



Li-Fi (Light Fidelity) and Wi-Fi (Wireless Fidelity): A Review

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ABSTRACT:

This paper is depend on wireless hi-tech. Wireless netting becomes an integral part in ultramodern period. Individual can use (exploit) WIFI as well as LIFI. LIFI represent for light dedication. The technology was innovated by German Physicist Harald Hass, in 2011. LIFI force (hand over) transmission of data through LED light bulb that varies (alter, diverge) in intensity briskly than mortal eye can follow. LIFI is possible (doable) in every sector where network is used. In this paper we will bandy (check, assay) the use of LIFI technology & WIFI technology. WiFi and LiFi used to shoot and admit data wirelessly. WiFi uses Routers and Radio frequency where as LiFi uses LED bulbs and Light signals to transfer and admit data. LIFI is affordable and fast-moving technology to share the data

Keywords: LED, VLC, Bandwidth, WIFI

I. Introduction to LIFI:

Light Fidelity (Li-Fi) VLC, visible light communication technology developed by exploration platoon at University of Edinburgh, including Professor Haas. Professor Harald Haas penned term. Light Fidelity is ultramodern wireless communication technology that empowers remote transmission of data using LED light. Light Fidelity depends on original capability of solid state lighting systems to produce 1s and 0s double law with mortal inappreciable LED illumination.

Information may be attained within vicinity of visible light by means of electronic widgets with print- diode. This means that light bulbs can bring not only light but wireless connection at same time anywhere where LED's are used. Generally speaking, Wi- Fi plays an effective part in wireless data content within structures, while using Li- Fi we will give excellent viscosity data content in particular position without any radio hindrance issues. Li- Fi provides better quiescence, performance, availability and security than Wi- Fi, and under laboratory conditions has indeed reached extreme pets lesser than 1 Gbps. [1][2]

History:

Professor Harald Haas, of University of Edinburgh, UK, is regarded as launching father of Li- Fi. The term Visible Radiation Communication (VLC) embodies any use of visible radiation portion of electromagnetic diapason for data transmission.

D- Light design was patronized at Center for Digital Dispatches in Edinburgh from January 2010 until January 2012. Haas introduced this advance in his 2011 TED Global talk, and helped announce it. Li- Fi institute, formed by Fraunhofer IPMS, Germany, IBSEN Telecom, Norway, Supreme Architecture, Israel/ US, and TriLumina, USA, is planning to upgrade and advance different optic Wireless Communication (OWC) technologies. Li- Fi technology was demonstrated at the 2012 Consumer Electronics Show in Las Vegas, employing brace of Casio smart phones to trade the data exercising light of varying intensities emitted from their displays, conspicuous up to 10 measures down. [3]

Working of Li- Fi:

Light Fidelity technology is wireless communication device concentrated substantially on use of visible light between violet (400 THz) and red (400 THz). Li- Fi is grounded solely on propagation of information in defined and invariant fashion via breadth modulation of light force. There's LED transmitter (light emitting) on one end and print sensor (light detector) on other. Li- Fi operates veritably simple and fast. The data input to LED transmitter is decoded into light by varying the fluttering rate at which double law(1s and 0s) is generated by LEDs flutter ' on ' and ' off '. LED transmitter's on/ off operation which seems to be unnoticeable to mortal eye as speed of LEDs is lower than second. By switching ON LED is logical '1' it makes data transfer according to incoming double canons, switching OFF is logical '0'. Data can be decoded in light by varying rate at which LEDs flutter on and off to different combinations of 1s and 0s. [4][5]

Applications:

In Aircrafts –In air craft's, passengers get high- charges on low- speed internet, but using Li- Fi provides affordable freights for high- speed internet.

Health technologies: – Wi- Fi has been replaced by Li- Fi in numerous hospitals because use of Wi- Fi in hospitals interferes with mobile bias and computers that block the monitoring outfit signals.

Business operation – Li- Fi can be used in business operation, which interacts with LED lights of vehicles similar as motorcars, which can help in viably dealing with business and can regulate accidents by advising other motorists when vehicles are exorbitantly close.

Disaster Operation – Li- Fi can be used as groundbreaking styles of correspondence in the midst of disaster, e.g. seismic earthquake or, on other hand, hurricanes as shelter stations and passages; common dead zones don't stymie Li- Fi.

Power Factory operation – Li- Fi is precipitously safe, bottomless vacuity in all regions of power factory as application of Wi- Fi and other radiation source is not respectable. [6]

II. Introduction to WIFI:

We all know about Wi- Fi, in our mobile, laptop far and wide Wi- Fi is supported. Wi- Fi is a wireless networking technology, by which we can pierce networks or connect with other computers or mobile using a wireless medium. In Wi- Fi, data are transferred over radio frequentness in a indirect range.

Wi- Fi, a brand name given by the Wi- Fi Alliance(formerly Wireless Ethernet Compatibility Alliance), is a general term that refers to the communication standard for the wireless network which works as a Original Area Network to operate without using the string and any types of wiring. It's known as WLAN. The communication standard is IEEE802.11. Wi- Fi works using Physical Data Link Layer.

Currently in all mobile computing bias similar as laptops, mobile phones, also digital cameras, smart TVs have the support of Wi- Fi. The Wi- Fi connection is established from the access point or base station to the customer connection or any customer- to- customer connection within a specific range, the range depends on the router which provides the radio frequency through Wi- Fi. This frequentness operates on 2 types of bandwidth at present, 2.4 GHz and 5 GHz.

All the ultramodern laptops and mobiles are able of using both bandwidths, it depends on the Wi- Fi appendage which is inside the device to catch the Wi- Fi signal.2.4 GHz is the dereliction bandwidth supported by all the bias.2.4 GHz can cover a big range of areas to spread the Wi- Fi signal but the frequency is low, so in simple words, the speed of the internet is less and 5 GHz bandwidth is for a lower range of area but the frequency is high so the speed is veritably high. Let's say-so, if there's an internet connection of 60 MB/ s bandwidth, also for2.4 GHz bandwidth, it provides approx 30 to 45 MB/ s of bandwidth connection and for 5 GHz bandwidth, it provides approx 50 to 57 MB/ s bandwidth.[7]

History:

The conception of Wi- Fi is veritably old but its perpetration isn't so old. At first ALOHA System is a wireless network system that's used to connect Hawaii islet via a network in the time 1971. Where the protocol is used for this was ALOHA protocol and the network used packet transfer. Latterly it's converted to IEEE802.11 protocol.

Also in 1985, the Federal Dispatches Commission (FCC) released a new network for general uses which works on 900 MHz, 2.4 GHz, and 5.8 GHz bandwidth. This is known as the ISM band. Also, IBM introduced a Token Ring LAN network for connecting several computers, it can transfer data at 4 Mb/ s speed. also in 1988, a wireless cashier system was constructed grounded on the Token Ring LAN network known as wave LAN, it operates at 900 MHz or2.4 GHz band and offers pets of 1 to 2 Mbps. also it was converted to IEEE802.11 LAN/ MAN norms in 1989.? also in 1990, IEEE802.11 Working Group for Wireless LANs is established by Vic Hayes, who was known as the “ Father of Wi-Fi also in 1994,Dr. Alex Hills introduced a exploration design on the wireless network, which handed content of the network to 7 structures wirelessly.

Also in 1996 Commonwealth Scientific and Industrial Research Organization (CSIRO) introduced a wireless network grounded on the same protocol802.11, latterly it was known as IEEE802.11 a norms.

Also after all this in 1997 the first interpretation of Wi- Fi is released officially which is802.11 and it can support an outside of 2 Mb/ s link speed.

Also in 1999, the link speed is increased to 11 Mb/ s over the2.4 GHz frequency band, this interpretation is known as802.11 b also after a month, the IEEE802.11 a standard is approved officially, which provides up to 54 Mb/ s link speed over the 5 GHz band, but the signal range is weaker than the2.4 GHz band.

Also in 2003, the speed is increased in a new interpretation, known as802.11 g. The speed offers up to 54 to 108 Mb/ s over2.4 GHz.

After this two further performances were introduced that are, 802.11 i and802.11 e. In802.11 i, the security medium was increased and in802.11 e, Voice over Wireless LAN and multimedia streaming are involved. Also in 2009,802.11 n is developed, which supports both2.4 GHz and 5 GHz radiofrequency. And these are used contemporaneously by binary- band routers and can reach maximum pets of 600 Mbps also in 2014, a new interpretation was introduced that offers an implicit speed of 1733 Mb/ s in the 5 GHz band. This interpretation is known as802.11 ac. till now this is the rearmost interpretation of Wi- Fi. [7]

Applications of Wi-Fi:

Wi-Fi has many packages; it's far utilized in all of the sectors wherein a pc or any virtual media is used, additionally for interesting Wi-Fi is used. Some of the programs are referred to below – Accessing Internet: Using Wi-Fi we will get right of entry to the net in any Wi-Fi- successful tool wirelessly. We

can circulate or forged audio or video wirelessly on any tool the use of Wi-Fi for our entertainment. We can proportion files, statistics, and so on among or extra computer systems or cell telephones the use of Wi-Fi, and the velocity of the statistics switch fee is likewise very high. Also, we will print any report the use of a Wi-Fi printer that is very a great deal used nowadays. We can use Wi-Fi as HOTSPOTS additionally, it factors Wireless Internet get right of entry to for a specific variety of region. Using Hotspot the proprietor of the principle community connection can provide transient community get right of entry to to WI-Fi- successful gadgets in order that the customers can use the community without understanding something approximately the principle community connection. Wi-Fi adapters are particularly spreading radio alerts the use of the proprietor community connection to offer a hotspot. Using Wi-Fi or WLAN we will assemble easy wi-fi connections from one factor to another, referred to as Point to factor networks. This may be beneficial to attach places which are hard to attain with the aid of using wire, together with homes of company business. One extra vital utility is VoWi-Fi that is referred to as voice-over Wi-Fi. Some years in the past telecom agencies are delivered VoLTE (Voice over Long-Term Evolution). Nowadays they're delivered to VoWi-Fi, with the aid of using which we will name everyone with the aid of using the use of our domestic Wi-Fi community, simplest one aspect is that the cell desires to hook up with the Wi-Fi. Then the voice is transferred the use of the Wi-Fi community in preference to the use of the cell SIM community, so the decision pleasant may be very good. Many cell telephones are already getting the help of VoWi-Fi. Wi-Fi in offices: In an office, the entire computer systems are interconnected the use of Wi-Fi. For Wi-Fi, there aren't any wiring complexities. Also, the velocity of the community is good. For Wi-Fi, an undertaking may be provided to all of the individuals at a time within side the shape of an excel sheet, ppt, and so on. For Wi-Fi, there's no community loss as in cable because of cable break. Also the use of W-Fi an entire town can offer community connectivity with the aid of using deploying routers at a selected region to get right of entry to the net. Already schools, colleges, and universities are supplying networks the use of Wi-Fi due to its flexibility.[8][9]

Difference between WiFi and LiFi:

Basis of Comparison	WiFi	LiFi
Development	WiFi was invented by NCR Corporation in 1991.	LiFi was first described by Prof. Harald Haas in 2011.
Data Transmission	It transmits statistics the usage of radio waves with the assist of a Wi-Fi router.	It transmits records the use of mild with the assist of LED bulbs.
Application	Used for net surfing with the assist of Wi-Fi Cafes or Wi-Fi hotspots.	Used in airlines, undersea explorations, operation theatres within side the hospitals, workplace and domestic premises for statistics switch and net browsing.
Passage Through Walls	Radio frequency sign passes thru the partitions and as a result there may be a want to hire strategies to gain steady records transfer.	Light does now no longer by skip via the partitions and for this reason will offer a far steady facts transfer.
Components	It makes use of modems and radio frequency sign for Wi-Fi statistics communication.	It makes use of LED bulbs and mild alerts for Wi-Fi information communication.
Interference	It suffers from interference troubles from close by get right of entry to points (routers).	It does now no longer have any interference troubles just like radio frequency waves.
Frequency Band	It operates at one-of-a-kind frequency bands among 2.4 GHz, 4.9 GHz and 5 GHz.	It operates among wavelengths withinside the variety from 380 nm to 780 nm.
Distance Of Coverage	It operates among wavelengths withinside the variety from 380 nm to 780 nm.	It can cowl distance up to ten meters.
Speed Of Data Transfer	Speed of data transfer for WiFi is between 150Mbps and 2 Gbps.	Speed of data transfer for LiFi is about 1 Gbps.
Passage Through Sea Water Or Salty Water	Due to giant interference, WiFi can't byskip via sea water and paintings in much less dense region.	Due to much less interference, LiFi sign can byskip via salty sea water and also can paintings in dense region.
Compatibility	It is compatible with WLAN 802.11 a/b/g/n/ac/ad devices.	It is compatible with IrD devices.
Components Of A Complete System	A entire WiFi gadget is made up a router and a subscriber device laptops, PDAs and desktops.	A entire LiFi machine is made of LED bulb (lamp), photodetector and lamp driver.
Operation Power Level	It is used to trade facts at an awful lot excessive strength degree in comparison to LiFi.	It is used to trade statistics exceedingly and securely at a whole lot decrease strength degree in comparison to WiFi.

Working Environment	Works in less dense environment due to interference related issues.	Works in high dense environment.
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Conclusion:

Conceivable outcomes for future use are inexhaustible. In the event that this innovation can be put into down to earth utilize, each knob can be utilized something like a WI-FI hotspot to transmit remote information and we will proceed toward the cleaner greener, more secure and eye catching destiny. The concept of LI-FI at present drawing a great deal interest not minimum since it might offer a bona fide and huge productive other option to radio-based remote. As a developing numerous individuals and their many equipments access remote web, the wireless transmissions are turning out to be progressively stopped up, making it harder to get a solid, fast flag. Optical cell systems in view of LI-FI are the connection between future vitality effective enlightenment and cell interchanges. They can likewise outfit unregulated, unused and immense measure of electromagnetic range and can even empower ever littler cells without the requirement for new framework. The issues of lack of radio recurrence can be handled effortlessly with just restriction being that it works in direct viewable pathway of light. There are no deadlocks to innovation and science. Presently both light radio waves can be utilized at the same time to exchange information and signs.

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