

LI-FI Communication

Poshettywar Baswaraj¹, Madhavi²

¹M.Tech Student ,CMR Engineering College, Telangana, India

²Asst. Professor ,ECE Dept,CMREC,Telangana ,India

ABSTRACT : Li-Fi is transmission of data through illumination by taking the fiber out of fiber optics by sending data through a LED light bulb that varies in intensity faster than the human eye can follow. 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. The term was first used in this context by Harald Haas in his TED Global talk on Visible Light Communication.

Keywords : lifi,LED

I. INTRODUCTION

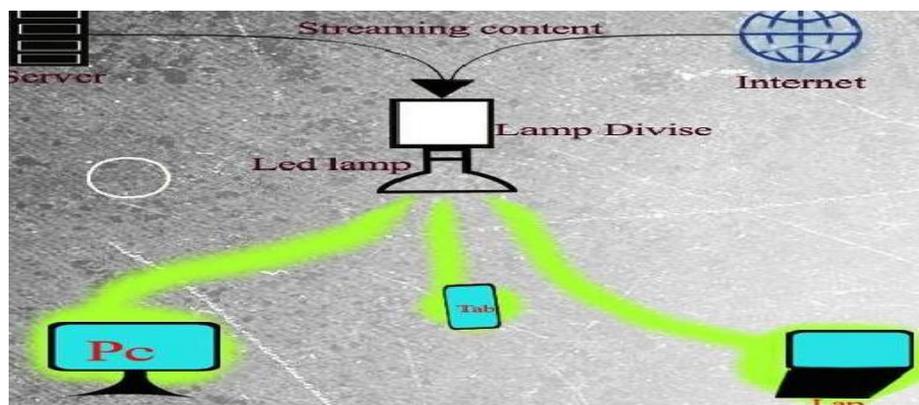
At the heart of this technology is a new generation of high brightness light-emitting diodes”, says Harald Haas from the University of Edinburgh, UK, “Very simply, if the LED is on, you transmit a digital 1, if it’s off you transmit a 0,” Haas says, “They can be switched on and off very quickly, which gives nice opportunities for transmitted data.” It is possible to encode data in the light by varying the rate at which the LEDs flicker on and off to give different strings of 1s and 0s. The LED intensity is modulated so rapidly that human eye cannot notice, so the output appears constant.

More sophisticated techniques could dramatically increase VLC data rate. Terms at the University of Oxford and the University of Edinburgh are focusing on parallel data transmission using array of LEDs, where each LED transmits a different data stream. Other group are using mixtures of red, green and blue LEDs to alter the light frequency encoding a different data channel. Li-Fi, as it has been dubbed, has already .

In October 2011 a number of companies and industry groups formed the Li-Fi Consortium, to promote high-speed optical wireless systems and to overcome the limited amount of radio based wireless spectrum available by exploiting a completely different part of the electromagnetic spectrum. The consortium believes it is possible to achieve more than 10 Gbps, theoretically allowing a high-definition film to be downloaded in 30 seconds.

Li-Fi comprises a wide range of frequencies and wavelengths, from the infrared through visible and down to the ultraviolet spectrum. It includes sub-gigabit and gigabit-class communication speeds for short, medium and long ranges, and unidirectional and bidirectional data transfer using line-of-sight or diffuse links, reflections and much more. It is not limited to LED or laser technologies or to a particular receiving technique. Li-Fi is a framework for all of these providing new capabilities to current and future services, applications and end users.

II. ARCHITECTURE



Li-Fi is typically implemented using white LED light bulbs at the downlink transmitter. These devices are normally used for illumination only by applying a constant current. However, by fast and subtle variations of the current, the optical output can be made to vary at extremely high speeds.

III. FEATURES

Capacity:

Li-Fi offers a number of key benefits over Wi-Fi but is inherently a complementary technology.

Bandwidth:

The visible light spectrum is plentiful (10,000 more than RF spectrum), unlicensed and free to use.

Data density:

Li-Fi can achieve about 1000 times the data density of Wi-Fi because visible light can be well contained in a tight illumination area whereas RF tends to spread out and cause interference.

High speed:

Very high data rates can be achieved due to low interference, high device bandwidths and high intensity optical output.

Planning:

Capacity planning is simple since there tends to be illumination infrastructure where people wish to communicate, and good signal strength can literally be seen.

Efficiency:

Low cost: Requires fewer components than radio technology.

Energy: LED illumination is already efficient and the data transmission requires negligible additional power.

Environment: RF transmission and propagation in water is extremely difficult but Li-Fi works well in this environment.

Safety:

Safe: Life on earth has evolved through exposure to visible light. There are no known safety or health concerns for this technology. Non-hazardous: The transmission of light avoids the use of radio frequencies which can dangerously interfere with electronic circuitry in certain environments.

IV. CONCLUSION

Data could soon be transmitted using the power of light following recent development work by a University of Edinburgh spin-out business.

New light has been shed on the field of wireless communication as a revolutionary new university spin-out looks to transmit data through LED bulbs. Visible Light Communications (VLC) believes that it has taken a leap forward in communication by creating a technology that can turn a light source into a localized data communications centre. Forget Wi-Fi: the University of Edinburgh spin-out is to launch the first 'Li-Fi' technology application. VLC chief executive Dr Gordon Povey comments, 'Our research has shown that, using LED light as the carrier, we can achieve data rate speeds well in excess of current Wi-Fi configurations.'

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