

Li- Fi COMPETE THE Wi-Fi AND COMPARATIVE STUDY BETWEEN Li- Fi Vs Wi-Fi

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ABSTRACT:

Li-Fi transfer data through the illumination by sending data through an LED light bulb that varies in intensity faster than the human eye. Wi-Fi is great for general wireless coverage within buildings, whereas Li-Fi is ideal for high density wireless data coverage in confined area and for relieving radio interference issues. Wi-Fi already achieved extremely intense speed in lab. Li-Fi provide the better bandwidth, efficiency availability and security than the WIFI communication. In future Li-Fi technology has been more useful to all the sectors.

Keywords: Li Fi, Wi Fi, VLC (Visible Light Communication), LED (Light Emitting Diode)

I INTRODUCTION

Many computers can be connecting internet through the Wi-Fi connections but there are some drawbacks that drawbacks reduce with the use of latest technology Li-Fi (Light Fidelity). The Li-Fi technology proposed by the German physicist –Herald Haas. Systems can be connected to internet through one watt bulb using light as carrier instead of traditional radio frequencies, as in Wi-Fi. Li-Fi is the term some have used to label the fast and cheap wireless communication system, which is the optical version of Wi-Fi. Li-Fi uses visible light instead of Gigahertz radio waves for data transfer. It will transmits the data through illumination by taking the fiber optics by sending data through an LED light bulb (Fig 1)



Fig 1 - Li Fi Bulb

II HOW IT IS WORK

Li-Fi uses fast pulses of light to transmit information wirelessly. The main components of Li-Fi systems are as follows:

- A high brightness white LED which acts as transmission source.
- A silicon photodiode with good response to visible light as the receiving elements.

LED can be switched on and off generate the digital string difference combination of 0's and 1's. The communication rate greater than 100Mbps is possible by using speed LED with the help of various multiplexing techniques and VLC transmit the data rate can be increased by parallel data transmission using an array LED. The Li-Fi emitter system consists of 4 primary sub assemblies.

- Bulb
- RF power amplifier Circuit (PA)
- Printed circuit board (PCB)
- Enclosure

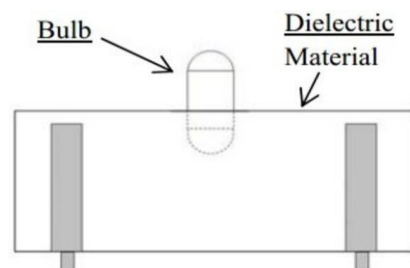


Fig 2 –Li-Fi bulb sub-assembly

Fig 2 The PCB controls the electrical inputs and outputs of the lamp and houses the micro controller used to manage different lamp functions. RF signal is generated by the solid state PA and is guided into an electric field about the bulb. The high concentration of the bulb to a plasma state at the bulb center its controlled plasma generates an instance source of light .All of these sub assemblies are contained in an aluminum enclosure.

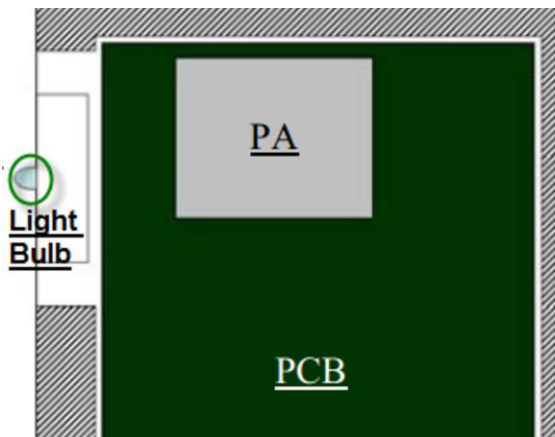


Fig 3
Bulb
Sub

Assembly

Fig 3 At the heart of LIFI is the bulb where as sealed bulb is embedded in a dielectric material. This design is more reliable than conventional light sources that insert degradable electrodes into the bulb. The dielectric material serves two purposes first as a waveguide for the RF energy transmitted by the PA and second as an electronic field concentrator that focuses energy bulb.

III HOW ITS DIFFER TO WIFI

Li-Fi technology is based on LED for the transfer of data. The four major limitations which the current wireless system faces are easily handled by this technology. Fig 4 capacity the first as we know is very limited as compared to the visible light spectrum(1:10000) and therefore no storage of the ever increasing demand of wireless spectrum. Availability being the second issue is solved as light is easily accessible as compared to Wi-Fi. Efficiency is the issue of utmost concern as the radio cellular base stations consume a lot of energy and mostly to cool them rather to transmit data and therefore only operational up to 5% efficiency on the other hand LEDs are highly efficient and energy consumption is

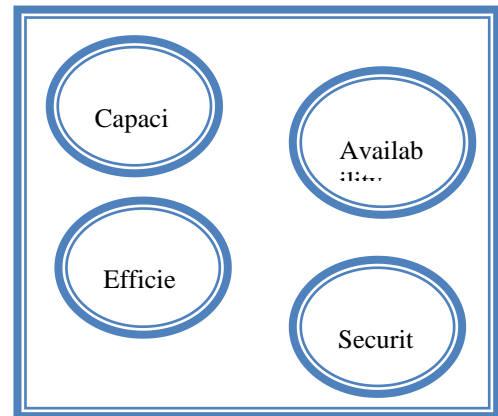


Fig 4 Major Illumination

never a problem. Security an issue which can't be neglected is a snap-if we can't see the light we can't access the data while radio waves which can penetrate through walls makes it prone to breach the security protocols.

IV COMPARISON BETWEEN LI-FI & WI-FI

Li-Fi is describing visible light communication technology applied to obtain high speed wireless communication. It derived this name by virtue of the similarity to Wi-Fi. Wi-Fi works well for general wireless coverage within buildings and Li-Fi is ideal for ideal for high density wireless data coverage inside a confined area or room and for relieving radio interference issues.

Table I is comparison of transfer speed of various technologies.

Technology	Speed	Data density
Wireless(Current)		
Wi-Fi IEEE 802.11n	150Mbps	*
Bluetooth	3Mbps	**
IrDA	4Mbps	***
Wireless(Future)		
Wi Gig	2Gbps	**
Giga-IR	1Gbps	***
Li-Fi	>1Gbps	****

Table I Comparison speed between the various wireless technologies

Advantage of Li-Fi

- a) Capacity : Light has 10000 times wider bandwidth than radio waves [5]. Also, light sources are already installed. So, Li-Fi has got better capacity and also the equipments are already available.
- b) Efficiency: Data transmission using Li-Fi is very cheap. LED lights consume less energy and are highly efficient.
- c) Availability: Availability is not an issue as light sources are present everywhere. There are billions of light bulbs worldwide; they just need to be replaced with LEDs for proper transmission of data.
- d) Security: Light waves do not penetrate through walls. So, they can't be intercepted and misused

A. Disadvantage of Li-Fi

One of the major demerits of this technology is that the artificial light cannot penetrate into walls and other opaque materials which radio waves can do. So a Li-Fi enabled end device (through its inbuilt photo-receiver) will never be as fast and handy as a Wi-Fi enabled device in the open air. Also, another shortcoming is that it only works in direct line of sight

V Application of Li-Fi

Applications of Li-Fi can extend in areas where the Wi-Fi technology lacks its presence like medical technology, power plants and various other areas. Since Li-Fi uses just the light, it can be used safely in aircrafts and hospitals where Wi-Fi is banned because they are prone to interfere with the radio waves. All the street lamps can be transferred to Li-Fi lamps to transfer data. As a result of it, it will be possible to access internet at any public place and street.

Some of the future applications of Li-Fi are as follows:

A. Wanna Live a Little Longer:

Ever since its existence, medical technology has been a couple of steps behind the wireless world. Operating rooms do not allow

Wi-Fi due to radiation concerns, and there is also that a whole lack of dedicated spectrum. Due to Wi-Fi interference from cell phones and computers causes signal blocking from monitoring equipment

B. Undersea Awesomeness:

Underwater ROVs, those favorite toys of treasure seekers, operate from large cables that supply their power and allow them to receive signals from their pilots above. ROVs work great, except when the tether isn't long enough to explore an area, or when it gets stuck on something. If their wires were cut and replaced with light —say from a submerged, high-powered lamp —then they would be much free to explore. They could also use their headlamps to communicate with each other.

B. Education systems:

Li-Fi is the latest technology that can provide fastest speed internet access. So, it can replace Wi-Fi at educational institutions and at companies so that all the people can make use of Li-Fi with the same speed intended in a particular area.

D Traffic management:

In traffic signals Li-Fi can be used which will communicate with the LED lights of the cars which can help in managing the traffic in a better manner and the accident numbers can be decreased [1]. Also, LED car lights can alert drivers when other vehicles are too close

E. Better and Efficient Power Plants:

Wi-Fi and many other radiation types are bad for sensitive areas like power plants. But thermal power plants need fast, inter-connected data systems to monitor things like demand, grid integrity and (in nuclear plants) core temperature. Li-Fi could offer safe (as no radiation) connectivity for these sensitive locations. Not only would this save a lot of money from the current power plant designs but the draw on a power plant's own reserves could be lessened if they haven't yet converted to LED lighting

V. Challenges for Li-Fi

Apart from many advantages over Wi-Fi, Li-Fi technology is experiencing some challenges. One of these shortcomings is that it works in direct line of sight. Another challenge is how the receiving device will transmit to the transmitting device. One cannot shift the receiving device in case of indoor arrangement of the apparatus as light cannot penetrate through walls and is easily blocked by somebody simply walking in front of LED source

VI Conclusion

Wi-Fi hotspot to transmit data wirelessly. The concept of Li-Fi is attracting a lot of eye-balls because it offers a genuine and very efficient alternative to radio based wireless. It has a bright chance to replace the traditional Wi-Fi because as an ever increasing population is using wireless internet, the airwaves are becoming increasingly clogged, making it more and more difficult to get a reliable, high-speed signal. The shortage of radio-frequency bandwidth and boot out the disadvantages of Wi-Fi. Li-Fi is the upcoming and on growing technology acting as competent for various other developing and already invented technologies. Hence the future applications of the Li-Fi can be predicted and extended to different platforms and various walks of human life.

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