RAJIV GANDHI
INSTITUTE OF TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

TECHNICAL SEMINAR

LI-FI (LIGHT FIDELITY) TECHNOLOGY

UNDER THE GUIDANCE OF :

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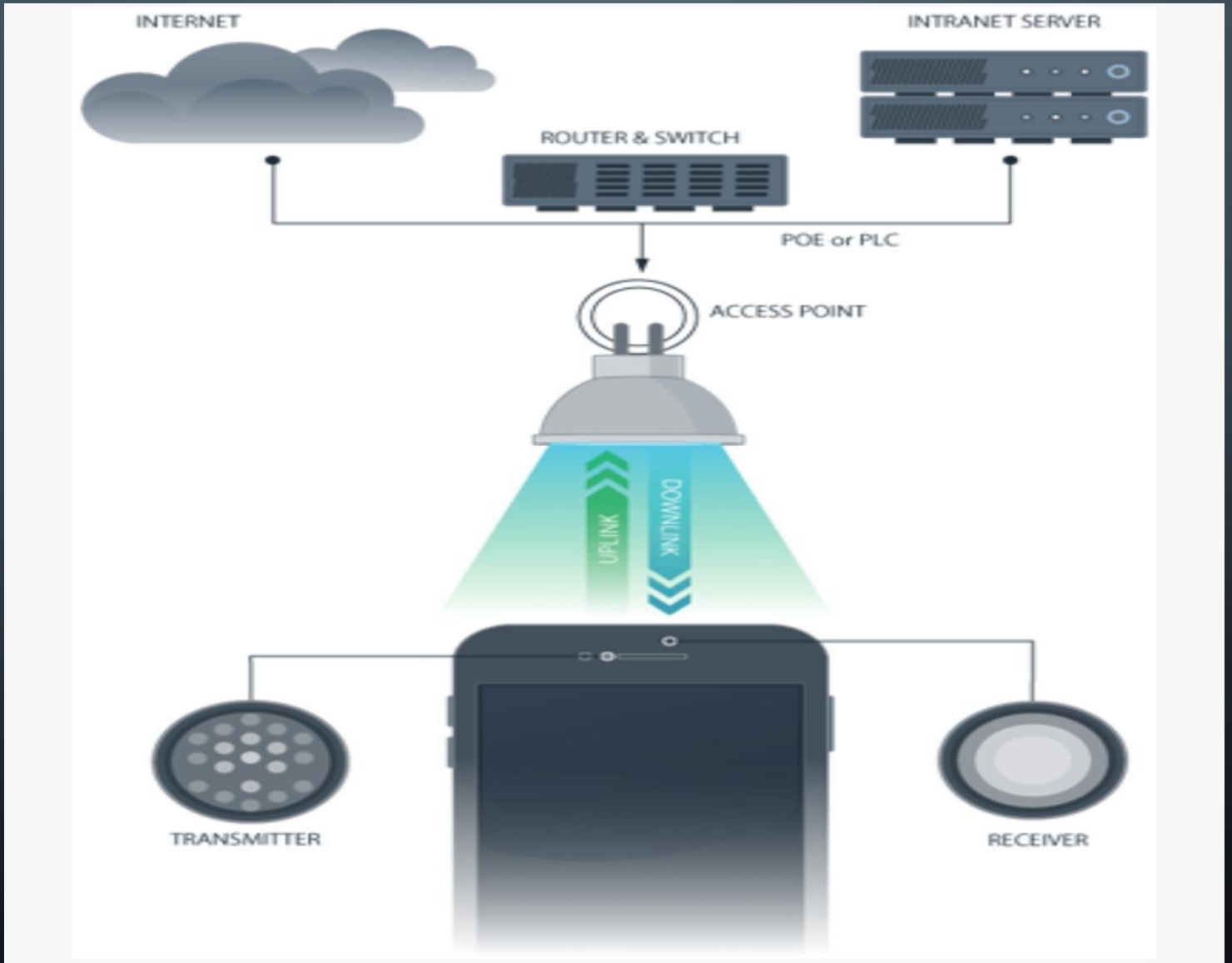
AGENDA

- Introduction
- Components of Li-Fi System
- Working of Li-Fi Technology
- Benefits
- Applications of Li-Fi
- Conclusion

INTRODUCTION

- LiFi (Light Fidelity) is transmission of data through illumination, i.e, sending data through a LED light bulb that varies in intensity faster than human eye could follow.
- LiFi can be thought of as a light based WiFi, it uses light instead of radio waves to transmit information.
- LiFi would use transceiver-fitted LED lamps that can light a room as well as transmit and receive information.
- It is based on Visible Light Communication(VLC), VLC is a wireless method that enables high speed transmission of data with visible light.

COMPONENTS OF LIFI SYSTEM



- **Data Access Point**

It connects the Li-Fi enabled data transmission system with internet via high speed router and switch. Acts as a smart hub which establishes connectivity between Li-Fi enabled devices and internet.

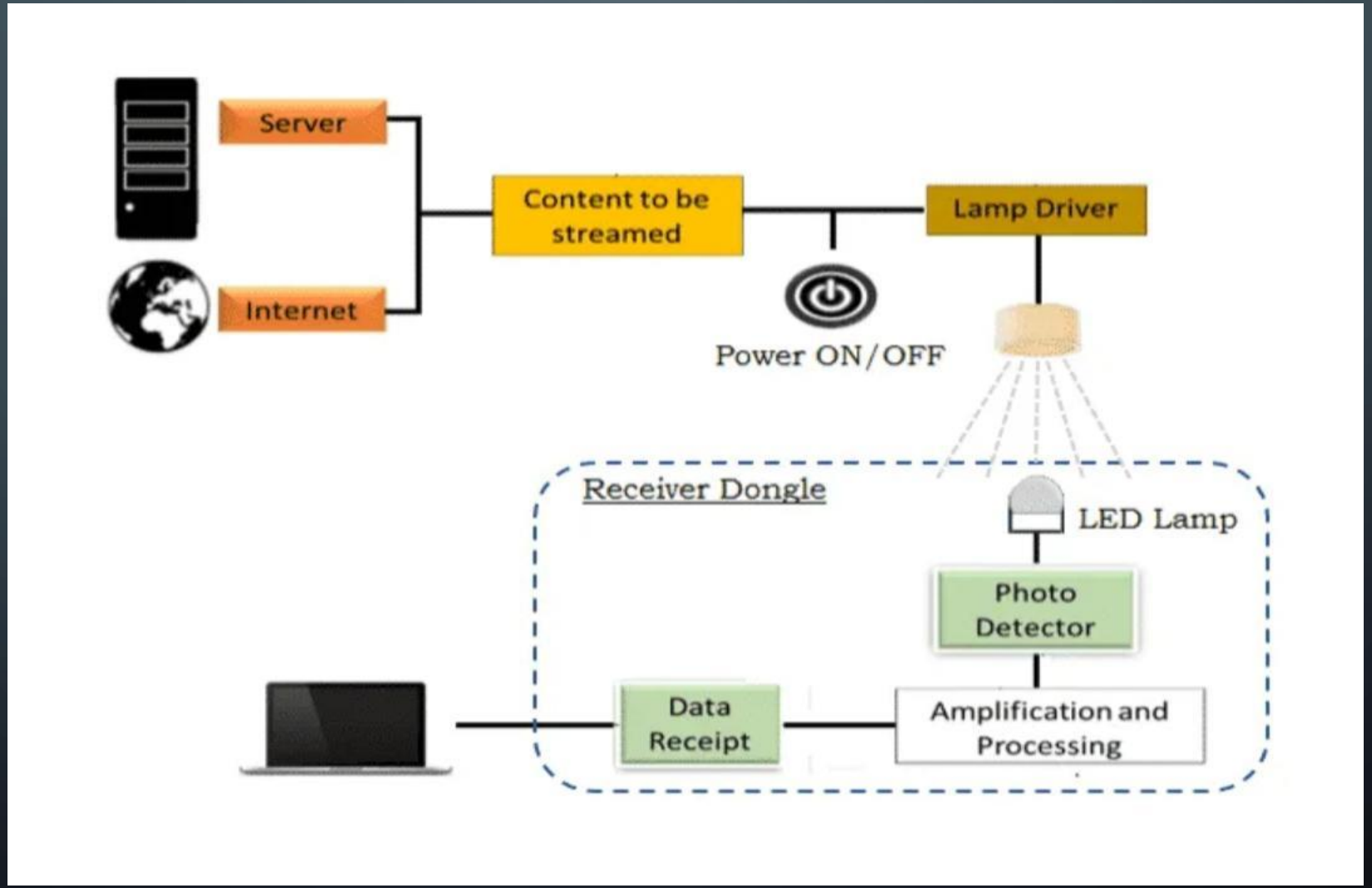
- **Li-Fi enabled Light Source**

LED bulbs can be used for transmitting data with fast switching of LED light according to high end modulation schemes.

- **Li-Fi enabled smart device (transceiver)**

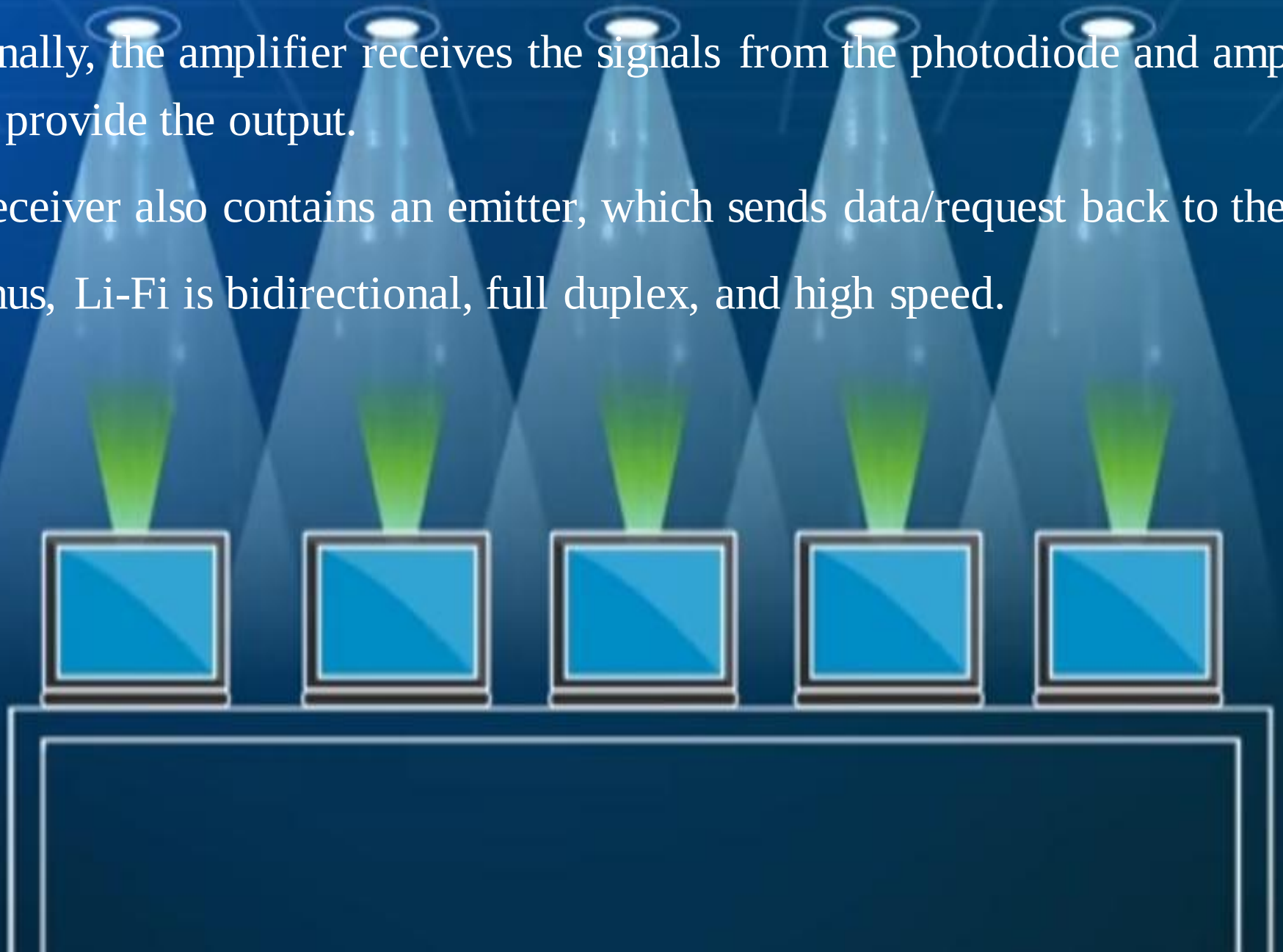
A Li-Fi enabled device has a photo detector (receiver) and light emitter (transmitter) for downlink and uplink. Once the device moves from the vicinity of one light source to another, the system re-establishes the connectivity like the traditional cell concept.

WORKING OF LIFI TECHNOLOGY



- The content to be streamed is fed into the Lamp driver.
- Data is encoded in the light by changing the flickering rate of the LED, which is used as the source. The ON/Off activity of LEDs permits a type of data transmission in the form of binary codes but the human eye cannot recognize this transform & the bulbs appear with a stable intensity.
- When the LED is ON, you transmit a digital 1 and when it is OFF you transmit a 0. The communication is just as seamless as other radio systems.
- The receiver section includes photodiode as well as amplifier. Here, photodiode receives the LED bulb flashes then changes the flashes into electrical signals.

- Finally, the amplifier receives the signals from the photodiode and amplifies to provide the output.
- Receiver also contains an emitter, which sends data/request back to the lamp.
- Thus, Li-Fi is bidirectional, full duplex, and high speed.



BENEFITS OF LIFI

- Enhanced wireless infrastructures by providing an additional layer of small cells (‘attocells’).
- The avoidance of the radio frequency spectrum crunch (100,000 times more capacity).
- Enabling very high peak data rates (224 Gbps).
- The enabling of the Internet-of-Things (100 times more devices), Internet-of-everything.
- Significantly enhanced secure wireless communication (reduced interception of signals).
- Enhanced energy-efficiency by combining data communication and illumination (100 times energy reduction).
- Complete elimination of health concerns.

APPLICATIONS

- Security
- Dense urban environment
- Cellular communication
- EMI sensitive environments
- Augmented reality
- Underwater communication
- Intelligent transportation system
- Safety environments

CONCLUSION

The possibilities are numerous and can be explored further. If this technology can be put into practical use, every bulb can be used something like a internet hotspot to transmit wireless data and we will proceed toward the cleaner, greener, safer and brighter future.

The concept of Li-Fi is currently attracting a great deal of interest. As a growing number of people and their many devices access wireless internet, the airwaves are becoming increasingly clogged, making it more and more difficult to get a reliable, high-speed signal.

This may solve issues such as the shortage of radio-frequency bandwidth and also allow internet where traditional radio based wireless isn’t allowed such as aircraft or hospitals.

THANK YOU!