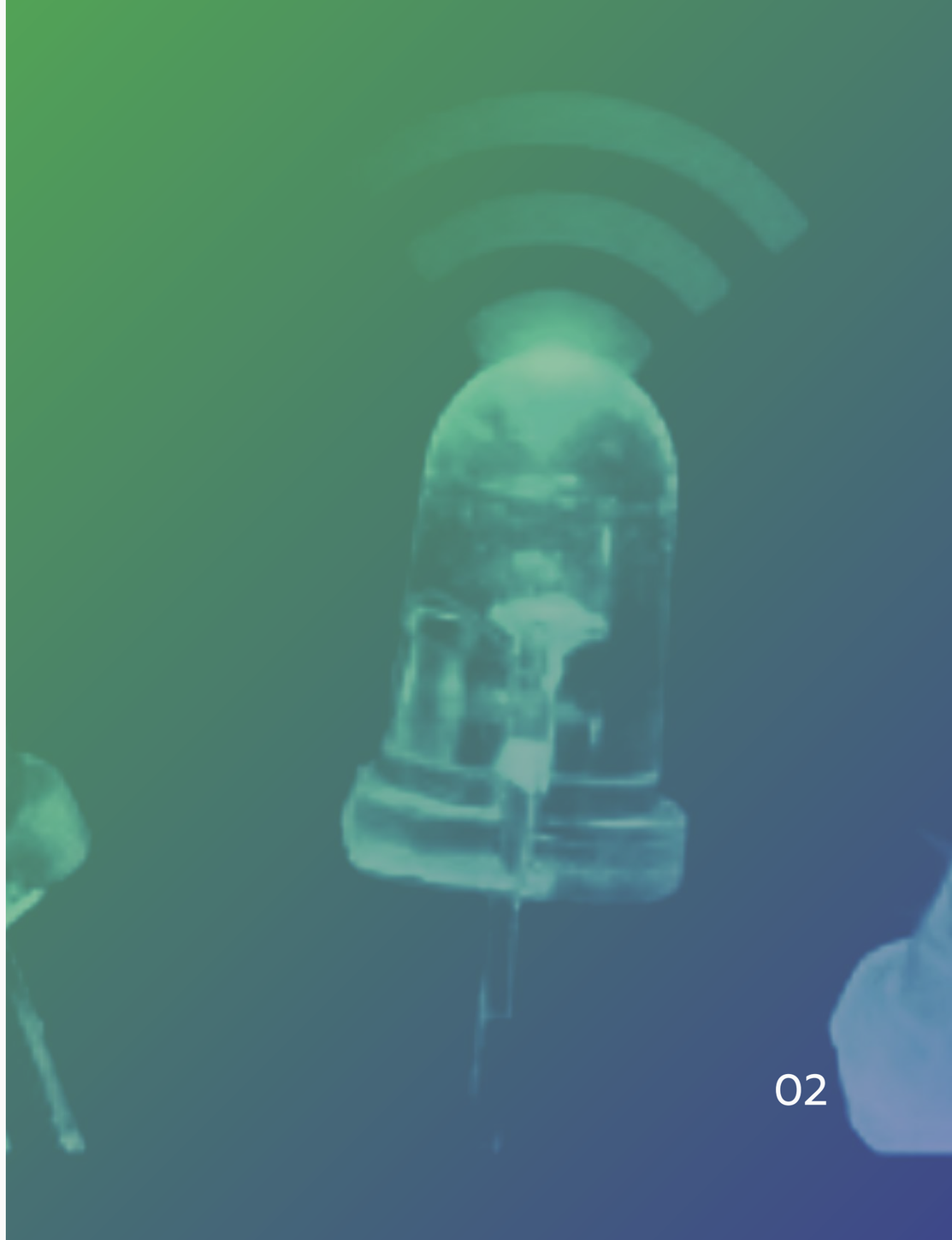
Li-Fi Technology

What is Li-Fi ?

- “LIGHT FIDELITY” is transmission of data through illumination.
- It is a light based Wi-Fi it uses light instead of radio waves to transmit information.
- i.e. sending data through a LED light bulb that varies in intensity faster than human eye can follow.



82%

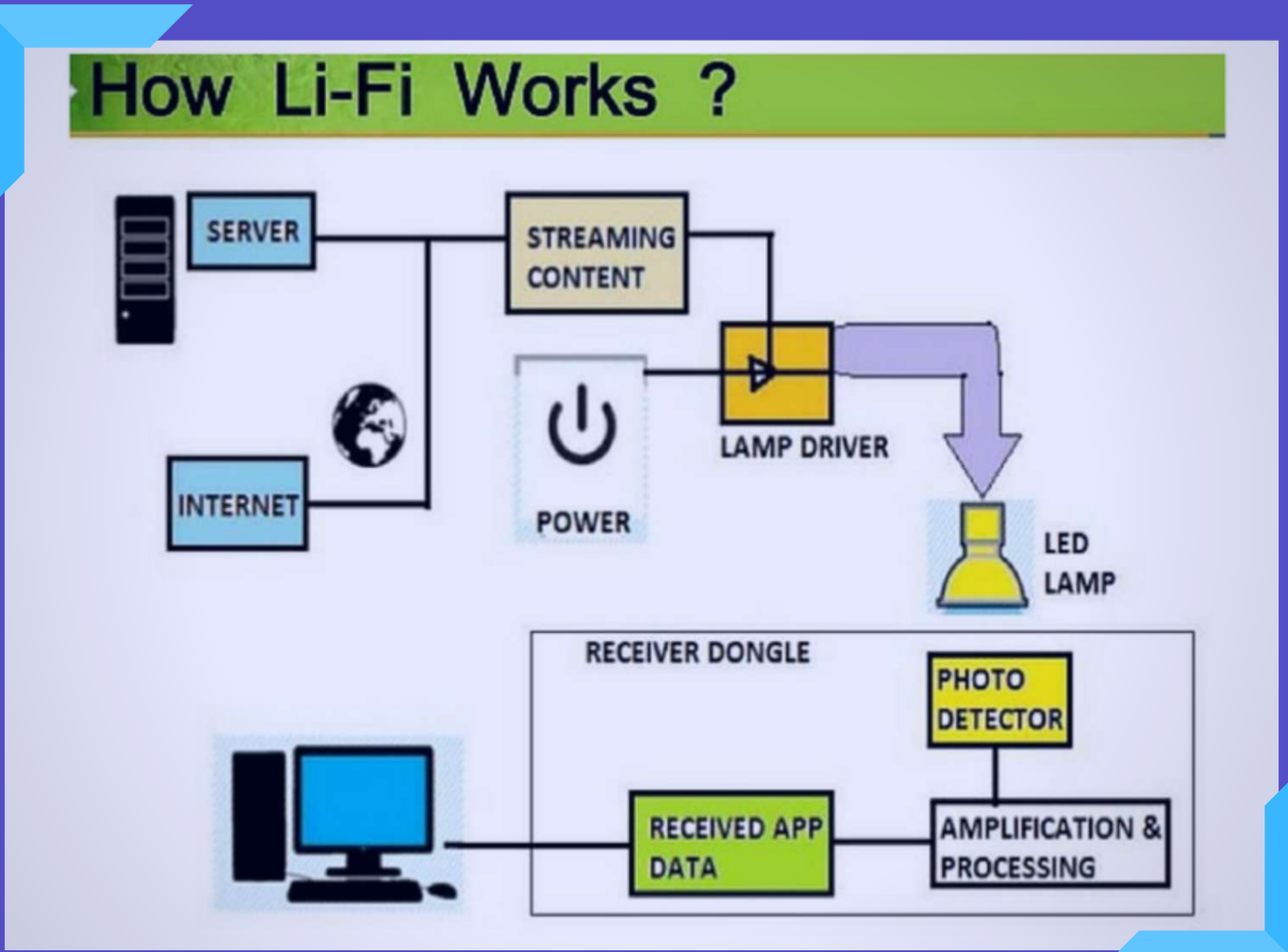
The Li-Fi market was projected to have a compound annual growth rate of 82% from 2013 to 2018.

More about Li-Fi

- Fundamentally, Li-Fi is based on Visible Light Communication (VLC) technology.
- It makes use of light as a medium of communication rather than traditional cable wire communication.
- The communication takes place through light medium. Data transmitted is received at the receiver’s side by a photodetector.

Basic working principle

- Basic working principle of Li-Fi bifurcates into 2 things:
  a. Transceiver
  b. Light as a media transmission



Contents

History of Li-Fi

- Term first coined in 2011
- Introduced by Prof. Harald Hass during a 2011 TEDGlobal talk in 2011
- Projected the idea of “wireless data from every light” among the world
- Emphasis on idea of communication wirelessly using light to transmit data and position among devices
- Developed by Prof. Harald Hass, Dr. Mostafa Afgani and Dr. Gordon Povey at University of Edinburgh
- Fast and cheap version of wi-fi which based on concepts of visible light communication

Need of Li-Fi

01

- Due to increasing demand of wireless communication, radio spectrums below 10 GHz are now found to be insufficient.
- So, to overcome this challenge, industry looks towards it by considering options of using radio spectrums above 10 Ghz frequency (mm-wave communication).

02

- Researchers and thinkers are finding a way in communication wirelessly through means of light.They sought to make light as a medium of communication.

More...

03

- To overcome the limited speed in Wi-Fi.

04

- By making use of Li-Fi, users can have a blazing speed upto 14 Gbps.

05

- Eliminating traditional cable wire communication as LED points, which are main medium of communication in this technique, are available everywhere.

Difference between VLC & Li-Fi

- VLC is unidirectional, point to point light communication, with low data speed rates.

- While Li-Fi is bidirectional, point to point light communication, with high data speed rates.

DIFFERENCE BETWEEN LI-FI AND WI-FI

Criteria	Li-Fi	Wi-Fi
Avg. operation speed	>10 Gbps	150-600 Mbps
Frequency band	1000 times of THz	2.4 GHz
Standard	IEEE 802.15.xx	IEEE 802.11xx
Coverage area	10 meters	20-100 meters
Topology	Point to Point	Point to Multi-point
Communication	Based on VLC	Based on RF comm.
Availability	Anywhere	Limited

Advantages

- Larger bandwidth
- High efficiency
- High security
- Green information Technology
- More Availability
- No license needed

Efficiency

in terms of cost and energy

As Li-Fi uses visible light technology for transmitting signals and every place like homes, offices, malls and even planes have a light source, and the same source of light can be used for transmitting the signals and data. So Li-Fi technology is very efficient in terms of cost and as well energy.

Speed

Light waves have the ability to carry more information as compared to radio waves because visible spectrum is approximately 10,000 times larger than the spectrum of radio waves.

Therefore, data transmission is faster in Li-Fi. Rate of transmission of signal is 224GB per second. This means high-definition video can be downloaded in seconds.

Availability of Li-Fi

Light bulbs, LEDs and many different sources of light are present everywhere. So where there is a light source, there is internet.

This means that high speed data transmission could be available everywhere.

Security

As light cannot travel through opaque structures like walls and other objects, Li-Fi internet is available to the users within a particular room or area and so cannot be breached from other rooms and buildings.

Limitations

01 Need of light source

02 Limited Range

03 Not energy efficient

04 Other light sources can interrupt

01

- We need a light source for Li-F internet. Without availability of light source, internet cannot be used. This can limit the location for the use of Li-Fi.

02

- As light cannot travel through opaque structures, it is a good thing while talking about security but this also means range of internet is limited.

03

- Light need to be on for transmission of data and would not work with the lights turned off. So it is an issue in terms of use of energy.

04

- One of the biggest potential drawbacks is the interception of signals in the open. Other sources of light like sun may interrupt the signal.

Applications

01 Modern medical Instruments

02 In aircrafts and Data Transmission

03 Underwater communications

and more...

Hospitals

for modern medical instruments

It is complicated to lay the optical fiber in hospitals. In the operation theatre Li-Fi can be used for modern medical instruments. As Li-Fi does not interfere with the devices using radio frequency, it can be used in many hospital applications.

Defense & security

Existing technologies pose a great threat to security due to data leakage and hacking. Role of Li-Fi has been identified to be quite huge due to its ability to secure data.

Enhanced Security

Underwater communication

In the present situation, underwater communication is next to impossible because radio waves get absorbed in water very quickly.

On the other hand, light travels through water easily and can be used for communication between divers and also for military communication underwater.

LiFi can deliver multiple Gbps speeds in mobile devices. This next generation technology will drive wireless beyond any current capability, opening up unprecedented bandwidth.

Speed & Bandwidth

Smarter Power Plants

- Wi-Fi and other radiations are dangerous for some sensitive areas like power plants. But power plants need high speed data transfer system for monitoring different things.
- Li-Fi could offer safe connectivity for such sensitive areas.

Industry

Can be used in petroleum and chemical plants where other frequencies could be hazardous.

Li-Fi in Aviation

Electronic equipments can create electromagnetic interference with the devices using radio frequency on the flight.

With the use of Li-Fi,
it is easy for the airline staff to communicate while eliminating data rates, extra wiring, and radio frequency interference.

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Thank You