Wi-Fi Technology Vs Li-Fi Technology

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Abstract - *Technology is making rapid progress and is making many things easier. As the innovative thinking of persons is increasing day-by-day, new method for wireless networking has been evolved such as Bluetooth, Wi-Fi and Li-Fi. Today everyone is in hurry for getting right information at the right time and right place which requires fast internet connectivity. So there are various types of connectivity to get hook on to internet such as Gateway access, Dail-up connection, Leased onnction, DSL, Cable Modem Connection, VSAT and wireless connection such as Wi-Fi. In this paper we are going to discussed importance and difference between Wi-Fi technology and Li-Fi technology.*

Key Words: Wireless, Li-Fi, Wi-Fi, Radio Signal, Wi-Fi Card and Wi-Fi Hotspot.

1. INTRODUCTION

1.1 Li- Fi TECHNOLOGY

What is Li-Fi Technology?
Light Fidelity or is a Visible Light Communications (VLC) system running wireless communications travelling at very high speeds. Li-Fi uses common household LED (light emitting diodes) light bulbs to enable data transfer, boasting speeds of up to 224 gigabits per second. The term Li-Fi was coined by University of Edinburgh Professor Harald Haas during a TED Talk in 2011. Haas envisioned light bulbs that could act as wireless routers. Subsequently, in 2012 after four years of research, Haas set up company pure Li-Fi with the aim 'to be the world leader in Visible Light Communications technology'.

Is Li-Fi Wireless Technology?
Li-Fi is a wireless technology as it uses visible light communication or infrared or even near ultraviolet spectrum. It does not use the radio frequency like the Wi-Fi technology we use today.

Explanation
Li-Fi and Wi-Fi are quite similar as both transmit data electromagnetically. However, Wi-Fi uses radio waves while Li-Fi runs on visible light. As we now know, Li-Fi is a Visible Light Communications (VLC) system. This means that it accommodates a photo-detector to receive light signals and a signal processing element to convert the data into 'strea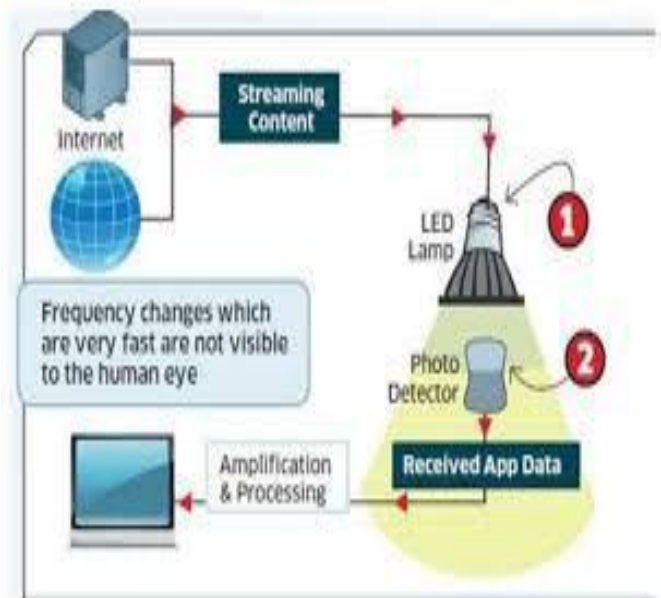m-able' content. An LED lightbulb is a semi-conductor light source meaning that the constant current of electricity supplied to an LED lightbulb can be dipped and dimmed, up and down at extremely high speeds, without being visible to the human eye. For example, data is fed into an LED light bulb (with signal processing technology), it then sends data (embedded in its beam) at rapid speeds to the photo-detector (photodiode). The tiny changes in the rapid dimming of LED bulbs is then converted by the 'receiver' into electrical signal. The signal is then converted back into a binary data stream that we would recognise as web, video and audio applications that run on internet enables devices.

Figure 1: Working of Li-Fi.

What is the Future of Li-Fi Technology?
Li-Fi will be able to provide faster and more reliable Internet connections. However, Li-Fi will not make 4G, 5G and even Wi-Fi obsolete. Li-Fi will function along with these Internet connections seamlessly. Li-Fi will integrate these technologies and create a more mobile, ultra-high speed Internet communication. Li-Fi will prove to be a more secure network as one cannot intercept it without a clear line of sight. It will eliminate neighboring network interference as well not interfere in the functioning of other sensitive electronic devices. Thus, one can use it in sensitive.

1.2 APPLICATION OF Li-Fi
- **Aircraft Cabins**
  Airlines Wi-Fi, Ugh you got to be either an adventure freak or a fool to be playing around

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radio waves on an airplane which is a security issue and so we are requested to switch off our electrical devices during a flight. The best I've heard so far is that passengers will "soon" be offered a "high-speed like" connection on some airlines and speeds as high as 9.8 Mbps per plane.

- **Hospitals**
  Operating rooms do not allow WI-FI due to radiation concerns, and there is also that a whole lack of dedicated spectrum. Due to Wi-Fi interference from cell phones and computers causes signal blocking from monitoring equipment. Li-Fi solves both problems: lights are the most glaring fixtures in the room, And Li-Fi also has 10,000 Fig.3 Light inside an operation theatre times the spectrum of Wi-Fi.

- **Nuclear Power Plants**
  Wi-Fi and many other radiation types are bad for sensitive areas like power plants. But thermal power plants need fast, inter-connected data systems to monitor things like demand, grid integrity and (in nuclear plants) core temperature. Li-Fi could offer safe (as no radiation) connectivity for these sensitive locations. Not only would this save a lot of money from the current power plant designs but the draw on a power plant's own reserves could be lessened if they haven't yet converted to LED lightning.

2. Wi-Fi TECHNOLOGY

2.1 What is Wi-Fi Technology?

Wi-Fi stands for **Wi**reless **Fi**delity. Wi-FiIt is based on the IEEE 802.11 family of standards and is primarily a local area networking (LAN) technology designed to provide in-building broadband coverage. Current Wi-Fi systems support a peak physical-layer data rate of 54 Mbps and typically provide indoor coverage over a distance of 100 feet. Wi-Fi has become the *de facto* standard for *last mile* broadband connectivity in homes, offices, and public hotspot locations. Systems can typically provide a coverage range of only about 1,000 feet from the access point. Wi-Fi offers remarkably higher peak data rates than do 3G systems, primarily since it operates over a larger 20 MHz bandwidth, but Wi-FiWi-Fi systems are not designed to support high-speed mobility. One significant advantage of Wi-Fi over WiMAX and 3G is its wide availability of terminal devices. A vast majority of laptops shipped today have a built-in Wi-Fi interface. Wi-Fi interfaces are now also being built into a variety of devices, including personal data assistants (PDAs), cordless phones, cellular phones, cameras, and media players.

2.2 WI-FI – WORKING CONCEPTS

2.2.1 Radio Signals
Radio Signals are the keys, which make Wi-Fi networking possible. These radio signals transmitted from Wi-Fi antennas are picked up by Wi-Fi receivers, such as computers and cell phones that are equipped with Wi-Fi cards. Whenever, a computer receives any of the signals within the range of a Wi-Fi network, which is usually 300 — 500 feet for antennas, the Wi-Fi card reads the signals and thus creates an internet connection between the user and the network without the use of a card. Access points, consisting of antennas and routers, are the main source that transmit and receive radio waves. Antennas work stronger and have a longer radio transmission with a radius of 300-500 feet, which are used in public areas while the weaker yet effective router is more suitable for homes with a radio transmission of 100-150 feet.

2.2.2 Wi-Fi Cards
You can think of Wi-Fi cards as being invisible cords that connect your computer to the antenna for a direct connection to the internet. Wi-Fi cards can be external or internal. If a Wi-Fi card is not installed in your computer, then you may purchase a USB antenna attachment and have it externally connect to your USB port, or have an antenna-equipped expansion card installed directly to the computer

Figure 2: Wi-Fi Card .

(as shown in the figure given above). For laptops, this card will be a PCMCIA card which you insert to the PCMCIA slot on the laptop.

2.2.3. Wi-Fi Hotspots
A Wi-Fi hotspot is created by installing an access point to an internet connection. The access point transmits a wireless signal over a short distance. It typically covers around 300 feet. When a Wi-Fi enabled device such as a Pocket PC encounters a hotspot, the device can then connect to that network wirelessly. Most hotspots are located in places that are readily accessible to the public such as airports, coffee shops, hotels, book stores, and campus environments. 802.11b is the most common specification for hotspots

worldwide. The 802.11g standard is backwards compatible with .11b but .11a uses a different frequency range and requires separate hardware such as an a, a/g, or a/b/g adapter. The largest public Wi-Fi networks are provided by private internet service providers (ISPs); they charge a fee to the users who want to access the internet.

2.3 Application of Wi-Fi

1. Share your internet
2. Share resources between PCs
3. Access your files via a NAS drive
4. Print & scan
5. Sync your stuff
6. Remote control of your entertainment system
7. Listen to music
8. Stream video
9. Play online games
10. Monitor your home

3. Li-Fi vs Wi-Fi

1. While some may think that Li-Fi with its 224 gigabits per second leaves Wi-Fi in the dust, Li-Fi's exclusive use of visible light could halt a mass uptake.
2. Li-Fi signals cannot pass through walls, so in order to enjoy full connectivity, capable LED bulbs will need to be placed throughout the home. Li-Fi requires the lightbulb is on at all times to provide connectivity, meaning that the lights will need to be on during the day.
3. where there is a lack of lightbulbs, there is a lack of Li-Fi internet so Li-Fi does take a hit when it comes to public Wi-Fi networks.
4. Li-Fi could make a huge impact on the internet of things too, with data transferred at much higher levels with even more devices able to connect to one another.
5. Li-Fi is more secure than Wi-Fi and it's reported that embedded light beams reflected off a surface could still achieve 70 megabits per second.

3.1 Some Major Difference between Li-Fi and Wi-Fi

Parameter	Li-Fi	Wi-Fi
Speed	1-3.5 Gbps	54-250 Mbps
Range	10 Meters	20-100 Meters
IEEE Standards	802.15.7	802.11b
Spectrum Range	100000 times than Wi-Fi	Radio spectrum Range
Network Topology	Point To Point	Point To Multipoint

Data Transfer Medium	Used light as a carrier	Use radio spectrum
Frequency Band	100 times of Tera Hz	2.4 GHz

Table 1: Difference between Li-Fi and Wi-Fi

4. Future of Li-Fi Technology

1. Li-Fi will be able to provide faster and more reliable Internet connections.
2. Li-Fi will integrate these technologies and create a more mobile, ultra-high speed Internet communication.
3. Li-Fi will prove to be a more secure network as one cannot intercept it without a clear line of sight.
4. Li-Fi will eliminate neighboring network interference as well not interfere in the functioning of other sensitive electronic devices. Thus, one can use it in sensitive

5. CONCLUSIONS

The wireless communication already contributed a huge revolution in the telecom sectors from the last three decades. Wi-Fi gives us the point-to-multiple point internet facility, by which we can create the Wi-Fi hotspot zone anywhere. As per the demand of consumers we introduced the Li-Fi technology for more than 1 Gbps speed.

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