ISSN XXXX XXXX © 2018 IJESC

IJESC

Research Article Volume 8 Issue No.4

LI-FI Smart Technology in Wireless Communication: Review Paper

Tanuja Saini
M. Tech Student
Electronics & Communication Engineering
Rayat Bhara University Chandigrah, Mohali, India

Abstract:
Today each and every person is using internet so it can easily say that this is the era of wireless technology .when large number of people are accessing the internet for their requirement as wireless network, the speed and security of network get decrease. To improve that thing we are accomplished with the WI-FI technology they provide the speed of 150 mbps as IEEE 802.11 Standard, but that is not sufficient to improve the speed and security for desired users. TO improve these things Introduce with new technology LI-FI (light fidelity). This technology is introduce by German physicist HaraldHass at march 2011 TED GLOBAL talk where he introduce the idea of **"WIRELESS DATA FROM EVERY LIGHT"**.LI-FI used the LED lamps for the transmission of visible light. In this paper focus how LI-FI replace the WI-FI.WI-FI (wireless fidelity) use for wireless coverage with in building while LI-FI deal with high speed, security, feasibility. Li-fi refers with visible light communication(VLC) that uses great speed similar to WIFI. This provide great speed , bandwidth, security ,efficiency than WIFI. In this author gives full detail of LI-FI, its working, its advantages and disadvantages, and future scope.

Key words: LI-FI,WI-FI, VLC, LED.

I. INTRODUCTION:

LI-FI is a creative idea in wireless technology which replaces the radio wave frequency with the light source that is LED blub. This technology has more potential to improve the wireless services.LI-FI technology is used the **visible light communication (VLC)** technology. This technology is proposed by a German physicist, DR. Harald Haaswith a creative idea to improve the internet services. by sending data through an LED light bulb that varies in intensity faster than the human eye can follow. Haas says his invention, calls D-Light, can produce data rates speed faster than 10 megabits per second, which is faster than our average broadband connection. He says in future data is transmitted through the light in a room and in a hall. When using internet slow speed of data and buffering frustrated, when large numbers of users access the internet. As to improve the speed of network and user utility by using LED blub as light rather than radio wave used by WI-FI. Wi-Fi technology provide faster speed that is 50-100Mbps and bandwidth used 2.5 -5GHz radio frequency to deliver the data in the wireless network. With the large use of Wi-Fi hotspot and traffic is also increased, suffer from the speed and security of the network. To improve this speed LIFI is used by adding switches to control the LED by using binary logic : "0" for off and "1" for on the LED bulb which emitted the light and make network continuous for accessing the internet.

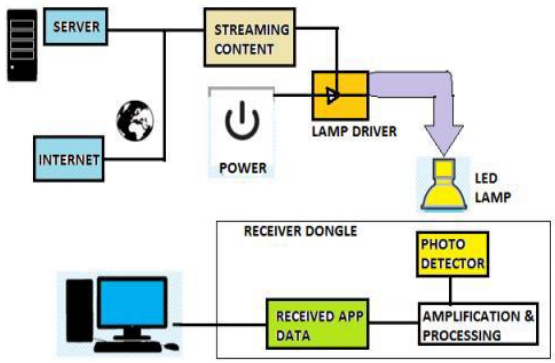

Figure.1. Block Diagram Of Li-Fi[4]

In August 2013, data rate is 100 Mbps is used and in 2016, data rate is up to 1Gbps were demonstrated in a single whit colour LED. In the TED talk he listed some key problem regarding WIFI that are overcome by using LIFI in future:

1. capacity: WIFI use the radio wave frequency 2.5 -5 GHZ are transmitted data are limited and expansive. 4 G and 5G are developed available spectrum running in faster speed.

2. Efficiency: LED used the visible light consume less energy and more efficient, whereas radio frequency consume more energy and not more efficient.

3. Availability: visible light used anywhere but radio wave frequency not used in homes, hospitals, mostly in aeroplane..

4. Security: LIFI provide more security than WIFI because light cannot be penetrate through walls whereas radio frequency penetrate through wall.

NEED OF LIFI:

Every person know the WIFI with radio frequency 2.5 -5 GHz to access wireless internet in our homes, offices , universities, school and other public places. When a large number of user access the WIFI that produce problem of accessing the internet buffering problem and limited speed and security.

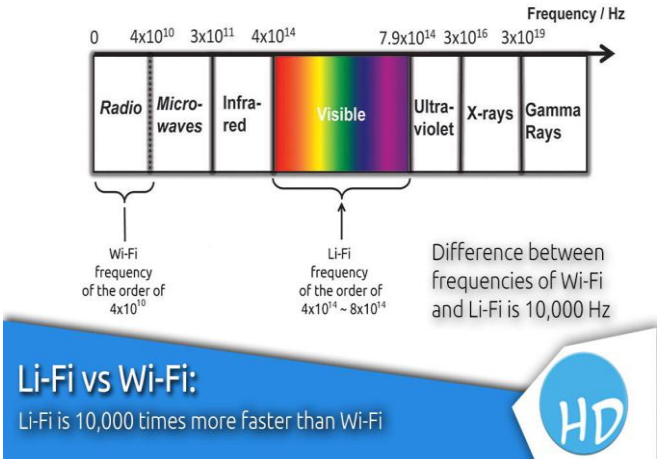

Figure.2. Lifi Vs Wifi Spectrum[7]

WORKING AND PRINCIPLE:

LEDs can be switch ON and OFF by single blink of human eye that is much faster than eye, operating speed is much faster LED'S speed is less than 1 µs. Light sources is in continues movement. By using the binary codes this on- off invisibility of data transformation through switch on by pressing "1" and off by "0".modulator modulate the signal and photo detector detects signal at the receiver and it into the original signal. This method use the visible light for transmission of data wirelessly refers as visible light communication (VLC).The VLC uses visible light between 400 THz (780 nm) and 800 THz (375 nm) as the optical carrier for data transmission and reception. This is used to chase the potential of WIFI through LIFI.

Figure.3. Connection Between Cellphone And Leds[4]

In LIFI uses the parallel transmission of data using array of LEDs, can separates the transmission of data .Data rates of LIFI is greater than 100 mbps and provide large security which acquire high speed in multiplexing of data.

Source Computer: Data Reading Module- Data Conversion Module-Transmitter Module

Destination Computer: Receiver Module - Data Interpretation Module -Data Display (GUI)

Major components of LI-FI are:

1. Data conversion module
2. Transmission module
3. Receiver module
4. Data interpretation module

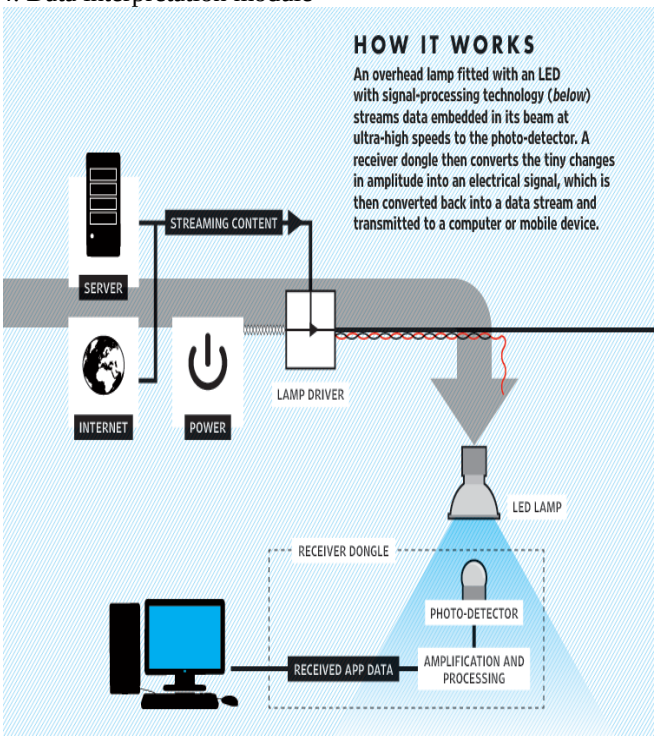

Figure.4. Block diagram Of Lifi Working[7]

Table1. Comparison between lifi and wifi:

	Parameter	**LI-FI(**Light fidelity **)**	**WI-FI** (Wireless fidelity)
1.	Speed	high	Less as compare to lifi (high)
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.	Ecological impact	Low	Medium
10.	Device to Device connectivity	High	High
11.	Obstacle interference	High	Low
12.	Bill of material	High	Low
13.	Market Maturity	Low	High
14.	Latency	In the order of microseconds	In the order of milliseconds
15.	Spectrum	10,000 times broader than that of Wi-Fi	Narrow spectrum

LIMITATION OF LIFI:

There are some limitations of li-fi these postulates are:

1. Light can be passing through any of the objects, if at the receiver there is any object than that block the signal and cut it out. If light is signal is block than one can back switch to the radio frequency.
2. External sources such as sunlight, normal bulb caused the interference that creates problem or interrupt in wireless communication.
3. Installation cost of VLC system is high.
4. Reliability and coverage networks are the major issue.
5. Major limitation is how the received data is transmitted back to the transmitter.

APPLICATIONS OF LI-FI:

1.**Medical application:** due to radio wave frequency operation theatres do not allow WI-FI. WI-FI usage at hospital block the

signals for monitoring equipments. so, it may the dangerous effect on human health due to weak performance of network to overcome this by using LI-FI to control and access the internet in the operation theatres and this also help in the robotics surgeries and automated procedure.

2. Education system: LI-FI provides faster access speed of internet that helps the student in education. So, WI-FI is easily replaced by LI-FI using in the education institutes.
3. Underwater: remotely operated vehicles operated from cables that supply their power and allowed the signal to receive. But by using ROVs is not enough to explore larger area. So these lights are replaced by light provide high speed, high power lamp .LI-FI can be worked under water whereas WI-FI IS not work under water.
4. Smart classroom: LI-FI can be used in smart classroom that help the teacher to teach the student 2D /3D animation on large screen and explain, freeze the different topics in a details.
5. Line of sight: LI-FI used in vehicle to vehicle communication used the GPS system that provides the better line of sight difference.
6. Hidden communication: this is used for confidential/hidden communication like military and defence based communication.
7. Toys: there are so many toys which has LEDs bulbs that are easily used for the access of internet and communication.
8. Telecomm. Connectivity: Laptops, mobiles, smart phones are interconnected through LI-FI and provide better speed and security.
9. Traffics: LI-FI is used in the traffic lights because in these light the LEDs are used which help in communication. There are headlights and back lights are in the vehicles used for vehicle to vehicle, vehicle to signal communication and traffic signals and accidental cases are improved.
10. **Power Plants and Hazardous Environments:** I-FI provides better connectivity to the power plants offers safe alternative to electromagnetic wave due to radio waves. Whereas Wi-Fi do not provide good connectivity to the power plants and other sensitive area because power plants require better connection and faster speed controlling and monitoring system. There are many application of LI-FI used in remote sensing areas, giga speed technology, smart lightings, RF avoidance, provide high transfer speed of data etc.

II. CONCLUSION:

In wireless communication LI-FI is the 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 carrier. 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 its create a many harmful effects to human beings. LI-FI provide a data up to 4 GBPS while use 5 milli watt optical output power and making use of high-bandwidth photodiodes at the receiving end. By enhancing the distance, using a simple lens, they can send data a distance of 10 meters at speeds of

1.1 Gbps.

for example ,in the transmission and receive encoding and decoding can be easily implemented in the circuit, reduce the errors.by using fast speed switching LEDs is a optical wireless communication, audio and videos in LEDs .this is new and creative technology to increase the speed, security , bandwidth, is safe and ever green technology.

III. REFFERENCES:

[1]. Shubham Chatterjee, Shalabh Agarwal, Asoke Nath, "scope and Challenges in Light Fidelity(Li-Fi)Technology in Wireless Data Communication", International Journal of Innovative Research in Advanced Engineering(IJIRAE), Issue 6, Vol. 2, Page 1-9,(June 2015).

[2]. M.Thanigavel,GKCE, Sullerpet "LI-FI Technology in Wireless communication", international journal of engineering research and development,vol.2, issue 10,October 2013.

[3]. Quick, Darren (2014). 10 Gbps Li-Fi System Shows Wireless Data Transfer in New Light http://www. gizmag.com /li-fi-wireless-technology/32968/

[4]. PankajSareen,"LI-FI Technology: the future of wireless communication, international journal of research & development in technology and management science-kailash, vol.-21,issue 6,march 2015.

[5]. S. Vinay Kumar, K. Sudhakar, L. Sudha Rani (2014). Emerging Technology Li-Fi over Wi-Fi , International Journal of Inventive Engineering and Sciences (IJIES), Vol. 2 Issue 3, February 2014

[6].Akshata m sonnad, Anjana Gopan,Sailakshmin R, Divya S, Ambikar "recent advancements in LI-FI technology" ,international journal of electrical and data communication ISSN:2320-2084,volume-1,issue-10,dec 2013.

[7]. Anurag Sakar,Shalabh Agarwal, Asoke Nath,"LI-FI technology: data transmission through visible light" ,international journal of advance research in computer science and management studies,volume3,issue6,june 2015.