Li-Fi a Ray of Future

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ABSTRACT:

Nowadays everyone uses technologies like computers, smartphones and internet to accomplish their tasks. Generally sharing of information or data is done with the help of wired or wireless connection. Wireless communication has become a fundamental need of human being. In wireless category wifi is available for data transmission. The wireless data is transmitted by the radio waves but due to limitations of radio waves such as availability, efficiency and speed Dr. Harald Haas proposed Li-Fi technology. That means using the visible spectrum i.e. LED light to send the data. It can overcome the issues related to data transfer using wifi technology or radio waves.

Keywords: Data Transmission, Li-Fi, Radio Waves, Visible Spectrum, Wireless Communication, Wi-Fi

1. INTRODUCTION

In today’s world we cannot think a life without internet. We are doing various activities with the help of internet. Generally we are using internet for data transmission. Obviously we want to transfer the data with high speed. Wireless communication between the devices facilitates the efficient and fast way of data transmission. Wireless communication becomes a need for every human being. Everyone use it in their day to day life. The wireless data is transmitted by the electromagnetic waves precisely by the radio waves. Due to limitations of radio waves such as availability, efficiency and speed Dr. Harald Haas proposed Li-Fi technology. Li-Fi stands for Light-Fidelity. In 2011 Dr. Harald Haas named the technology of transmitting data through visible light as Li-fi. Li-fi uses visible light instead of radio waves in data transmission [1]. With the help of li-fi we can transmit the data by LED light beam or connect to internet by just a LED light beam. The working is very simple if the LED (Light Emitting Diode) is ON, it means we are transmitting the data that is we transmit a digital 1 and if the LED is OFF it means we transmit a digital 0 that is no data transfer. Li-fi is much simpler than the radio frequency communication. Li-fi uses direct modulation which is similar to techniques used in infrared communication but due to safety reasons infrared is used in low power. LED has high intensity and we can achieve high transmission rates [2] [3].

2. LIMITATIONS OF RADIO WAVES

The wireless data is generally transmitted by the Radio waves but the radio waves are limited. Radio waves have low frequency so it cannot transmit large amount of data at one time. Radio base stations consume lot of energy. Security is also the issue, because radio waves can go through walls and anyone can interpret it. We cannot use radio waves while traveling in aircraft because it can affect the airlines signal. So we have to switch off the devices like mobile phones while traveling [2].
We cannot use the Gamma rays, Ultraviolet and X-rays for data transmission because they are dangerous for human beings. We are also having the Infrared rays but due to safety reasons infrared is used in low power. The visible light spectrum is safe for use and LI-Fi makes use of it for wireless data transmission [2].

3. WORKING OF Li-Fi
Li-Fi i.e. Light-Fidelity facilitates the cheap and fast communication. Li-fi uses visible light spectrum instead of radio waves for data transmission. It sends the data through LED light beam. The li-fi requires two main components first one is the Light Emitting Diode (LED light) which will act as a light emitter and second is photodiode that is light sensor. The working is very simple if the LED (Light Emitting Diode) is ON, it means we are transmitting the data that is we transmit a digital 1 and if the LED is OFF it means we transmit a digital 0 that is no data transfer. The light sensor or photodiode will detect binary 1(one) when light is ON and binary zero when light is OFF. Here LED light will act as a source of transmission [4]. The different combinations of one’s and zero’s (1s and 0s) can be generated by switching LED light ON and OFF. Data is encoded in the light by varying the current to the LED and we can regulate the output at enormously high speeds which can be detected by a photo detector device. LED light now act as a source by regulating the LED light with data signals. The regulating rate of LED light’s is so high that it will appear constant light to human eye. Thus we can encode data into light by switching LED ON or OFF. The light ON will act as a binary 1 and light OFF as a binary zero. This modulation of light that is switching of light ON and OFF is done so fast that it will appear as a constant light [3] [5].
4. APPLICATIONS OF Li-Fi

As we know capacity is the issue with radio waves, we overcome this issue with Li-Fi technology it has 10000 times more spectrum. A LED light consumes less energy thus we can transfer data at the low cost. Now days LED lights are everywhere and also we can replace other lights with LED. The Prominent advantage of Li-Fi is the security. Li-Fi is using light for data transfer and light does not go through the wall so no one can interpret it. We can also use the Li-Fi while travelling in the aircraft as it does not affect the airlines signal. We can also use it on the highways where headlight of vehicles can be replaced by the LED or LED Street light can also do the task [2] [6].

There are various advantages of Li-Fi some are as below. It can be used for transmitting the data wirelessly under the water and it can help in various defense operations under water. Li-Fi can be used to make university or college campuses connected. Li-Fi will provide high speed connectivity within campuses. The prominent use is in the places where use of Wi-Fi or radio waves is prohibited. We can use Li-Fi in Places such as airplanes, hospitals and public places. It can also help in traffic management where LED lights of vehicles can communicate or transfer data among each other. Also traffic lights with LED can transmit the data. So where there is the light data transfer will be possible there [2].

4. CONCLUSION

Data transmission with Li-Fi is safer it has high speed of transmission. We can use Li-Fi where radio wave transmission is prohibited. We can connect to internet or transit data where LED light is available. We can also increase the capacity by replacing other lights with Light Emitting Diode (LED). Li-Fi will provide connectivity as well as the illumination. Li-Fi technology will definitely brighten the future and provide high speed data transmission.

REFERENCES