LIFI-LIGHT FIDELITY

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WHAT IS LI-FI?

Li-Fi, as coined by Prof. Harald Haas during his TED Global talk, is bidirectional, high speed and fully networked wireless communications similar to Wi-Fi. Li-Fi is a subset of optical wireless communication (OWC) and can be a complement to RF communication (Wi-Fi or Cellular network), or a replacement in contexts of data broadcasting.

WHAT IS LI-FI?

High-speed, Bidirectional, Networked and Mobile Wireless Communications Using Light.

High speed

Data rates of at least 10 Mbps per access point.

Bidirectional

Light spectrum (190 nm – 10,000 nm wavelength) used for uplink and downlink.

Networked

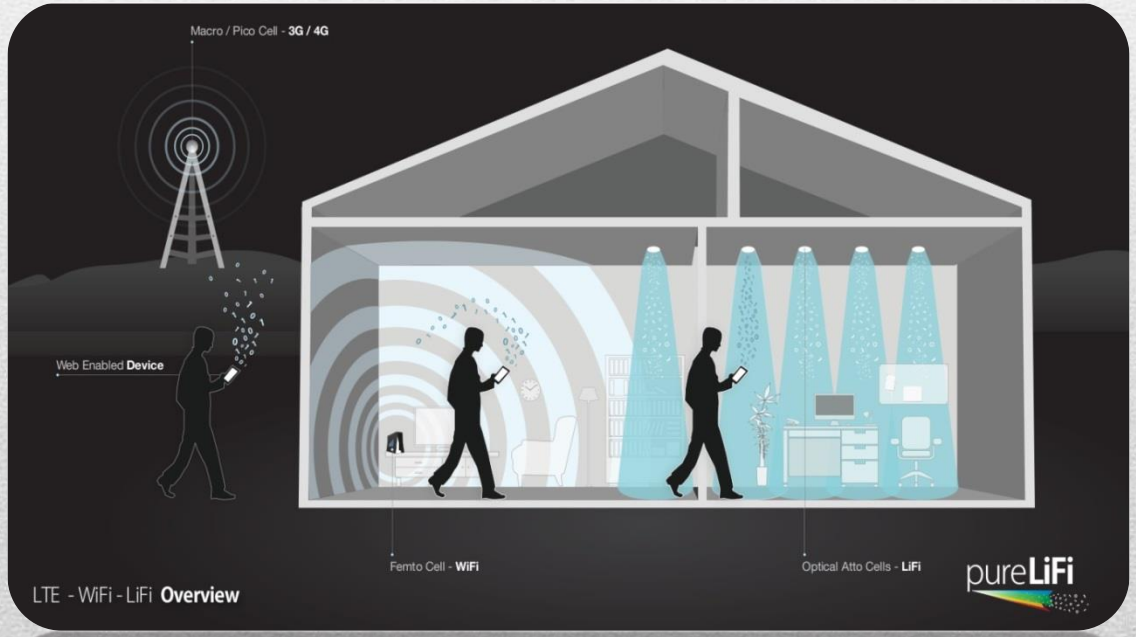
Facilitate network connectivity and management.

Mobile

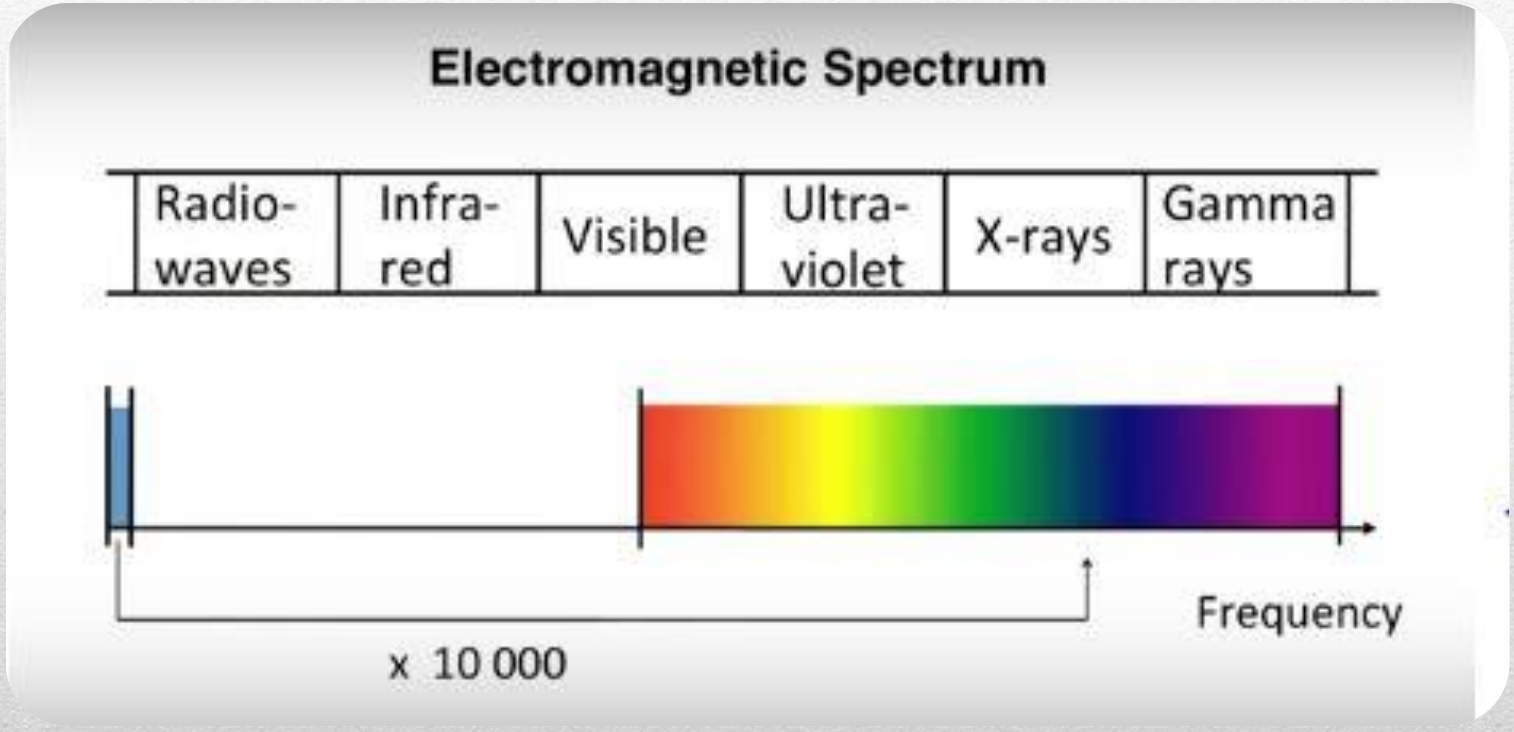
Support roaming users and multiple users per access point (hand-over and multiple access).

Existing wireless technology - Why do we need an alternate technology?

- CAPACITY
- EFFICIENCY
- AVAILABILITY
- SECURITY



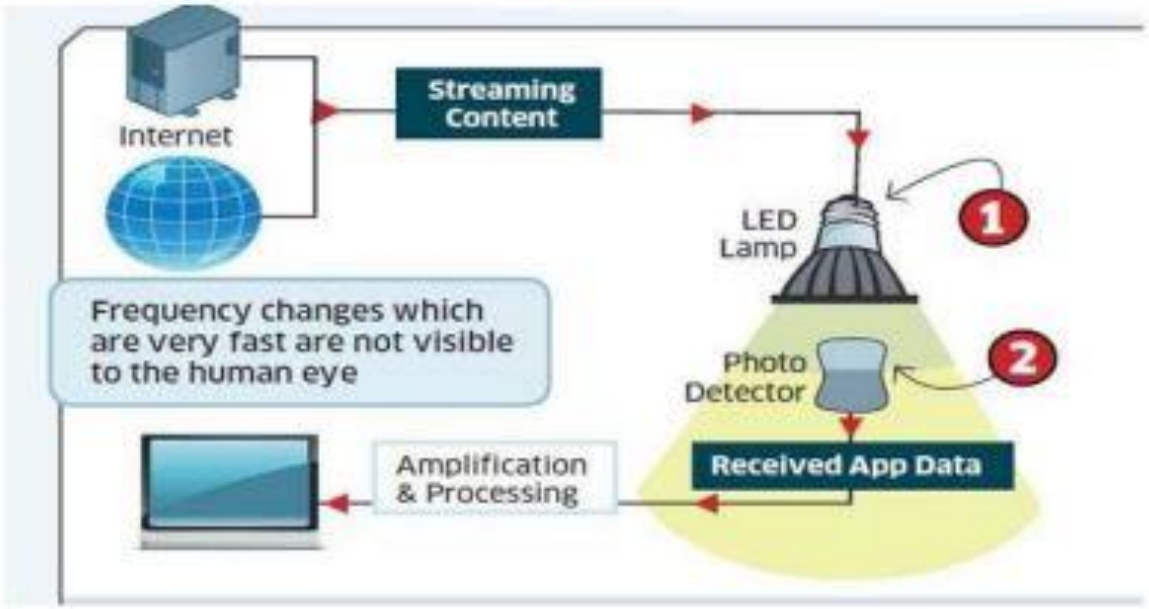
VISIBLE SPECTRUM



LIFI OVER WIFI

S.NO.	BASIS OF COMPARISON	WIFI	LIFI
1.	Security	Not secured (can be hacked)	Secured (cannot be hacked)
2.	Data transmission rate	Slower (uses radio waves)	Much faster (uses visible light)
3.	Range	Small	Large
4.	Traffic control	Less (signal become weaker as traffic increases)	More (due to high speed & easy availability)
5.	Where can be used	Within a range of WLAN infrastructure , usually inside a building	Anywhere , where light source is present
6.	Cost	Costly	Cheap
7.	Working concept	various topologies	direct binary data serving

WORKING


Internet
Streaming Content
LED Lamp
1
Frequency changes which are very fast are not visible to the human eye
Photo Detector
2
Amplification & Processing
Received App Data

DISADVANTAGES

Nothing in this world is perfect and so does LIFI.

- These signals cannot penetrate walls. So the person needs wired bulb in that room also.
- Only works if there is direct line of sight between source and receiver.
- Used for broadcast and it is difficult to uplink.

APPLICATIONS

- **Underwater communications:** Since radio waves cannot be used under water because these waves are strongly absorbed by sea water within feet of their transmission and this renders it unusable underwater but LIFI is suitable for underwater communication
- **Health sector:** Since WIFI is not safe to be used in hospitals and other various health care sectors because it penetrates human body. LIFI can be implemented and well suit in this sector.
- **Internet anywhere:** street lamps, light of vehicles can be used to access internet anywhere in footpaths, roads, malls, anywhere where light source is available.
- **Safety and management**: it can be used to update traffic information at almost every instant and it will be easy for traffic police to deal with traffic and catch the one who breaks the rule.

IDEAS FOR MORE APPLICATIONS :

- Finding the location of a person :

  LiFi uses visible light and this property can be exploited in finding the location of people. Suppose if a child is misplaced and he/she is wearing an earing which is made of Led's. this led can constantly communicate with the visible light available and reveal the location of the child.

- Navigation System : since visible light is present everywhere, we can create internal navigation systems for the bigger areas to create automated machinery/ automatic navigation for the visitors.

IDEAS FOR MORE APPLICATIONS :

- Underwater Applications : the LEDs can be embedded in the water bed to reveal the various impurities underwater. The various leds will communicate with each other to give the overall amount of impurity in that particular area.

- Instant data transfer between the devices : the high speed transfer of the leds can be used to transfer the data between the devices.
- The disadvantage of the Lifi is uplink is difficult.
  - So we can have the photodiodes embedded near to the people on the pillars for eg.
  - Or we can have the same led behaving as a photodiode as well as an led.

REFERENCES

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- https://www.youtube.com/watch?v=NaoSp4NpkGg