SkyFi

● ● ●

A fast and secure wireless network paradigm using VLC

Current wireless standards

Pros:

    Convenience

    Accessibility

Cons:

    Speed

    Interference

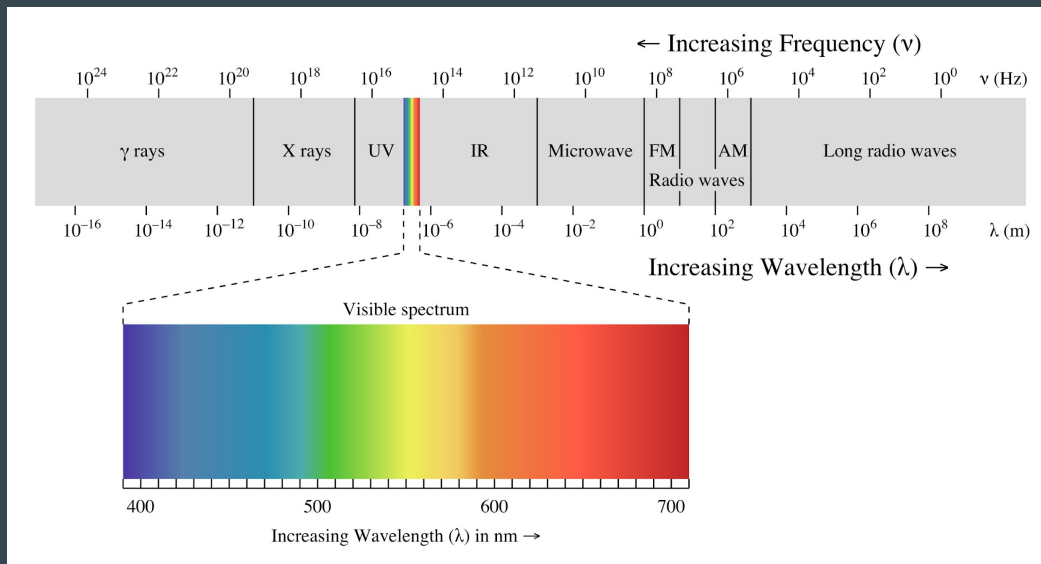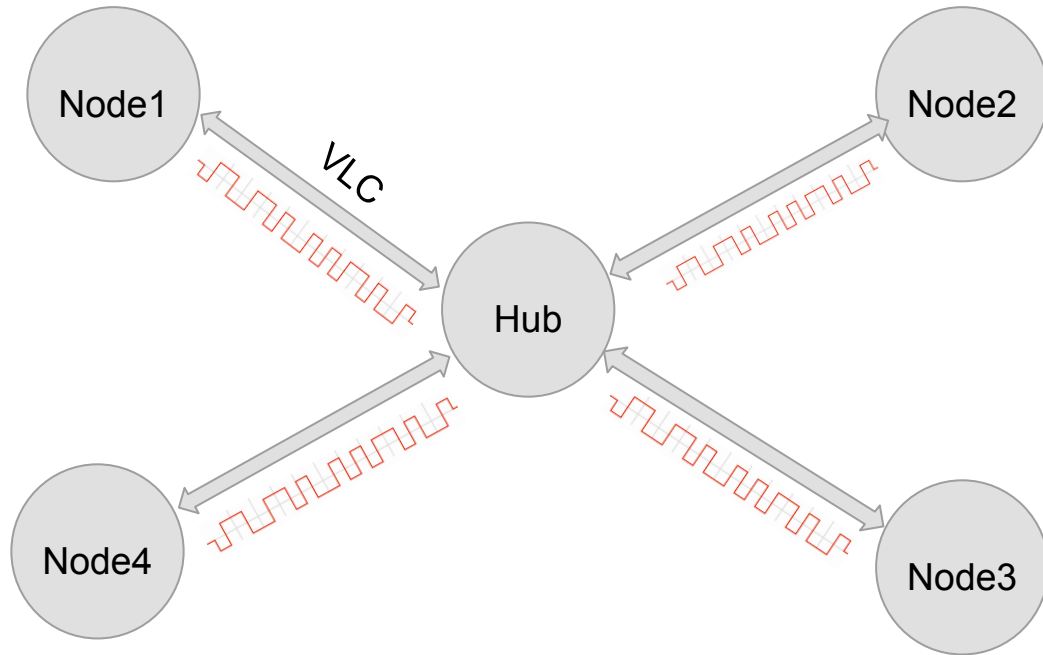# Visual Light Communication

Security

Speed

Bandwidth

Range

Special use cases

Our project

Technology used

We plan to set up a star-network topology with 4 nodes connected to a central hub

Each node consists of an FPGA with an LED transmitter and a photodiode receiver

The nodes will be connected to IO devices (monitors, keyboards, laptops, etc.) to show the working of the network.

Proposed demo

Set up a multiplayer game (Bomberman) where 4 players can play with each other from separate nodes

Transfer a large file multiple times between different nodes in the network and provide statistics on the data transfer rates

Aim to obtain a data transfer rate of approximately 100 Mbps

Verification and Metrics

Multiplayer game

- full-duplex communication between multiple nodes concurrently
- correctness (no loss of data between nodes)

File Transfer Test

- speed

Testing

- Creation of test benches for unit testing
    - One way comms between node and hub
    - One way comms between hub and node
    - Two way comms between hub and node
    - Multi-way comms between hub and nodes
    - Speed tests
- Test working of game
- Test correctness and speed of file transfer

Task list

- Identify photodiodes and LEDs that can be used

- Test basic circuit using arduino and check to see if bits are properly sent and received

- Research TDMA and CDMA (time division multiple access and Channel division multiple access) methods

- Research protocols for error correction and to avoid data loss

- Design and implement single node to hub duplex comms. protocol

- Perform correctness tests by sending packets back and forth and measuring data loss

Task list (contd.)

- Tweak protocols and implementation as necessary to achieve speed goals

- Design and implement multi access methods to connect all nodes to hubs

- Perform correctness and speed test

- Implement multiplayer game on network

- Perform tests to ensure game works

- Implement performance test UI to show speed of network

Initial Gantt chart

Anticipated challenges

Loss of data during transmission

Interference when transmitting and receiving from multiple LEDs

Researching/designing and implementing the necessary protocols for communication

Questions?

...