CERTIFICATION

The thesis paper entitled **"PERFORMANCE EVALUATION OF OPTICAL WIRELESS COMMUNICATION FOR INDOOR APPLICATION"** submitted by the group as mentioned below has been accepted as satisfactory in partial fulfillment of the requirements for the degree of B Sc in Electrical Electronic and Communication Engineering on December 2013.

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DECLARATION

It is hereby declared that the work presented in the thesis titled **"PERFORMANCE EVALUATION OF OPTICAL WIRELESS COMMUNICATION FOR INDOOR APPLICATION"** is an outcome of the study carried out by the author under the supervision of Dr. M. Shamim Kaiser.

It is also declared that neither of this thesis paper nor any part therefore has been submitted anywhere else for the award of any degree, diploma or other qualifications.

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ABSTRACT

There has been a growing interest in optical wireless communications for indoor and outdoor applications. The high cost of reconfiguring and maintaining wired networks makes wireless an economical and flexible alternative to wired systems. This paper presents an up-to-date review of the Performance evaluation of optical wireless communication for indoor application. Our motivation is to look at suitable means of achieving high-speed wireless connectivity for indoor applications. Infrared is one such alternative. Compared with radio frequency, the optical signal carrier considered for wireless communication does not fall under regulations and there is no interference with the electromagnetic spectrum. Since the optical power is confined to the room where it is generated, there is no interference with similar systems operating next door. It offers a potentially huge bandwidth with is unregulated world-wide, and is capable of supporting the high data rates demanded by future multi-media applications. In order to improve the performance of indoor optical wireless communication links, multi-spot diffusing (MSD) geometries combine the advantages of the diffuse and the line-of-sight systems, giving great robustness and ease of use. MSD transmitter modulates data onto a series of beams that are projected onto the ceiling above the communications floor. The MSD receiver ideally images one or perhaps several spots and decodes data from the diffusely reflected energy. The same data is modulated for all spots and the arrangement and number of spots is optimized so that at least one spot is in the imager for every receiver position . Delay spread results at various locations are calculated to get the mean delay time for SNR and BER calculation. From the numerical analysis it was found that significant SNR improvement of almost 3 dB is observed as spot beams moved, select the best positioned spot

only and allocate the power adaptively based on channel condition of the selected slots.

Keywords- Optical wireless, indoor system, beam delay, signal-to-noise plus interference ratio (SNIR), adaptive neuro-fuzzy interference system (ANFIS), Doppler shift effect, multi-spot diffuse system (LSMS)

CONTENTS

LIST OF FIGURES

LIST OF ABBREVIATION

OW	-	Optical Wireless
OWC	-	Optical Wireless Communication
SNR	-	Signal – to – Noise Ratio
LOS	-	Line of Sight
SNIR	-	Signal – to – Noise plus Interference Ratio
ISI	-	Inter – symbol Interference
LSMS	-	Line Streaming Multi- beam Spot Diffusion
ANFIS	-	Adaptive Neuro- Fuzzy Interference System
RF	-	Radio Frequency
OFDM	-	Orthogonal Frequency Division Multiplexing
PDA	-	Personal Digital Assistants
LMR	-	Land Mobile Radio
SMR	-	Specialized Mobile Radio
GPS	-	Global Positioning System
LED	-	Light Emitting Diodes
LD	-	Laser Diodes
PD	-	Photodiodes

VLC	-	Visible Light Communication
BER	-	Bit Error Ratio
FOV	-	Field-of-View
MIMO	-	Multiple-Input-Multiple-Output
SLM	-	Spatial-Light Modulator
RMS	-	Root-Mean Square
MSD	-	Multispot Diffusing
IM/DD	-	Intensity Modulation and Direct Detection
CP	-	Cyclic Prefix
NF	-	Neuro-Fuzzy
NFMS	-	Neuro-Fuzzy based Multibeam System