

Li-Fi (Light Fidelity)-The Future Technology In Wireless Communication

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Abstract:

Whether you're using wireless internet in a chocolate shop, stealing it from the guy next door, or competing for bandwidth at a conference, you have probably gotten disturbed at the slow speeds you face when more than one device is tap into the system. As more and more people and their many devices access wireless internet, clogged airwaves are going to make it. single german physicist.Harald Haas has come up with a solution he calls —data through illumination— taking the fiber out of fiber optic by transfer data through an LED light bulb that vary in intensity faster than the human eye can follow. It's the same idea behind infrared remote controls but far more powerful. Haas says his invention, which he call D-LIGHT, can produce data rates faster than 10 megabits per second, which is speedier than your standard broadband connection. He envision a future where data for laptops, smart phones, and remedy is transmitted through the light in a room. And security would be shatter – if you can't see the light, you can't access the data.

Keywords: LED (Light emitted diode), Wi-Fi, Visible Light Communication,Light Fidelity(Li-Fi)

INTRODUCTION

LiFi is communication of data through lights by enchanting the fiber out of fiber optics by transfer data through a LED light bulb that vary in intensity faster than the human eye can follow.Li-Fi is the term some have used to label the fast and low-priced wireless-communication system, which is the optical version of Wi-Fi. The term was first used in this circumstance by Harald Haas in his TED Global talk on Visible Light message —At the heart of this technology is a new production of high precision light-emitting diodes!, says Harald Haas from the campus of Edinburgh, UK,Very simply, if the LED is on, you broadcast a digital 1, if it's off you transmit a 0,Haas says, —They can be switch on and off very quickly, which gives nice prospect for transmitted data.It is possible to encode data in the light by unstable the rate at which the LEDs sparkle on and off to provide special strings of 1s and 0s.The LED intensity is modulate so rapidly that human eye cannot notice, so the output appears constant. More complicated techniques could radically increase VLC data rate. provisions at the University of Oxford and the University of Edingburgh are focusing on parallel data extend using array of LEDs, where all LED transmits a different data stream. Other group are using combination of red, green and blue LEDs to vary the light frequency encoding a different data channel.Li-Fi, as it has been dub, has already

achieved blisteringly high speed in the lab. Researchers at the Heinrich Hertz Institute in Berlin,Germany,have reach data rates of over 500 megabytes per following using a normal white-light LED. The technology was established at the 2012 purchaser Electronics Show in Las Vegas using a pair of Casio smart phones to replace data using light of varying intensity given off from their screens, noticeable at a space of up to ten metres.

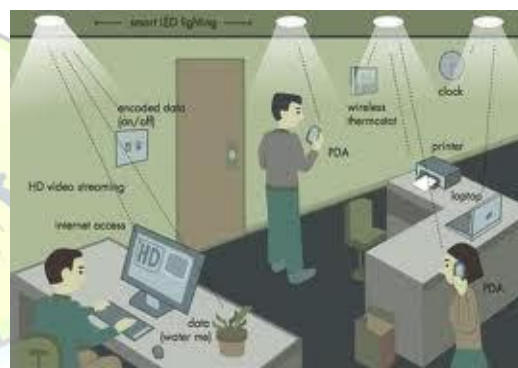


Fig.1 Li-Fi environment

In October 2011 a numeral of company and industry groups formed the Li-Fi group, to promote high-speed optical wireless systems and to overcome the imperfect amount of radio-based wireless spectrum available by exploit a completely different part of the electromagnetic sfield. The group believes it is possible to achieve more than 10 Gbps, in theory allowing a high-definition film to be downloaded in 30 seconds.

WORKING TECHNOLOGY

This radiant idea was first showcased by Harald Haas starting University of Edinburgh, UK, in his TED universal talk on VLC. He explain,Very easy, if the LED is on, you screen a digital 1, if it's off you broadcast a 0. The LEDs can be switched on and off incredibly quickly, which gives nice opportunity for transmit data. So what you need at all are some LEDs and a organizer that code data into those LEDs. We have to just vary the rate at which the LED's flicker depending upon the data we fancy to encode. Further enhancement can be made in this method, like using an array of LEDs for parallel data diffusion, or using mixture of red, green and blue LEDs to alter the light's numbers

each occurrence indoctrination a different data direct. Such advancements promise a theoretical speed of 10 Gbps – sense you can download a full high-meaning film in just 30 seconds. Simply grand! But blazingly fast data rates and deplete bandwidths worldwide are not the only reason that give this equipment an upper give. Since Li-Fi uses just the glow, it can be used securely in aircrafts and hospitals that are prone to interference from radio waves. This can even work submarine where Wi-Fi fails totally, thereby throwing open endless opportunities for military operation.

envision only need to hover under a road lamp to get civic internet access, or downloading a movie from the lamp on your desk. There's a new expertise on the mass which could, quite literally as well as metaphorically, 'throw light on' how to meet the ever-increasing demand for high-speed wireless connectivity. Radio waves are replaced by light waves in a new method of data broadcast which is being called Li-Fi. Light-emit diodes can be switch on and off faster than the human eye can notice, causing the light source to appear to be on continuously. A sparkling light can be incredibly annoying, but has turned out to have its upside, being precisely what makes it possible to use light for wireless data program. Light-emit diodes (commonly referred to as LEDs and found in transfer and street lights, car brake lights, remote control units and numerous other applications) can be switch on and off faster than the human eye can detect, cause the light basis to explain to be on continuously, even though it is in fact 'flickering'. This invisible on-off motion enables a kind of data communication using binary codes: switching on an LED is a logical '1', switch it off is a logical '0'. in order can therefore be encoded in the light by unreliable the rate at which the LEDs flicker on and off to give unlike strings of 1s and 0s. This scheme of using rapid pulses of light to transmit information wirelessly is theoretically referred to as Visible Light Communication (VLC), though it's budding to compete with conventional Wi-Fi has moved the accepted characterisation Li-Fi.

2.1 Visible light communication (VLC)-“A potential solution to the global wireless spectrum shortage”

LiFi (Light Fidelity) is a fast and cheap optical edition of Wi-Fi, the knowledge of which is based on Visible radiance Communication (VRC). VRC is a data communication medium, which use observable light connecting 400 THz (780 nm) and 800 THz (375 nm) as optical carrier for data communication and light. It use fast pulses of light to send out information wirelessly. The main workings of this communication system are 1) a high intensity white LED, Which acts as a announcement source and 2) a silicon photodiode which show good response to observable wavelength province serving as the receiving aspect? LED can be switch on and off to generate digital string of 1s and 0s. Data can be programmed in the radiance to generate a new data stream by varying the shining rate of the LED. To be clearer, by modulate the LED light with the data signal, the LED explanation can be used as a communication source. As the shining rate is so fast, the LED output appear stable to the human eye. A data rate of greater than 100 Mbps is probable by using high speed LEDs with appropriate multiplexing technique. VLC

data rate can be increased by parallel data transmission using LED arrays where each LED transmit a different data stream. There are reasons to prefer LED as the light source in VLC while a lot of other illumination procedure like fluorescent lamp, incandescent bulb etc. are available.

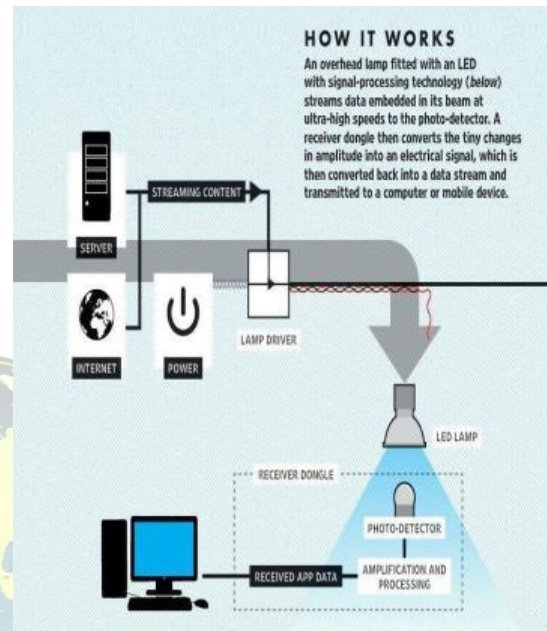


Fig 2. Data transmission using LED

COMPARISION BETWEEN Li-Fi & Wi-Fi

LI-FI is a term of one used to describe visible light communication technology useful 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 worldwide wireless exposure within building, and li-fi is ideal for high density wireless data coverage in restrained area and for relieving radio interference issues, so the two technology can be considered approving.

Technology	Speed	Data density
Wireless (current)		
Wi-Fi – IEEE 802.11n	150 Mbps	*
Bluetooth	3 Mbps	*
IrDA	4 Mbps	***
Wireless (future)		
WiGig	2 Gbps	**
Giga-IR	1 Gbps	***
Li-Fi	>1Gbps	****

Table :Comparison between current and future wireless technology

The table also contains the current wireless technology that can be used for transfer data between plans today, i.e. Wi-Fi, Bluetooth and IrDA. Only Wi-Fi at present offers very high data rates. The IEEE 802.11.n in nearly all implementations provide up to 150Mbit/s (in theory the average can go to 600Mbit/s) though in perform you receive considerably less than this. Note so as to one out of three of these is an visual technology.

3. How it is different?

Li-Fi equipment is base on LEDs for the transfer of data. The transfer of the data can be with the help of each one kinds of light, no material the part of the choice that they fit in. That is, the beam can fit in to the unseen, ultraviolet or the noticeable part of the range. Also, the speed of the internet is incredibly high and you can download movies, sports meeting, music etc in just a few notes with the help of this skill. Also, the technology removes confines that have been put on the consumer by the Wi-Fi. You no more need to be in a region that is Wi-Fi enabled to have right of entry to the internet. You can simply stand under any form of light and surf the internet as the link is made in case of any light attendance. There cannot be no matter which better than this technology.

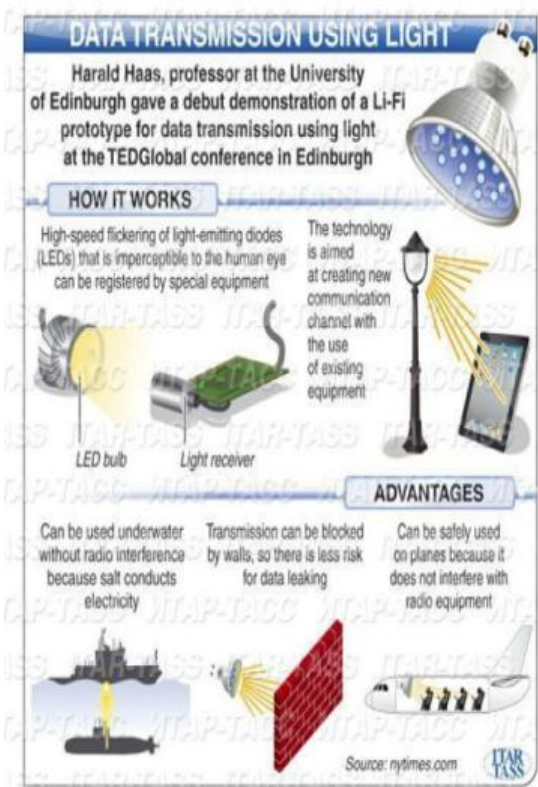


Fig 3. Working and advantages

APPLICATION OF LI-FI

4.1 You Might Just Live Longer

For a long time, checkup technology has lag behind the rest of the wireless world. in service rooms do not allow Wi-Fi over energy concerns, and there is also that complete lack of

Dedicated spectrum. While Wi-Fi is in put in many hospital, meddling from cell phones and computers can hunk signals from monitor equipment. Li-Fi solves both troubles: lights are not only allowed in in service accommodation, but be inclined to be the most glaring (pun intended) furniture in the room. And, as Haas mentions in his TED Talk, Li-Fi has 10,000 times the spectrum of Wi-Fi, so maybe we can, I dunno, delegate red light to priority health check data. Code Red!

4.2 Airlines

Airline Wi-Fi. Ugh. not anything says captive audience like have to pay for the "service" of dial-up rate Wi-Fi on the plane. And don't get me in progress on the pricing. The best I've heard so far is that passenger will "soon" be offered a "high-rate like" connection on some airlines. United is preparation on speeds as high as **9.8 Mbps** per plane. Uh, I have twice that ability in my livelihood room. And at the same price as checking a bag, I expect it. Li-Fi could easily introduce that kind of speed to all seat's reading light. I'll be the guy WoWing next to you. Its better than listening to you tell me about your wildly successful son, ma'am.

4.3 Smarter Power Plants

Wi-Fi and a lot of other emission types are bad for perceptive areas. Like those adjacent power plants. But power undergrowth need fast, inter-linked data systems to check things like command, grid truth and (in nuclear plants) core warmth. The hoard from proper monitor at a single control plant can add up to hundreds of thousands of dollars. Li-Fi could present safe, abundant connectivity for all areas of these sensitive locations. Not merely would this save money related to at present implemented solutions, but the draw on a power plant's own reserves could be pointed if they haven't yet changed to LED illumination

4.4 Undersea Awesomeness

marine ROVs, those favourite toys of riches seekers and James Cameron, operate from large cable that supply their power and let them to receive signal from their pilots above. ROVs labor great, except when the join isn't long sufficient to explore an area, or when it gets stuck on top of something. If their wires were cut and replace with light — say from a submerged, high-powered lamp

— then they would be much freer to explore. They could also use their headlamps to speak with each other, processing data autonomously and referring findings sometimes back to the surface, all the while obtain their next lot of guidelines.

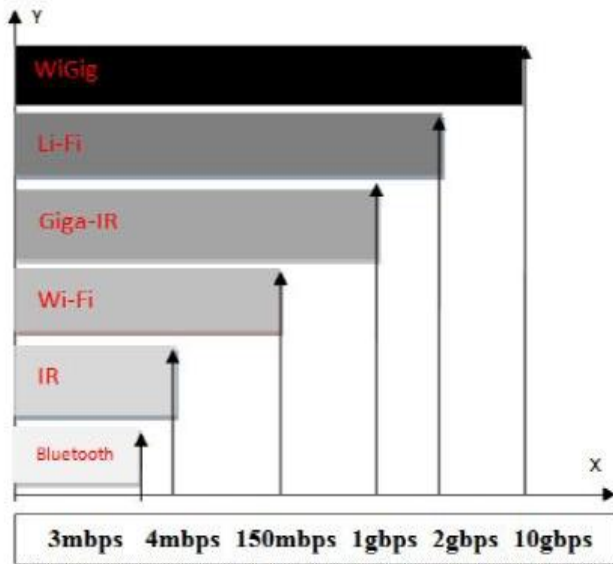
4.5. It Could Keep You Informed and Save Lives

Say there's an quake in New York. Or a hurricane. Take your pick — it's a wacky city. The regular New Yorker may not know what the protocols are for those kind of disaster. awaiting they pass below a street light, that is. bear in mind, with Li-Fi, if there's light, you're online. channel stations and tunnels, common dead zones for most crisis connections, pose no obstruction. Plus, in times less stress cities could opt to supply cheap high-speed Web access to each street corner.

USES IN VARIOUS AREAS

Can be used in the chairs where it is not easy to lay the optical string like hospitals. In process theatre LiFi can be used for modern checkup instruments. In traffic signals LiFi can be used which will converse with the LED illumination of the cars and disaster numbers can be decrease. Thousand and millions of street lamp can be transferred to LiFi lamps to transfer data. In aircraft LiFi can be worn for data broadcast. It can be used in oil or chemical plants where additional broadcast or frequencies could be dangerous.

RESULT



CONCLUSION

The possible are numerous and can be explored further. If this technology can be put into practical use, every bulb can be used great like a Wi-Fi hotspot to transmit wireless data

and we will proceed in the direction of the cleaner, greener, safer and brighter future. The perception of Li-Fi is at present attracting a great deal of attention, not least because it may offer a genuine and very efficient choice to radio-based wireless. As a growing number of people and their many campaign access wireless internets, the airwaves are becoming more and more clogged, making it more and additional difficult to get a reliable, high-speed sign. This may solve issues such as the dearth of radio-frequency bandwidth and also allow internet where customary radio based wireless isn't allowable such as aircraft or hospitals. One of the short coming however is that it simply work in straight line of sight.

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