# SkyFi - Team BB

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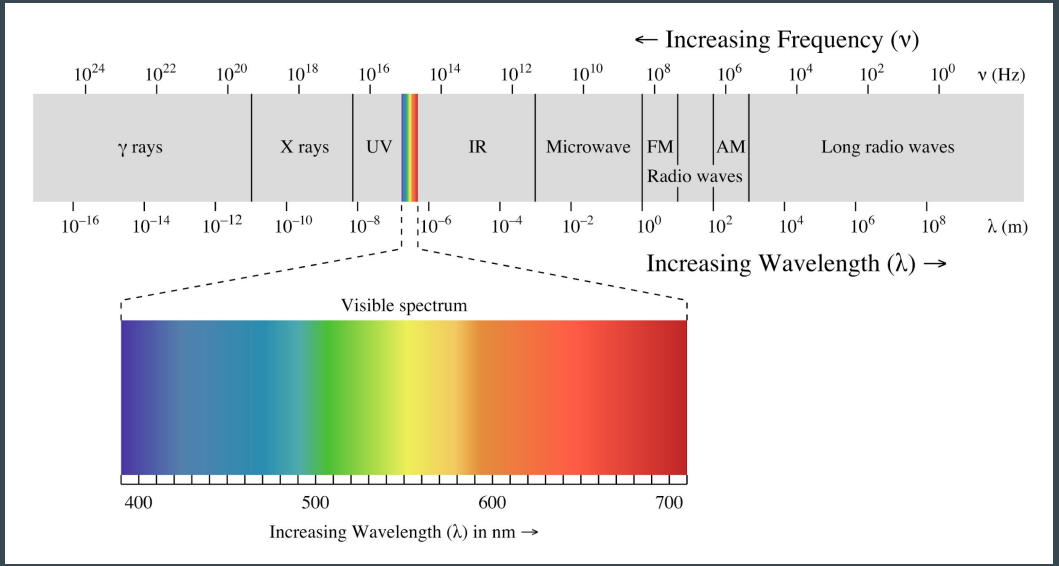
# What is Visible Light Communication?

Benefits

- Bandwidth
- Security
- Cost
- Safety

Challenges

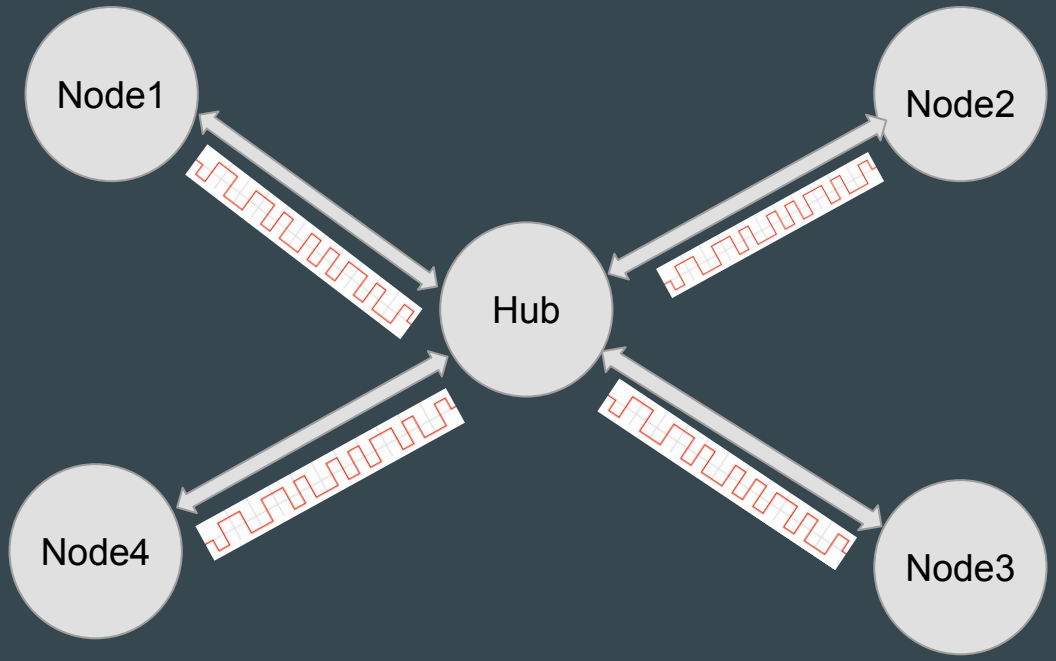
- Flicker mitigation
- Dimming support
- Multi-user scenarios



# The DarkLight Takes to the SkyFi

DarkLight is a PHY-level prototype addressing many of the challenges

We will adapt DarkLight to a real-world use case - gaming!

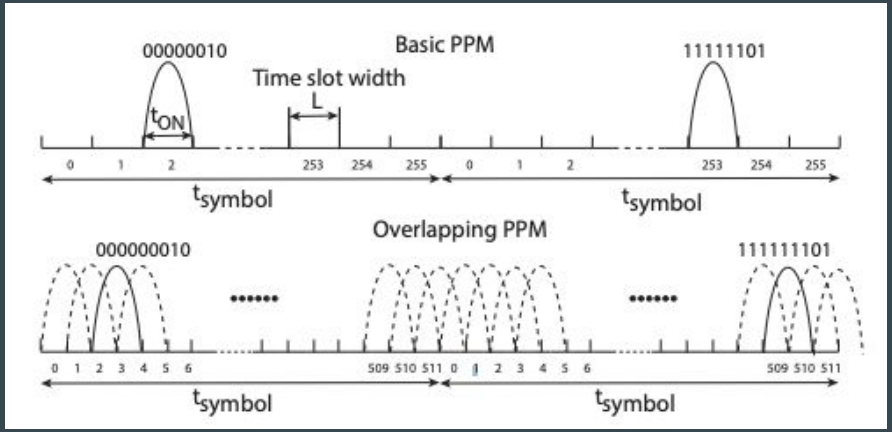


# System Specification

1-meter separation between node and hub

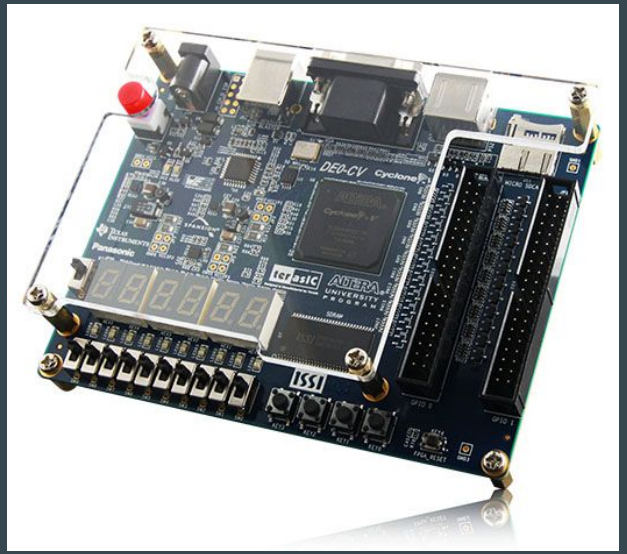
1.6 Kbps data rate

Hub arbitration between simultaneous node transmissions (OPPM)



# System Specification

DE0-CV Development Kit as computing platform of choice

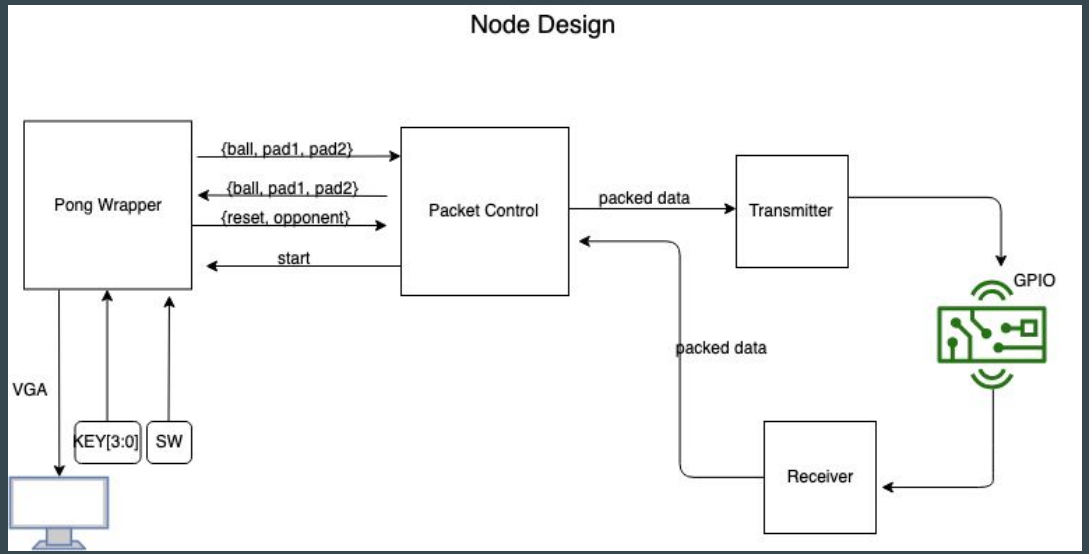


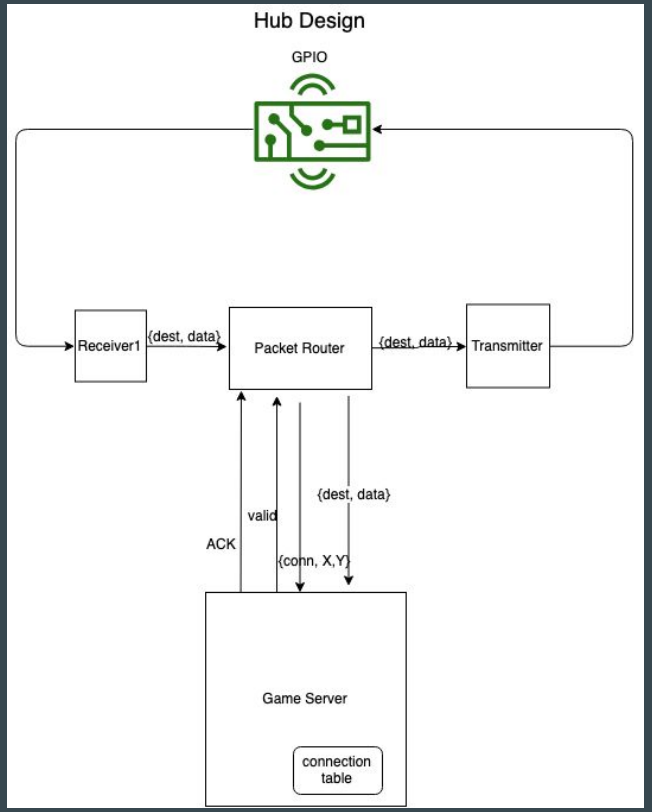

Forward error correction (Reed-Solomon coding)

Media Access Control (MAC) on Datalink Layer

| FLP | TDP | Physical header | MAC header | MAC payload | CRC |
|---|---|---|---|---|---|
| SHR | | PHR | PSDU | | |

# Block Diagram



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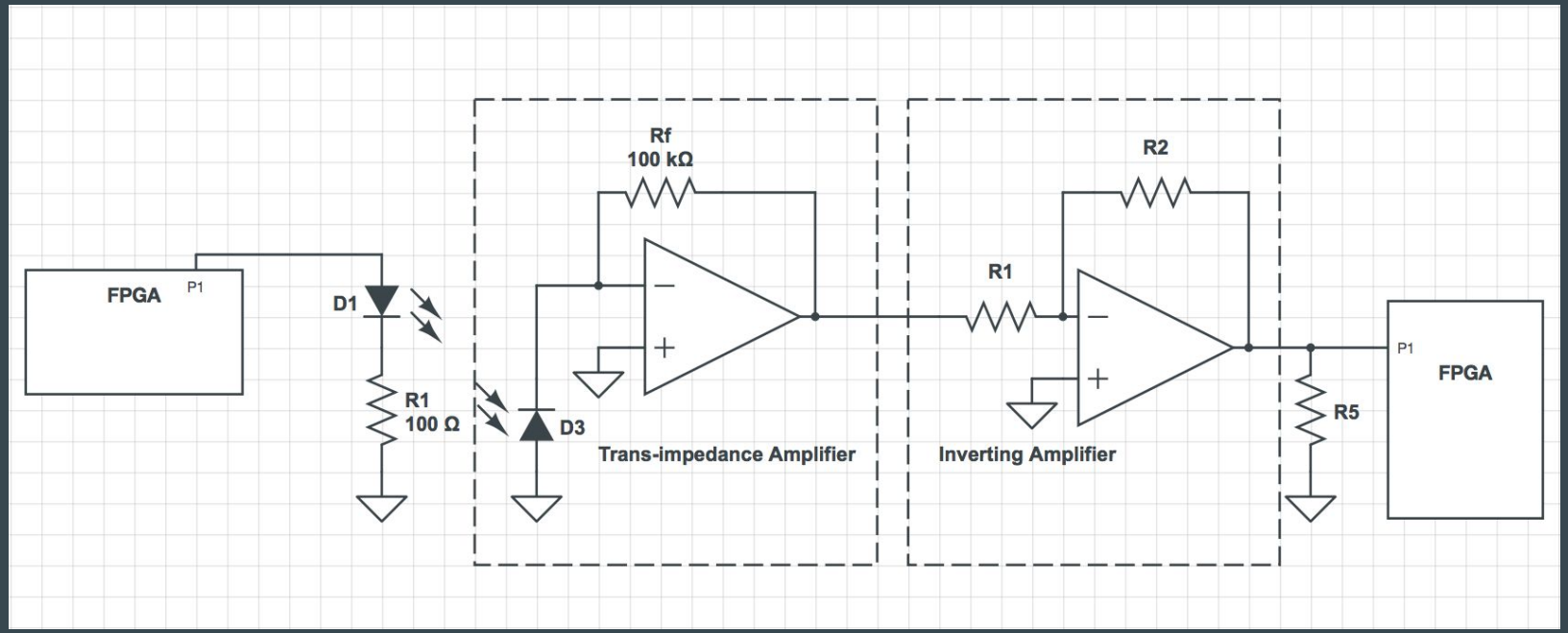


# Implementation Plan

- Buy
  - OPT 101/OPT 202 photodiode trans-impedance amplifier
  - SD5421 photodiode
- Download
  - Pong game
- Borrow
  - DE0-CV boards

# Metrics and Validation

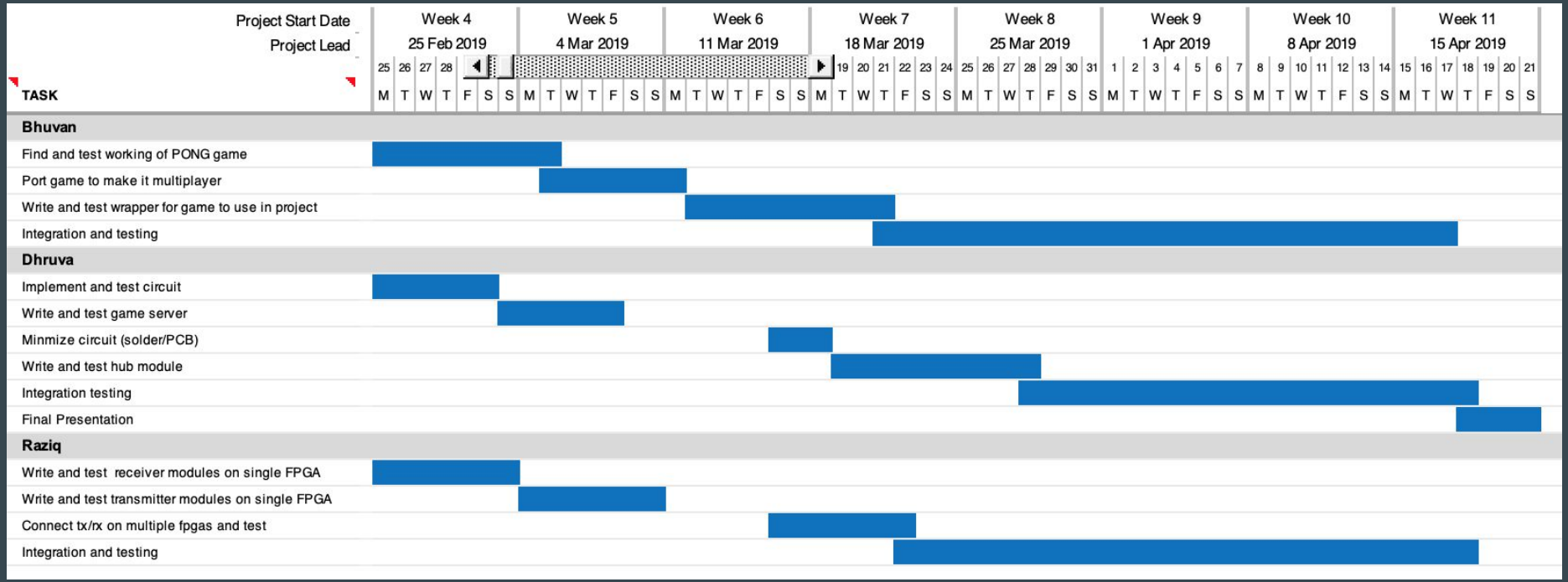
Test with a pseudo-random number generator on the source and destination FPGAs and initialize it with the same seed. This will give the percentage of lost bits.

Circuit Testing with square wave input and FPGA check signal tap on GPIO pins for waveform accuracy.

Testbenches for individual FSMs in the Nodes and Hub.

Risk factors: Too many off dropped bits can result in correctness problems.
Resolution: Tradeoff with speed to reduce bits sent per period.

# Project Management



# Conclusion

VLC prototype that addresses many of the existing challenges

Considerable changes from our proposal

Questions?