

# A Report On

## LiFi-The Path To A New Way Of Communication

Tanvir Mahtab

American International University  
Bangladesh  
[tanvirrohan1@gmail.com](mailto:tanvirrohan1@gmail.com)  
16-32044-2

Khandaker Md. Ashikul Hoque

American International University  
Bangladesh  
[kh.ashik96@gmail.com](mailto:kh.ashik96@gmail.com)  
16-32061-2

Md. Bariul Islam

American International  
University Bangladesh  
[bariulislam0021@gmail.com](mailto:bariulislam0021@gmail.com)  
16-32085-2

Zahid Hossain

American International  
University Bangladesh  
[hossainzahid93@gmail.com](mailto:hossainzahid93@gmail.com)  
16-32597-2

**Abstract**—To offload a large portion of the network traffic from radio frequency domain important research have been directed over the past years. Optical wireless communication is a feasible solution to radio frequency traffic. As mobile data consumed indoor, LiFi related to visible light communication offers a lot advantages and solutions to the problems of wireless communication [2].For transmitting we are going to use visible light and receiving we are going to use photodiodes [1].In this paper we are going to discuss about the uses of LiFi, background researches and future scope and the proposed methods.

**Index Terms**—OWC, LiFi, VLC.

### I. INTRODUCTION

By taking the fiber out of fiber optics by sending data through a bulb which transmits data through illumination is called LiFi[1].It sends data faster than the human eye can follow[1].It uses light as a medium. As LED lights are widely used in home and offices LiFi can be a feasible alternative to Wi-Fi.As we can see from the table speed is both the same but LiFi provides more security and it has more data density.It has more power for transmission than WiFi[3].LiFi also uses 802.11 protocol as WiFi but for using light it has more wider bandwidth.

| Parameters                    | Li-Fi  | Wi-Fi  |
|-------------------------------|--------|--------|
| Speed                         | High   | High   |
| Range                         | Low    | Medium |
| Data Density                  | High   | Low    |
| Security                      | High   | Medium |
| Reliability                   | Medium | Medium |
| Power Available               | High   | Low    |
| Transmit/Receive Power        | High   | Medium |
| Ecological Impact             | Low    | Medium |
| Device-to-device connectivity | High   | High   |
| Obstacle Interference         | High   | Low    |
| Bill of Materials             | High   | Medium |

**Fig 1: LiFi vs Wifi [3]**

### II. RELATED BACKGROUND

In future, expect a lot to hear about LiFi. Already a lot of work and research been done in this sector. A scientist team led by Harald Haas achieved 10GBps internet data transmission through lights of LED lamps [2].In 2016 Outstanding Technologies of Japan released their products which has electromagnetic compatibility and high accuracy positioning system for mobile and tablets using LED lights[2].Frances Oledcomm released LiFi products in the market[2].There are also many researches going on tp introduce LiFi more extensively.In 2014 at the Mobile World Congress Barcelona,british company pureLiFi launched Li-1<sup>st</sup> [2].They have plans to make LiFi commercially available in a deal with Lucibel[2].

### III. PROPOSED METHODOLOGY

Li-Fi is implemented at the downlink transmitter using LED bulbs[1].When the LED is on,1 is transmitted,0 is transmitted if LED is off[1].Using array of LED for parallel transmission or mixture of color like red,green,and blue LED can be used to alter the light frequency which can be used for different data channel[1]When the LED is on the data will be streamed to a lamp driver and a microchip will convert the data in form of light, and a light sensitive device receive the signal converting it to a its original data[1].

Many applications of LiFi can be used worldwide. Sensitive areas like a nuclear powerplants can use LiFi because of electromagnet [2].In an airplane where WiFi is banned LiFi can be used in a limited space [2].Also it can be used in hospitals,petrochemical industries. There are certain lackings in this technology.It works better in the closed room,so it might encounter problems in the open air[3].Special types of LED bulbe are required fot LiFi[2],so LED bulbs have to be replaced.It needs an alternate for retransmission(3).As it uses light there are also interference from the sun[2].

LiFi is seen as a bi-directional technology but in real life it needs an alternate for retransmission [3].So WiFi can be used for retransmission. To receive data user will use Li-Fi but when sending data they will switch to Wi-Fi[3].

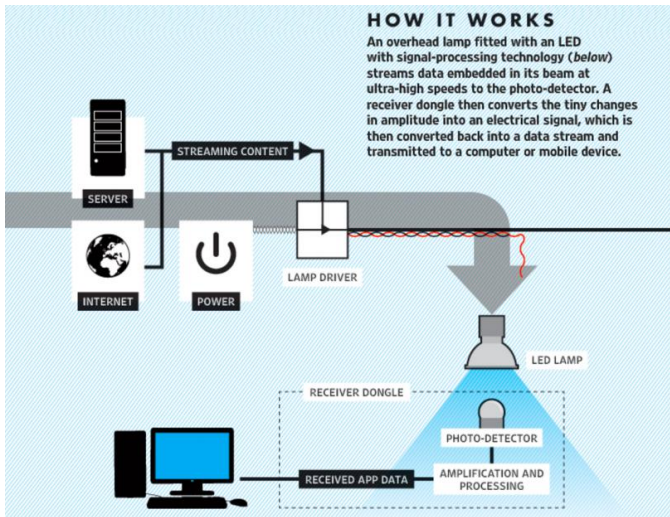


Fig: How Li-Fi works [4]

. Proposed Solution:

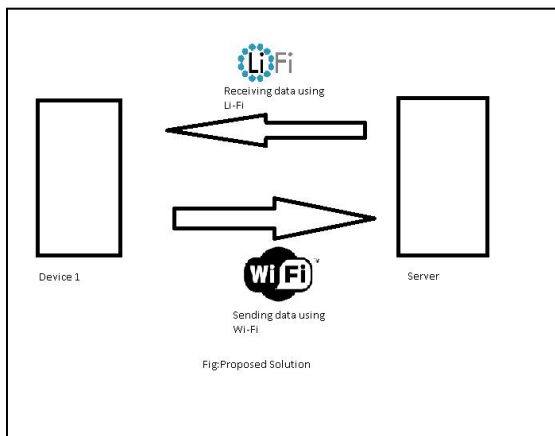


Fig.: Proposed Solution(Bi-directional)

As in real life Li-Fi has bi-directional problem, it can be solved by using Wi-Fi parallelly. When device 1 sends data to server it uses Wi-Fi, but when it receives data from server it uses Li-Fi[3]. The switching will happen automatically. That way the device can get the full use of the internet connection.

#### IV. RESULT AND ANALYSIS

Li-Fi is seen as a bi-directional technology but in real life it needs an alternate for retransmission [3]. So Wi-Fi can be used for retransmission. To receive data user will use Li-Fi but when sending data they will switch to Wi-Fi[3]. So, that way user can get the most benefit. We can also install a LED bulb into the Wi-Fi. So the data can be sent and received using both Li-Fi and Wi-Fi simultaneously. If a person is sitting in a room under a LED bulb he can get the full speed of the transmission but if he wants to move to another room there is no need of another

bulb in the other room, he will be switched to Wi-Fi automatically[3].

#### V. FUTURE WORK/SCOPE

There are many opportunities for research on Li-Fi. There are many places where this technology can be used. It can be used on airplanes where Wi-Fi is banned [2]. Also it can be used in hospitals where Wi-Fi is also forbidden [2]. It can use every bulb to transfer data after it is developed fully. The radio frequency is being clogged overtime, Li-Fi can be used for solving this problem[1].

#### VI. CONCLUSION

Li-Fi system promises for a safer, greener and healthier environment for our generation and upcoming generation[2]. If this system is developed completely each and every light source can be used as a medium for transmitting data and receiving data[2]. But as we have seen in the above report it still cannot replace Wi-Fi completely. However, it can work alongside Wi-Fi smoothly. In a few years we expect Li-Fi to compete with all the other wireless technologies [2].

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