LI-FI (LIGHT FIDELITY)

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Abstract- **Now a days with the arrival of technology, communication became the backbone of ICT. Present paper reflects the long run of Communication (LI-FI) which can have an effect on all lives. Li-Fi stands for light-weight Fidelity. Li-Fi technology, projected by the German man of science Harald Haas, provides transmission information of knowledge of information} through illumination by causation data through associate degree junction rectifier light-weight bulb that varies in intensity quicker than the human eye will follow. This paper focuses on developing a Li-Fi based mostly system and analyzes its performance with relevance existing technology. WI-Fi is nice for general wireless coverage among buildings, whereas Li-Fi is good for top density wireless knowledge coverage in confined space and for relieving radio interference problems. Li-Fi provides higher information measure, efficiency, availableness and security than Wi-Fi and has already achieved blisteringly high speed within the work. By investment the cheap nature of LEDs and lighting units there are a unit several opportunities to use this medium, from public web access through street lamps to auto-piloted cars that communicate through their headlights. Haas envisions a future wherever knowledge for laptops, sensible phones, and tablets are transmitted through the sunshine in an exceedingly area.**

I. INTRODUCTION

Now days with the appearance of technology, communication became the backbone of ICT. Present paper reflects the long run of Communication (LI-FI) which can have an effect on all lives. Li-Fi stands for light-weight Fidelity. Li-Fi technology, projected by the German scientist Harald Haas, provides transmission information of knowledge of information through illumination by causing data through associate degree semiconductor diode light-weight bulb that varies in intensity quicker than the human eye will follow. This paper focuses on developing a Li-Fi based mostly system and analyzes its performance with relevance existing technology. Wi-Fi is nice for general wireless coverage at intervals buildings, whereas Li-Fi is right for prime density wireless information coverage in confined space and for relieving radio interference problems. Li-Fi provides higher information measure, efficiency, handiness and security than Wi-Fi and has already achieved blisteringly high speed within the science lab. By leverage the cheap nature of LEDs and lighting units there are several opportunities to take advantage of this medium, from public web access through street lamps to auto-piloted cars that communicate through their headlights. Haas envisions a future wherever information for laptops, good phones, and tablets are going to be transmitted through the sunshine in an exceedingly space. Light-weight is inherently safe and might be employed in places wherever frequency communication is commonly deemed problematic, like in craft cabins or hospitals. Thus actinic ray communication not solely has the potential to resolve the matter of lack of spectrum area, however may also alter novel application. Li-FI technology has higher potential, it's pretty much potential to transmit the information via light-weight by dynamic the glint rate that offer completely different strings of one and zero, and its intensity is modulated thus quickly that the human eyes cannot notice. The actinic ray spectrum is unused; it is not regulated, and might be used for communication at terribly high speeds. Web services are terribly extremely stringent and essential accessories in ICT.

II. PRINCIPLE OF LI-FI SYSTEM

Li-Fi could be a quick and low-cost optical version of Wi-Fi. It's supported actinic radiation Communication (VLC).VLC could be an electronic communication medium, that uses actinic radiation between four hundred THz (780 nm) and 800 THz (375 nm) as optical carrier for information transmission and illumination. It uses quick pulses of sunshine to transmit data wirelessly. The most elements of Li-Fi system could be a high brightness white diode that acts as transmission supply, a atomic number 14element semiconductor semiconducting material photodiode with sensible response to actinic radiation because the receiving element. The LI-FI product consists of 4 subassemblies that area unit as Follows

1. Bulb
2. RF amplifier
3. Printed circuit board
4. Enclosure circuit

At the center of LIFI is that the bulb assembly wherever a

sealed bulb is embedded in an exceedingly nonconductor material. This style is additional reliable than typical lightweight sources that insert degradable electrodes into the bulb. The PCB controls the electrical inputs and outputs of the lamp and homes the microcontroller accustomed manage completely different lamp functions.

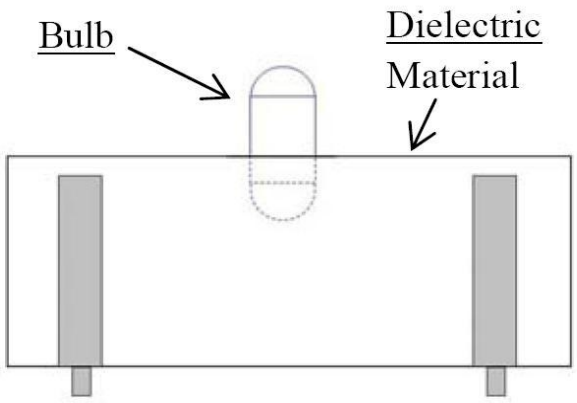

Fig.1 The bulb sub assembly

A RF (radio-frequency) signal is produce by the solid-state PA and is guided into an electrical field regarding the bulb.

III. WORKING

The basic principle of Li-Fi is that light has 10000 times as broad a spectrum because the radio frequencies that Wi-Fi uses, providing rather more information measure, once broached this is often accomplished by the unsteady of diode lightweight bulbs to make computer code (on = one, off = 0), and is finished at higher rates than the human eye will discover. The additional LEDs in your lamp, additional information it will method.

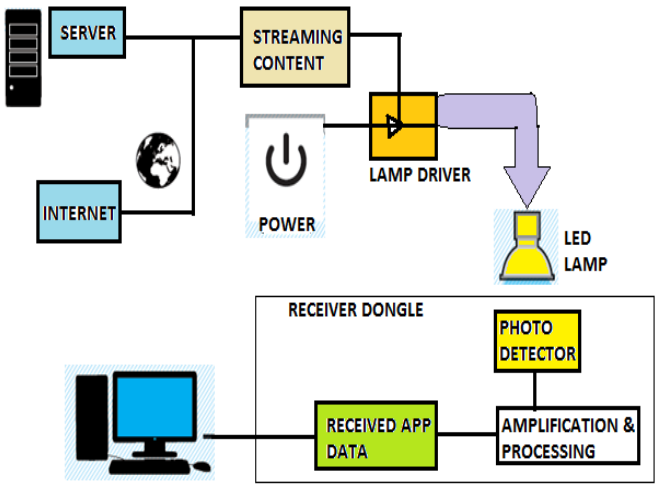

Fig 2 Li-fi processing

LiFi new technology is such as infrared remote controls that send knowledge through associate semiconductor diode lightweight bulb. To additional get a grasp of Li-Fi contemplate associate IR remote. It sends one knowledge stream of bits at the speed of 10,000-20,000 bps. Currently replace the IR semiconductor diode with a light-weight Box containing an oversized semiconductor diode array. This technique is capable of causing thousands of such streams at in no time rate. Light-emitting diodes (commonly brought up as LEDs and located in traffic and street lights, automobile brake lights, device units and innumerous different applications) will be switched on and off quicker than the human eye will notice, inflicting the sunshine supply to look to air unceasingly, although it's indeed 'flickering'. Radio waves area unit replaced by lightweight waves in an exceedingly new technique of information transmission that is being referred to as Li-Fi. Light-emitting diodes will be switched on and off quicker than the human eye will notice, inflicting the sunshine supply to look to air unceasingly. A flicker lightweight will be unbelievably annoying, however has clothed to possess its side, being exactly what makes it potential to use lightweight for wireless knowledge transmission. Light-emitting diodes (commonly brought up as LEDs and located in traffic and street lights, automobile brake lights, device units and innumerous different applications) will be switched on and off quicker than the human eye will notice, inflicting the sunshine supply to look to air unceasingly, although it's indeed 'flickering'. This invisible on-off activity permits a sort of information transmission mistreatment binary codes: change on associate semiconductor diode may be a logical '1', change it off may be a logical '0'. Data will thus be encoded within the lightweight by variable the speed at that the LEDs flicker on and off to relinquish completely different strings of 1s and 0s. Throughout the globe awareness of the requirement to be energy economical and thoughtful of the setting is chop-chop growing. though the technology accustomed produce the semiconductor diode lightweight bulbs has existed for several years, it's solely in recent years that these bulbs have received their due recognition as a light-weight supply that's reliable and premium quality, in addition as extremely energy economical.

A. LI-FI COMMUNICATION

Li-Fi communication is sculptured once communication protocols established by the IEEE 802 workgroup. This commonplace defines the physical layer (PHY) and media access management (MAC) layer. The quality is in a position to deliver enough knowledge rates to transmit audio, video and transmission services. It takes count of the optical transmission quality, its compatibility with artificial lighting gift in infrastructures, the defiance which can be caused by interference generated by the close lighting. Currently days with the appearance of technology, communication became the backbone of ICT. ICT had created our globe sort of a city. These days everybody (Business, establishments, organizations, entrepreneurs) all are thrust for obtaining right

data at the proper time and right place. This needs quick net property, Technology and enormous spectrum of channels. The visible radiation communication which can be the longer term of net Another advantage that LIFI technology offers over HID lamps is that the speedy stimulus time. Electrodes in HID lamps limit the number of current and power which will be delivered to the bulb inflicting slow mercury evaporation protraction time to brightness. The long term use of Communication (LI-FI) which can have an bad effect on all our lives. It is a technology that will be as quick as five hundred MBPS (30GBPS per minute) another, price effective and additional strong and helpful than Wi-Fi.

IV. COMPARISONS OF WI-FI & LI-FI

LI-FI could be a term of one accustomed describes actinic ray communication technology applied to high speed wireless communication. It no heritable this name attributable to the similarity to WI-FI, solely exploitation lightweight rather than radio. WI-FI is nice for general wireless coverage among buildings, and li-fi is good for prime density wireless knowledge coverage in confined space and for relieving radio interference problems, that the two technologies may be thought-about complimentary. Li-Fi is that the name given to explain actinic ray communication technology applied to get high speed wireless communication.

TABLE I Comparisons of WI-FI & LI-FI

CHARACTERSTICS	**WI-FI**	**LI-FI**
Frequency	2.4 GHz to 5 GHz	No frequency for light
Standard	IEEE 802.11	IEEE 802.15
Range	100 meters	Base on LED light
Primary application	Wireless local area networking	Wireless local area networking
Data transfer rate	11 Mbps	>1Gbps
Power consumption	Medium	Low
Security	Its medium secure	Its high secure
Cost	Medium	High

V. APPLICATIONS

There square measure various applications of this technology since Li-Fi uses simply the sunshine, it may be used safely in aircrafts and hospitals wherever Wi-Fi is illegal as a result of they're at risk of interfere with the radio waves. A number of the longer term applications of Li-Fi square measure as follows

• Undersea Awesomeness

Underwater ROVs, those favorite toys of treasure seekers and James Cameron, operate from massive cables that provide their power and permit them to receive signals from their pilots on top of. ROVs work nice, except once the tether isn't long enough to explore a locality, or once it gets stuck on one thing.

• Cheaper web in aircrafts

Whenever we have a tendency to travel through airways we have a tendency to face the matter in communication media, as a result of the complete airways communication is performed on the premise of radio waves.

• Green info technologies

Green info technology implies that not like radio waves and alternative communication waves effects on the birds, human body's etc.

• Public web hotspots

There square measure uncountable street lamps deployed round the world. Every of those street lamps might be a free access purpose.

• Disaster management

Li-Fi may be used as a strong suggests that of communication in times of disaster like earthquake or hurricanes. The common folks might not grasp the protocols throughout such disasters.

•Education systems

Li-Fi is that the latest technology which will offer quickest speed web access. So, it will replace Wi-Fi at academic establishments and at corporations in order that all the folks will create use of Li-Fi with a similar speed supposed in an exceedingly explicit space.

• Medical Applications

Operation theatres (OTs) don't permit Wi-Fi because of radiation considerations. Usage of Wi-Fi at hospitals interferes with the mobile and computer that blocks the signals for watching equipment's. So, it's going to be venturous to the patient's health.

• Applications in sensitive areas

Power plants want quick, inter-connected knowledge systems in order that demand, grid integrity and core temperature (in case of atomic energy plants) may be

monitored. Li-Fi may also be utilized in oil or chemical plants wherever alternative transmission or frequencies might be venturous.

VI. ADVANTAGES

Although the employment of sunshine so as to transmit information is often restricted compared to radio waves, there's an excellent quantity of prospects which will be developed attributable to this technology. In essence, one of a monitor may transmit one channel of data to a supply though this technology remains in its babe stages; the utility of this Li-Fi technology has implications for an excellent quantity of fine.

• Cost

Instead of running near a mile price of cable, the LED-powered Li-Fi association may well be accustomed beam the data on to the destination.

•Efficiency

Data transmission victimization Li-Fi is incredibly low-cost. Crystal rectifier lights consume less energy and are extremely economical.

• Availability

LED lights also are noted for his or her sturdiness. AN incandescent light-weight bulb will commonly last for up to one thousand hours; a crystal rectifier light-weight bulb encompasses an anticipation of up to thirty years. There are billions of sunshine bulbs worldwide; they merely got to get replaced with LEDs for correct transmission of information.

• Security

Light waves don't penetrate through walls. So, they can't be intercepted and used. Thus this technology is sort of secure.

• High Speed

High speed, as high as 500mbps or 30GB per minute

• Free from Frequency

Li-fi is a communication media in the form of light, so no matter about the frequency bandwidth problem. It does not require the any bandwidth spectrum i.e. we don't need to pay any amount for communication and license.

• Increase Communication Safety

Due to visual light-weight communication, the node or any terminal attach to our network is visible to the host of network.

•Multi User Communication

Li-Fi supports the broadcasting of network; it helps to share multiple things at one instance known as broadcasting.

VII.CONCLUSION

The possibilities area unit varied and may be explored any. If this technology becomes with reason marketed then each bulb may be used analogous to a Wi-Fi hotspot to transmit information wirelessly. By virtue of this we are able to build a greener, cleaner, safer and a resplendent future. The idea of Li-Fi is attracting plenty of eye-balls as a result of it offers a real and extremely economical different to radio primarily based wireless. it's a bright likelihood to exchange the normal Wi-Fi as a result of as associate degree ever increasing population is victimization wireless web, the airwaves are getting more and more clogged, creating it a lot of and harder to induce a reliable, high-speed signal. This concept guarantees to unravel problems like the shortage of radio-frequency information measure and boot out the disadvantages of Wi-Fi. Li-Fi is that the forthcoming and on growing technology acting as competent for numerous alternative developing and already made-up technologies. As a growing range of individuals and their several devices access wireless web, the airwaves are getting more and more clogged, creating it a lot of and harder to induce a reliable, high-speed signal.

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