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A Survey between Wi-Fi and Li-Fi Technologies in optimization the Network Access

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ABSTRACT
In the current investigation, we will make a compression between the WI-FI and LI-FI innovations, in which we will decide the favorable circumstances and burdens of these advancements when they are executed. We will utilize a similar strategy where we will dissect qualities, for example, the transmission technique, the speed and the sign scope of the two innovations. As per how the exploration between these two remote innovations progresses, we will have the option to figure out which of these gives the best administrations as far as transmission and security. Toward the finish of the examination we can show which of these advances is the perfect to use in improving the network access. We infer that the two advancements can offer us a decent web access, be that as it may, LI-FI innovation is the most advantageous choice to execute in light of the fact that it gives us incredible speed and security in the transmission of data contrasted with the utilization of WI-FI innovation which gives speed and lower security.

I. INTRODUCTION

Wireless technology has improved the manner in which we transmit the data, permitting the sending and information gathering without the need to associate our wired device. Remote transmission permits smooth out associations in a system, providing fast access to information wherever you are network located. WI-FI innovation is a framework that utilizations floods of radio as a method for transmitting and accepting data between different gadgets without the utilization of any link. WI-FI is available in practically all electronic devices like phones and PCs, permitting to have a snappy their association with the web. The great use of this technology in our devices, has originated that public places like terminals, parks, shopping centers among others; offer web access utilizing WI-FI systems, which allow connecting and explore rapidly.

LI-FI technology is another method of transmitting the data wirelessly using the light for data transmission. Using the light produced by the LEDs as lights and spotlights to send the data and it is received by a photo sensor introduced in hardware with LI-FI technology. The WI-FI (Short for Wireless Fidelity) is a wireless communication system that permits connection between devices without utilizing any cable links. Use the radio waves for transmitting and receiving data information.

Components of Wi-Fi system
1. Access Point (AP): It is the gadget that permits the association of remote hardware to the system.
2. WI-FI Clients: These are the gadgets equipped with Wi-Fi cards, for example, PCs and cellular phones.
3. SSID: It is the name that recognizes and identifies the Wi-Fi network. Its groups all the associations that are in the system.
4. Roaming: Permits clients to have mobility and go substituting access point depending on force of the sign.

Internet services is provided by a direct cable connection to the Router via a modem. The router is accountable of sending the data it receives through of radio waves that are transmitted throughout the scope of the router. These waves are received by the Wi-Fi devices, which have software that is responsible of decoding and interpreting them for use.
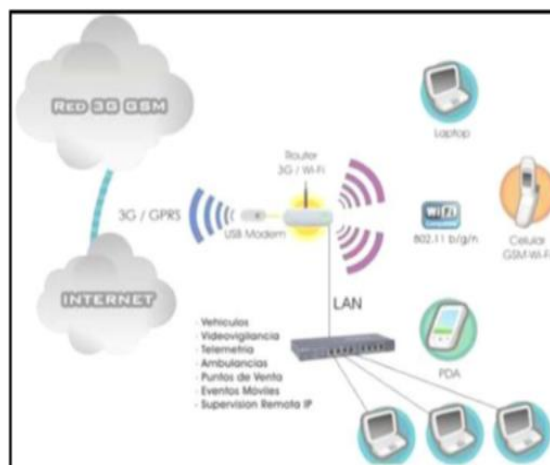
Figure 1. WI-FI operation

IEEE Standards
Wi-Fi networks and devices must obey the regulations of the IEEE standard 802.11 ,which was developed with for the communication of wireless devices. This standard determines the layers the OSI model for a wireless link using electromagnetic waves. There are many standards that developed consecutively, such as:

- IEEE 802.11b
- IEEE 802.11a
- IEEE 802.11g
- IEEE 802.11n

All the types of different IEEE 802.11 standards determine two modes of operations:
(1) Ad Hoc mode: In this type of connection allows two devices or computers to connect and communication each other's without using Access Point. This mode of connection also known as point-to-point (P2P) network.
(2) Infrastructure mode: In this type of connection an Access Point must be used as a part of the network, providing wireless connection signal to all devices in the network. This mode is used at the most Wi-Fi networks.

Transmission: The Wi-Fi transmits the data utilizing the radio waves, these waves are probably going to be influenced by different kinds of interference, for example,
- The Signal reflection.
- The Weather conditions.
- Materials that obstruct the signal transmission or passage.
- Signals produced by different communication devices that operation on the same network range.

The new 802.11n standard utilizes Wi-Fi devices with a few inner reception antennas to permit transmitting and receiving signal by different routers making the framework increasingly stable against obstruction. Also, it utilizes 2 channels of transmission with a bandwidth of 20 and 40 MHz which gives the system a higher speed.

Standard	802.11a	802.11b	802.11g	802.11n
Frequency	5 GHz	2.4 GHz	2.4 GHz	2.4 – 5 GHz
Bandwidth	20 MHz	20 MHz	40 MHz	20 -40 MHz

Table 1. WI-FI transmission parameters

Distance: The distance of the signal depends on the range of the WI-FI devices that offered for the transmission of the signal and the various materials through which the signal will have to pass, for example: the walls. The various standards of WI-FI is used indicate the following distances that the signal can take.

Standard	802.11a	802.11b	802.11g	802.11n
Distance	10-30 meter	90 meters	50 meters	20-30 meter

Table 2. WI-FI signal distance

Speed: The speed in a WI-FI network depends on the broadband used in the data transmission and distance existing between connected devices.

Standard	802.11a	802.11b	802.11g	802.11n
Speed	54 Mbps	80 Mbps	130 Mbps	54–300 Mbps

Table 3. WI-FI signal speed

Security: The security of a WI-FI network is enormous considering because that as the WI-FI signal wholeheartedly propagates in space, the makes you uncovered against being hacked if measures are not utilized of relating security. The key security structures of a WI-FI structure are:

WEP: It allows encrypting the network with a key between 40 and 104 bits. The WEP does not provide good security and is not recommended use it.

WPA: It was made as a substitute for WEP, it covered the main security deficiencies of its predecessor. We should use keys 128-piece login for each customer on the framework.

WPA2: It is an improvement of the WPA, the same as the previous each user it has a password to access the network.

Mac Filtering: Indicates the access point (AP) to only allow connection to devices with MAC address (Media Access Control) specified.

Advantages and disadvantages of WI-FI

Advantages

- Permits quick and easy access to the internet.
- Fast installation to the network compared with other wired networks.
- Allows anyplace connection that arrived at the system subsequently accomplishing mobility.
- Provides wired network extension to location that has no scope.
- Few and easy configurations for connection new computers to the network.
- Highly commercialized technology, so which is easy to find the necessary equipment to build a network.

Disadvantages

- Lower speed and transmission compared with wired network.
- Signal can be interfered since it propagates at the free space
- WI-FI signals can be hacked by others in the surroundings.
- Cannot be used in certain places where which radio frequencies cause interference such as in hospitals.
- May cause interference problems with other communication that use the same radio spectrum.

LI-FI

It is a wireless communication system by which information can be transmitted and received using light. This technology uses light that generated by LED diodes to send and receive the data through a sensor that detects changes in light. It is a new technology developed by the physicist Harald Haas from the University of Edinburgh.

The server or device that provides the internet are connected to the electrical network to transmit the data. These data travel at high speed from the LED lamp to the which has a modular that converts the electrical pulses in light pulses. The light emitted by the LED turns off and turns on thousands of times per second, generating a binary signal (0 and 1) which is detected by a photosensor and then be decoded and processed by digital data software installed on LI-FI devices.

Standard: The IEEE 802.15.7 standard is used for the data transmission wirelessly using the visible light frequencies. This standard gives great transmission speed that allows information to be shared of a large size in a few seconds

Transmission: LI-FI technology as noted above makes use of light generated by LEDs. On each LED a device is placed and loaded that acts as an antenna and responsible to send the data through the generated light wave. This wave is received by the sensor of the LI-FI devices located at the lighting site.

Due to the using the spectrum of light, which is free and unlicensed, the transmitted signal has a frequency of 385-789 THz and it has a side of unlimited width.

Distance: The distance the LI-FI signal transmission depends on of the light wave generated by the LED. The wave has a short range and does not go through the walls, causing the signal is limited to a certain area of illumination.

Speed: The speed that the LI-FI can provide is 5 Gbps according to the last standard, a speed tremendous compared to the speed provided by other wireless technologies. Light gives great broadband and it does not suffer from interferences that cause the decrease of the speed that found in other technologies.

Safety: The characteristic of light that cannot pass through the walls and other obstacles give a great security to the information compared with WI-FI where the signal spreads freely. To transmit the information the sender and receiver must be located under the same lighting site, with which we can assure with whom we are sharing the information.

Advantages and disadvantages of LI-FI

Advantages
- Provides a higher transmission speed than others wireless technologies.
- No interference like other wireless technologies because it uses the light spectrum instead of radio frequency.
- Allows of sharing huge information in a few seconds.
- Provides higher security to the passed data and information since light does not pass through the walls giving signal limitation through the site of light spreading.
- Can be used in location where not possible to use WI-FI.
- It can be adapted to any light source by installing LI-FI emitter.

Disadvantages
- It has little scope imposing the use of multiple emitters LI-FI to have a network.
- It dependable on having lighting always ON for data transmission.
- Not compatible with other device with different technology.
- Does not work in places that are directly exposed in sunlight.
- Very expensive network.

II.   CONCLUSION

Upon completion of the study and analysis of the characteristics of both wireless technologies we determine that the ideal to optimize internet service is the LI-FI, which offers high transmission speeds for excellent Internet connection and high security of information, without However, this technology is not yet commercialized tremendously therefore the necessary elements for its implementation are difficult to obtain in addition of having a very high cost. With the use of LEDs, the information can be transmitted at very high rates with just the simple turning on and off the LEDs. Hence the ongoing increase in the cellular networks, the newest technology of Li-Fi has proven to be a visible spectrum of light which is far better than the RF as it is disposed to to interference. This technology is not only free to use but also provides a safe and secure access. On the other hand, WI-FI is a highly demanded system and its implementation cost is cheaper offering a good speed for an internet connection.

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