

DATA TRANSFER USING VISIBLE LIGHT (LIGHTFIDELITY)

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Abstract- Visible Light Communication (VLC) technology, one of the advanced optical wireless communication technologies, in which light in the visible region (375nm-780nm) is used as a medium for data transmission is more secure and achieves high data rates as compared to conventional wireless technologies like Wi-Fi, Bluetooth, Wi-max etc., which use radio waves for communication. While using wireless internet, when more than one device is tapped into the network, then bandwidth got frustrated at the slow speeds. To overcome the shortage of bandwidth we can use light to transfer the data which can be known as “DATA THROUGH ILLUMINATION”. The idea behind is that, infra-red remote is slightly modified i.e., LED light bulb that varies in intensity which cannot be followed by the naked eye. It is possible to encode the data in the light by varying the light at which the LEDs flicker on and off to give different strings of 1s .and 0s. While using mixtures of red, green and blue LEDs to alter the light frequency encoding a different data channel. If you can’t see the light then you cannot access the data so the security would be snapped.

KEYWORDS: Data Transfer, Visible Light, Sound Transfer

1. INTRODUCTION

Transfer data from one place to another is one of the most important day-to-day activities. The current wireless networks that connect us to the internet are very slow when multiple devices are connected. As the number of devices that access the internet increases, the fixed bandwidth available makes it more and more difficult to enjoy high data rates and connect to a secure network. Nowadays, Everyone is interested in using his mobile phone, laptop to communicate with other people through Wireless-Fidelity (Wi-Fi) systems, and this technology, Wi-Fi, is widely used in all public areas like home, cafes, hotels and airports by people, also the time usage of wireless systems is increasing exponentially every year; but the capacity is going down, due to the limitation of Radio Frequency (RF) resources, so we are going to suffer from severe problem. In order to overcome this problem in the future, Professor Harald Haas, an expert in optical wireless communications, proposes in 2011 a brilliant and applicable solution by using light to transmit data, he demonstrated how an Light-Emitting Diodes (LED) bulb equipped with signal processing technology could stream a high-definition video to a

computer and he showed that one watt LED light bulb would be enough to provide net connectivity to four computers. This new technology is known as Light-Fidelity (Li-Fi). It is a short range wireless communication system based on light illumination from LED, and use the visible light as a signal carrier instead of traditional RF carrier as in Wi-Fi. Professor Harald Haas coined the term "Light-Fidelity" and set up a private company, called "Pure Visible Light Communication", to exploit that technology. He envisions a future where data for laptops and smart phones are transmitted through the light in a room in a secure way. In this seminar, we will talk about its features, applications and advantages, some practical projects that have been implemented; and we will show that it can be seriously the future of communication technology.

2. LITERATURE SURVEY

The most of the people are using Wi-Fi Internet devices, which will be useful for 2.4-5GHz RF to deliver wireless Internet access surrounded our home, offices, schools, and some public places also. We are quite dependent upon these nearly ubiquitous services [7, 15]. While Wi-Fi can cover an entire house, school, the bandwidth

is limited to 50-100 megabits per seconds (Mbps). It is a most current Internet services, but insufficient for moving large data files like HDTV movies, music libraries and video games. The most of the dependent upon 'the cloud' or our own 'media services' to store all of our files, including movies, photos, audio and video devices, games, the more and most bandwidth and speed should be needed to access this data. Therefore RF-based technologies such as today's Wi-Fi are not the optimal way. In addition, Wi-Fi may not be the most efficient way to provide new desired capabilities such as precision indoor positioning and gesture recognition. The optical wireless technologies, sometimes called visible light communication (VLC), and more recently referred to as Li-Fi. On the other hand, offer an entirely new paradigm in wireless technologies in the terms of communication speed, usability and flexibility, reliability. VLC is the possible solution to the global wireless spectrum shortage. technology is a fast and cheap optical version of Wi-Fi. It is a based on Visible Light Communication [12, 18]. The VLC is a data communication medium using visible light between 400THz to 375THz as optical carrier for the data transmission and illumination. The data is encoded in the light to generate new data stream by varying the flickering rate, to be clearer, by modulating the LED light communication source [4]. This is a whole new spectrum of possibilities as compared to the

radio waves spectrum and is 10000 times more in size. Visible light is not injurious to vision and are a mandatory part of an infrastructure, therefore abundantly available and easily accessible. Comparing the number of radio cellular base stations (1.4 million) to the number of light bulbs (14 billion) installed already the ratio is coincidentally same

LiFi is a structure for these giving new capacities to current the data and future administrations, applications and end clients. This is the splendid thought was first is show cased by Harald Haas from place University of Edinburgh, UK, in his TED Global chat on the noticeable VLC. He clarified, basic, if the Light of the transmitting diodes is on, you transmit computerized 1; if it's off you transmit a 0. The LEDs can be turned here and there rapidly, which gives great open doors for transmitting information. Dr. Harald Haas calls it as Data through light and he is able to flow HD video from a regular Light emitting diodes lamp.

Prof. Harald Haas started his exploration in this field in 2004, gave a presentation exhibition of what he called a LiFi model at the TED Global Conference in Edinburgh on 12 July, 2011. He showed an information pace of transmission of around 10Mbps. After two months he accomplished 123Mbps. [8]. In October 2011, various organizations and industry bunches

shaped the Li-Fi Consortium, to advance rapid optical remote frameworks and beat the restricted measure of radio-based remote range accessible by misusing a very surprising piece of the electromagnetic range.

The innovation was exhibited at the 2012 Consumer Electronics Show in Las Vegas utilizing a couple of Casio advanced mobile phones to trade information utilizing light of alterable power emitted from the screens, noticeable a good ways off of up to ten meters Li-Fi has the upside of having the option to be utilized in touchy territories, for example, in

airplane without causing obstruction. Later in 2012, Pure Visible light correspondence, a firm was set up to market Li-Fi and to achieve Li-Fi items for firms introducing Light emanating diodes lighting frameworks.

Examiners are using Visible Light Spectrum go between 400 THz (780 nm) to 800 THz (375 nm) concerning transmission of data since that is unblemished yet. We can achieve data pace of more than 1 GB/s using Li-Fi instead of 54-600 megabits for each second (Mbps) of Wi-Fi which is must for the current High Definition Digital world [6]. The sending and accepting is basic as we use transceiver built-in Light emitting diodes lamps for both purposes with normal lightening room property but in Wi-Fi we use modems for only data transmission. Obvious light correspondence is an information correspondence Medium, which utilizes

noticeable light between 400 THz (780 nm) and 800 THz (375 nm) as optical bearer for information transmission and light. Quick heartbeats are utilized for remote transmission. The correspondence framework parts are: A high splendor white Light radiating diodes which goes about as a correspondence source and Silicon photograph diode which shows great reaction to noticeable frequency area Utilizing light to convey remote web will likewise permit network in conditions that don't as of now promptly bolster Wi-Fi, for example, airplane lodges, clinics and perilous situations. Light is as of now utilized for information transmission in fiber-optic links and for point to point joins, yet Li-Fi is an uncommon and novel blend of advancements that permit it to be all around received for versatile ultra-fast web correspondences .

Move information starting with one spot then onto the next is one of the most significant everyday exercises. The current remote systems that interface us to the web are extremely moderate when different gadgets are associated. As the quantity of gadgets that get to the web expands, the fixed transfer speed accessible makes it increasingly more hard to appreciate high information rates and interface with a safe system. These days, Everyone is keen on utilizing his cell phone, PC to speak with others through Wireless-Fidelity (Wi-Fi) frameworks, and this innovation, Wi-Fi, is generally utilized in every open zone

like home, bistros, lodgings and air terminals by individuals, likewise the time use of remote frameworks is expanding exponentially consistently; yet the limit is going down, because of the impediment of Radio Frequency (RF) assets, so we will experience the ill effects of serious problem .

Security issues in light fidelity (LiFi) technology are vulnerable to a variety of attacks. Its security is a vital and difficult issue to consider when designing network system. A study of security issues in Li Fi technology have many properties such as: Integrity, brilliance, availability and confidentiality. These properties are important to secure it. As a result, security standard services such as confidentiality, integrity, availability, authentication and access control. We will study the threat, attack, and a study of security issues in

Li Fi technology of network system. However, the main goal of this study was to describe different types of analysis security issues in Li Fi technology of network system using network simulator version three (NS3) Simulators which was chosen because of its high reliability under a new powerful graphical user interface, optical communication systems to obtain accurate results and propose a solution to improve its security .

Most by far of noticeable light correspondence "VLC" examination to date has concentrated on the improvement of the

physical medium. Li-Fi assuming a significant job to defeat the deficiency of radio signs data transmission by utilizing light source. Its execution is getting the beginning and making an incredible unrest in remote system documented. Various analysts and researchers are accomplishing their incredible work done to illuminate the basic issue of Li-Fi. Some improvement advances and issues are talked about in different exploration papers which are clarified as beneath with the great contribution of researchers: Mushammad Usama, Kamran Saeed et. [11], has proposed a new method for Li-Fi using new technology i.e. Mobility in IP-based Communication Approach. They formulated a problem in Li-Fi technology i.e. loss of connection due to obstacle occur between source and destination as light signals can't penetrate through wall.

3.EXISTING SYSTEM:

Transmitting data through photodiodes has been happening for a long time through our IR Remotes.

Every time we pressed a button on our Television remote the IR LED in the Remote pulses very fast this will be received by the Television and then decoded for the information.

Wi-Fi and Bluetooth are the two consistent wide range sources used by multiple applications today.

DISADVANTAGES OF EXISTING SYSTEM:

No efficient methods used.

More complex

4. PROPOSED SYSTEM:

The aim of this paper is to identify different approaches Visible light is a new technique of data transmission method.

Li-Fi, data is transmitted by modulating the intensity of the light, which is then received by a Photo-sensitive detector.

The receiver section interprets the incoming light which is detected using a solar panel and converts to the audible sound signal with the help of Speaker.

ADVANTAGES OF PROPOSED SYSTEM:

Li-Fi, which uses visible light to transmit signals wirelessly, is an emerging technology poised to compete with Wi-Fi. Also, Li-Fi removes the limitations that have been put on the user by the Radio wave transmission such as Wi-Fi as explained above vide 4.1. Advantages of Li-Fi technology include:

Efficiency:

The efficiency of each radio station is just 5% due to the fact that most of the energy is used for the cooling system in base of the radio station. Li-Fi is highly efficient because LED consumes less energy. It is effective in terms of low cost, low required energy and for various Environments. In this topic there are some main and important points

- **Low cost:** Requires fewer components than radio technology, due to the cheap price of the LEDs and Digital components compared with the microwave equipment.

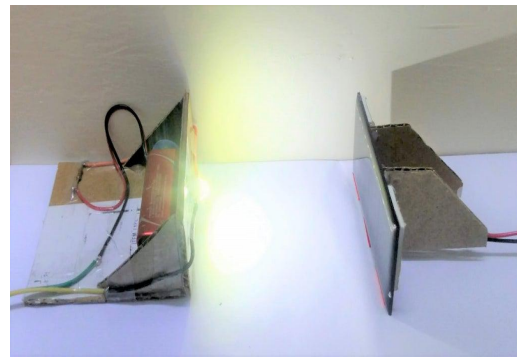
5. MODULES:

Li-Fi which can be the future of data communication appears to be a fast and cheap optical version of Wi-Fi. Being a Visible Light Communication (VLC), Li-Fi uses visible light of electromagnetic spectrum between 400 THz and 800 THz as optical carrier for data transmission and illumination. It uses fast pulses of light to transmit information in wireless medium. The main components of a basic Li-Fi system may contain the following: a) A high brightness white LED which acts as transmission source. b) A silicon photodiode

with good response to visible light as the receiving element. Switching the LEDs on and off can make them generate digital strings with different combination of 1s and 0s. To generate a new data stream, data can be encoded in the light by varying the flickering rate of the LED. In this way, the LEDs work as a sender by modulating the light with the data signal. The LED output appears constant to the human because they are made to flicker at a phenomenal speed (millions of times per second) and it's impossible for human eye to detect this frequency. Communication rate more than 100 Mbps can be achieved by using high speed LEDs with the help of various multiplexing techniques. And this VLC data rate can be further increased to as high as 10 Gbps via parallel data transmission using an array of LED lights with each LED transmitting a different data stream. The Li-Fi transmitter system comprises of four primary subassemblies: Bulb RF Power Amplifier Circuit (PA) Printed. The Printed circuit board (PCB) controls the electrical inputs and outputs of the lamp and houses the microcontroller used to manage different lamp functions. A Radio Frequency (RF) signal is generated by the Power Amplifier and is directed into the electric field of the

bulb. As a result of the high concentration of energy in the electric field, the contents of the bulb will get vaporized into a plasma state at the bulb's centre. And this controlled plasma in turn will produce an intense source of light. All of these subassemblies are contained in an aluminium enclosure

6.RESULT



7. CONCLUSION

Although there's still a long way to go to make this technology a commercial success, it promises a great potential in the field of wireless internet. A significant number of researchers and companies are currently working on this concept, which promises to solve the problem of lack of radio spectrum, space and low internet connection speed. By deployment of this technology, we can migrate to greener, cleaner, safer communication networks. The very concept of Li-Fi promises to solve issues such as,

shortage of radiofrequency bandwidth and eliminates the disadvantages of Radio communication technologies. Li-Fi is the upcoming and growing technology acting as catalyst for various other developing and new inventions/technologies. Therefore, there is certainty of development of future applications of the Li-Fi which can be extended to different platforms and various walks of human life

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