

# Improving Performance of Indoor Visible Light Communication Systems with Hexagonal Designed LED Transmitters

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**Abstract:** We report a simulation program for indoor visible light communication with hexagonal LED array shape that will allow us to focus the luminance of optical light for the room center with neglecting of the boundary since they will be occupied by furniture. Users will not be in those areas. We are going to model OOK, PPM and QAM modulation techniques with varied semi-angle degrees, as a result we want to prove with hexagonal shape we could make and uniform luminance in the room. We are going to use MATLAB and Simulink for simulation.

In this indoor VLC system both LOS and diffuse configurations will be taken into consideration. So, when received optical power at a point calculated, direct path and reflections from the wall should be taken into account as below [1]

$$P_r = \sum^{N_{LEDs}} P_t H_d(0) + \int_{reflections} P_t dH_{ref}(0)$$

The horizontal intensity at a point  $(x, y, z)$  is given as

$$I_{hor} = \frac{I(0) \cdot \cos(\phi)^m}{D_d^2 \cdot \cos\psi}$$

**Keywords:** Visible light communications (VLC), LED, illumination, modulation.

## REFERENCES

- [1] H. Q. Nguyen et al., "A MATLAB-Based simulation program for indoor visible light communication system," in Proc. CSNDSP, Jul. 2010, pp. 537-540.