

A Study on Li-Fi Technology

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Abstract—In this generation of advanced science, a number of wireless connections are available to connect to the internet. It has become a very common tool to access wireless internet from a coffee shop to a conference hall. As the number of people accessing the wireless network has been increased. So one of the German physicist Harald Haas has come up with an idea of accessing data through LED bulb that varies in intensity faster than a human eye can.

Index Terms—Bandwith, Spectrum, Visible Light.

I. INTRODUCTION

Li-Fi is a technology for wireless communication between devices using light to transmit data and position. In its present state only, LED lamps can be used for the transmission of visible light. It was introduced by Harald Haas during the year 2011. It's communications system that is capable of transmitting data at high speeds over the visible light, spectrum, ultraviolet and infrared radiation.



Fig. 1. Li-Fi

A. What is Li-Fi

Li-Fi stands for Light Fidelity. It is a light-based communication technology that uses visible light waves to deliver data, instead of radio waves as it is the case of Wi-Fi. The system works by transmitting data as light signals using LED light bulbs. Although Li-Fi is mostly used to off-load data or information from existing Wi-Fi networks, it may also be used to provide capacity for a greater downlink demand in such a way that the existing wireless or wired network infrastructure may end up as a complementary technology to Li-Fi.



Fig. 2. What is Li-Fi

B. How does it Work

With Li-Fi, the transmission of data is achieved by modulating the intensity of the light. The modulated light signal is then received by a photo-sensitive detector, which then converts the signal back into electronic data. This modulation is performed in such a way that it is not perceptible to the human eye. Li-Fi transmits binary data in the form of light pulses and it relies on Optical Wireless Communication (OWC) technology, thus dispensing with cables or optical fibers. Li-Fi can cover up to three meters distance wise.

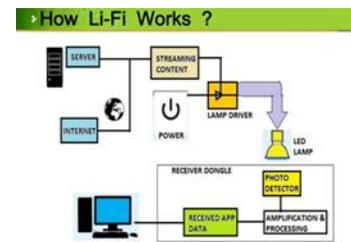


Fig. 3. How Li-Fi works

C. Li-Fi Internet

Li-Fi can cover up to three meters distance, it will become the future next best internet solution in the short-term future. Due to its low cost, Li-Fi seems like a better way to transfer data and surf on the web. Unlike Wi-Fi, Li-Fi does not depend at all on the radio spectrum, which not also makes it cheaper than Wi-Fi, but also faster and much more secure. Since it only needs an LED bulb and a receptor, Li-Fi is increasingly becoming a more suitable candidate both for speed and security. Some experts say it's the successor of Wi-Fi itself, but for now it's only on its testing and beta stage; and it also would need help from Wi-Fi to work properly on its early stages. In addition, it would still need help from Wi-Fi to work properly on its early stages.

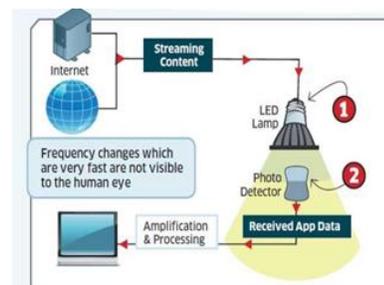


Fig. 4. Li-Fi internet

D. Application

- Security
- Dense urban environments
- Cellular communication
- EMI Sensitive environments
- Localized advertising
- Under water communication
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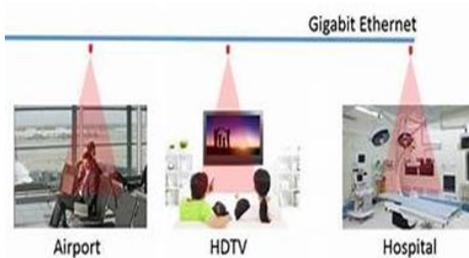


Fig. 5. Applications

E. Advantages

- It is operated using visual light technology which is already used in offices and homes. Using a point-to-point array, office buildings are connected without cables, so it is cost efficiency.
- The scope of Li-Fi technology is very wide.
- The light cannot pass through solid and opaque structures and the network is available within a room .So that it is secured.



Fig. 6. Advantages

F. Disadvantages

- Internet cannot be used without a light source. This could limit the locations and situations in which Li-Fi could be used.
- It uses visible light, and light cannot penetrate walls, the signal's range is limited.
- One of the biggest potential drawbacks is the interception of signals outdoors.

II. CONCLUSION

Hence Li-Fi has many advantages and found applications in many fields.

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