moreover in this spectrum 10,000 times more space is available and it also multiplies to 10,000 times more availability as a light bulb and street bulbs are available already technologies or to a particular receiving the technique. Li-Fi is a good framework for all of these providing new capabilities to current and future services, applications and end users .This brilliant idea was first showcased by Harald Haas from University of E dinburgh, UK, in his TED Global talk on VLC. , if the LED is on, you transmit digital 1; if it's off you transmit a 0. The Led can switch on and off according to situation., which gives nice opportunities for transmitting data.

DESIGN OF LI-FI

The Li-Fi architecture consists numbers of Led bulbs or lamps,so many wireless devices such as PDA, Mobile Phones, and laptops. Important factors we should consider while designing Li-Fi as following:

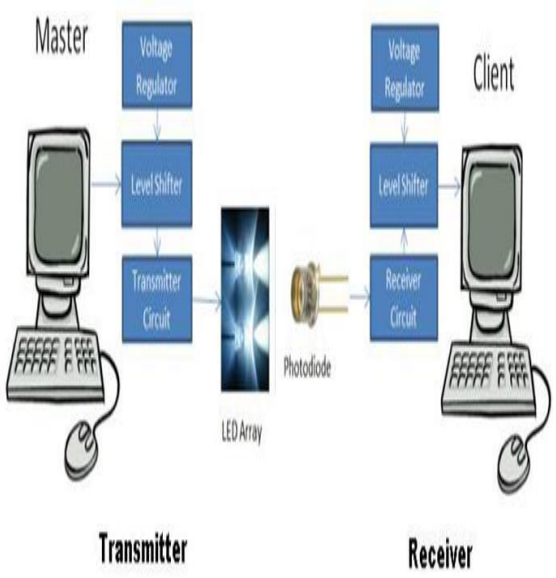
- Presence of Light
- Line of Sight(Los)
- For better performance use fluorescent light & LED

As shown in figure 2 streaming content must have proper integration with server & internet network, so that it is easily possible to work efficiently.



IMPLEMENTATION: LI-FI

Li-Fi is typically implemented using white LED light bulbs at the downlink transmitter. These devices are normally used for illumination only by applying a constant current. 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 setup. The operational procedure is very simple-, if the LED is on, you transmit a digital 1, if it's off you transmit a 0. The LEDs can be switched on and off very quickly, which gives nice opportunities for transmitting data. Hence all that is required is some LEDs and a controller that code data into those LEDs. All one has to do is to vary the rate at which the LED's flicker depending upon the data we want to encode. 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 There are also some enhancement could be made, channel. Such advancements promise a theoretical speed of 10Gbps – meaning one can download a full high-definition film in just 30 seconds. means
like using an array of LEDs for parallel transmission, or using amalgamation of basic three colour's i.e., red, green and blue LEDs as different frequency with each having a different data channel. To further get a grasp of LI-FI consider an IR remote. It sends a single data stream with 10-20 kbps speed. Now if we replace the IR LED with a large LED array then that can be capable of Transmission of data is done by single LED or multi LED through a visible light as shown in below figure-3.On the receiver side there is a photo detector, which convert this light into electric signals and it will give to the device which connected to it. Voltage regulator and level shifter circuits are used on both the side to convert or maintain a voltage level between transmitter and receiver. sending thousands of such streams at a very fast rate



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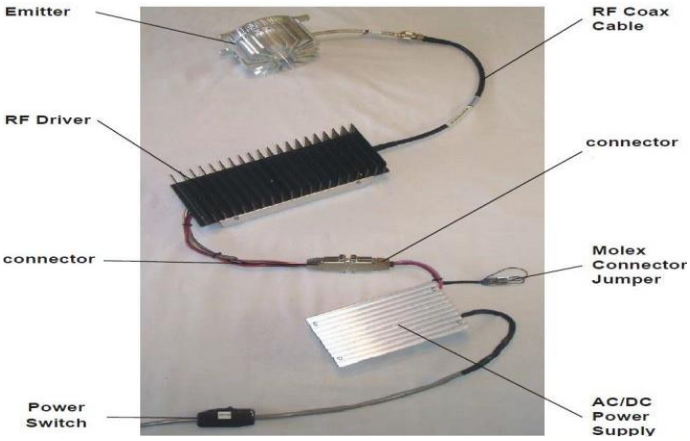

VALUES OF LI-FI

- High instalment cost but very low maintenance cost.
- Cheaper than Wi-Fi.
- Theoretical speed up to 1 GB per second: Less time & energy consumption.

CONCLUSION

Li-Fi is certainly not useless, but it has certain inherent limits for the technology. Li-Fi may not be able to replace conventional radios altogether, but it could turbo charge the development of wireless television and make it easier to throw the wireless,
signal across an entire house. At present, finding the ideal position for a wireless router is something of a divine art. If the signal could be passed via VLC from Point A to Point B inside a home, small local routers at both points could create local fields with less chance of overlapping and interfering with each other. Large scale areas that are saturated with radio signals or that doesn't permit them for security reasons could use Li-Fi as an alternate high-speed wireless network solution.

ACKNOWLEDGEMENTS

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