# The Future of Internet Technology: Light Fidelity (LIFI)

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**Abstract**: It is always feel bad when the slow speed of internet network leads to limited or restricted to connectivity and long processing hours while using wireless internet either at home network or coffee shop or airport or competing for bandwidth at a conference. As more and more users are tapped in with their devices, the clogged airwaves make it difficult to latch on a reliable signal. What if we can use such type of waves other than Radio waves to internet surf ? Radio wave are to be fully exploited and other spectrum needed to be explored. In this direction, Dr Harold Haas, a German physicist proposed an idea called "Data through Illumination" in which he used fiber optics to send data through LED light bulb. The idea is very similar to infrared remote controls but it is more powerful.

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## I.     INTRODUCTION

Now everyone is familiar with term Wi-Fi (Wireless Fidelity) which uses 2.4-5GHz Radio Frequency to deliver wireless Internet access around our schools, colleges, homes, offices and in public places. We become quite dependent upon this nearly everywhere service. But like other technologies it has also its limitations. While Wi-Fi can cover an entire house, its bandwidth is typically limited to 50-100 megabits per second (Mbps). This is a good match to the speed of most current Internet services, but insufficient for moving large data files like HDTV movies, music libraries and video games.[5] The more we become dependent upon the cloud or our own 'media servers' to store all of our files, including movies, music, pictures and games, the more we will want bandwidth and speed. So all RF-based technologies are available today's Wi-Fi is not the optimal way. In addition, Wi-Fi is not be the most efficient and smart way to provide new desired needs such as precision indoor positioning and gesture recognition. Optical wireless technologies is also called as visible light communication (VLC) and more recently referred to as Li-Fi (Light Fidelity). Hence, offer an entirely new method in wireless technologies in terms of communication speed, usability and flexibility.

LI-FI is a mode of transmission of data through illumination is done by taking the fiber optics cable by sending a data through a Light Emitting Diode (LED) light bulb that varies in intensity faster than the human eye can follow. Li-Fi term some have used to label the fast and cheap wireless-communication system which is the advanced optical version of Wi-Fi. 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. LED intensity is modulated so fast that human eye cannot notify it very well, so its looks the output

appears constant. This is the one of the most sophisticated techniques that could increase VLC data rate.[3]

## II.     WHAT LI-FI MEAN ?

Li-Fi means a broad 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.

## ANATOMY OF LIFI?

Imagine ourselves walking into a complex where GPS signals are unavailable but the complex is equipped with ceiling bulbs that create their own 'constellation' of navigation beacons. As the camera of our cell phone automatically receives these signals, it switches our navigation software to use this information to guide us to the ATM machine we're looking for. We conclude our ATM transaction and notice the Giga Spot sign for instant digital movie downloads. We pick out that new data using our phone's payment facility and then download within a few seconds the high-definition movie into the Giga Link flash drive plugged into the USB port of our Smartphone. As we walk away, our phone notifies us that the leather jacket featured in the character of movie is on sale nearby. We walk over towards the show window and our image comes up on the screen, wearing that coveted jacket. You turn and pose while the image matches our orientation and body gestures for a 'digital fitting.' When we walk into

the store, the clerk handover us the actual jacket in exactly size fitting.

### III.   DIFFERENT  MODELS OF LIFI

Within a local Li-Fi cloud several data based services are supported through a heterogeneous communication system. In an initial approach, the Li-Fi Consortium defined different types of technologies to provide secure, reliable and ultra-high-speed wireless communication interfaces. These technologies included giga-speed technologies, optical mobility technologies and navigation, precision location and gesture recognition technologies. For giga-speed technologies, the Li-Fi Consortium defined Giga Dock, Giga Beam, Giga Shower, Giga Spot and Giga MIMO models to address different user scenarios for wireless indoor and indoor-like data transfers.[7] While Giga Dock is a wireless docking solution including wireless charging for smart phones tablets or notebooks, with speeds up to 10 Gbps, the Giga Beam model is a point-to-point data link for kiosk applications or portable-to-portable data exchanges. Thus a two-hour full HDTV movie (5 GB) can be transferred from one device to another within four seconds. [5]
Giga Shower, Giga Spot and Giga-MIMO are the other models for in-house communication. There a transmitter or receiver is mounted into the ceiling connected to, for example, a media server. On the other side are portable or fixed devices on a desk in an office, in an operating room, in a production hall or at an airport. Giga Shower provides unidirectional data services via several channels to multiple users with gigabit-class communication speed over several meters.[5]

### IV.   DIFFERENCE BETWEEN Li-Fi & Wi-Fi

LI-FI is a term, one used to describe visible light communication technology applied to high speed wireless communication. It acquired this name due to the similarity to WI-FI, only using light instead of radio. WI-FI is great for general wireless coverage within buildings and li-fi is ideal for high density wireless data coverage in confined area and for relieving radio interference issues, so the two technologies can be considered complimentary.

**HOW IT IS DIFFERENT?**
Li-Fi technology is based on LEDs for the transfer of data. The transfer of the data can be with the help of all kinds of light, no matter the part of the spectrum that they belong. That is, the light can belong to the invisible, ultraviolet or the visible part of the spectrum. Also, the speed of the internet is incredibly high and we can download movies, games, music etc in just a few minutes with the help of this technology.

Also, the technology removes limitations that have been put on the user by the Wi-Fi. We do not need to be in a region that is Wi-Fi enabled to have access to the internet.

**LI-FI—THE SUPERSET OF VLC & CO.**
VLC represents only a fraction of what appears to be a much larger movement towards optical wireless technologies in general. Li-Fi comprises several optical wireless technologies such as optical wireless communication, navigation and gesture recognition applied for natural user interfaces. Thus, it provides a completely new set of optical technologies and techniques to offer users add-on as well as complementary functionalities compared to well-known and established RF services.[6] This could reach from a new user experience regarding communication speeds in the gigabit-class to bridge the well-known spectrum crunch, over to precise indoor positioning or controlling video games, machines or robots with entirely new natural user interfaces. Finally, these and many more could be merged to a full-featured Li-Fi cloud providing wireless services for other future applications as well.

### UNDERSEA AWESOMENESS
Underwater ROVs, those favourite toys of treasure seekers, operate from large cables that supply their power and allow them to receive signals from their pilots above. ROVs work great, except when the tether isn't long enough to explore an area or when it gets stuck on something.[8] If their wires were cut and replaced with light - say from a submerged, high-powered lamp - then they would be much freer to explore. They could also use their headlamps to communicate with each other, processing data autonomously and referring findings periodically back to the surface, all the while obtaining their next batch of orders.

### V.   CONCLUSION
There are lots of possibilities and various numerous and can explored further. If this technology can be used into practical life we can used every bulb something similar like a Wi-Fi hotspot to transmit wireless signal and data and we will proceed further toward the greener, safer, cleaner and brightest future. The concept of Li-Fi is new technology which currently attracting a great deal of interest, not least because it may offer a genuine and very efficient alternative to radio-based wireless. As we know that the number of user increasing day by day and growing number of people and many communicating devices access via wireless internet, the airwaves are becoming increasingly time to time and clogged, So, it making more and more difficult to get a reliable, high-speed signal. This may solve and overcome various issues like such as the shortage of radio frequency bandwidth, power and

also allowing internet in that place where traditional radio based wireless is not allowed like aircraft or hospitals. One of the shortcomings is that it is only applicable in direct line of sight.

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