Notice of the Final Oral Examination
for the Degree of Master of Science

of

ALWA BOHARBA

BSc (Al Zawia University, 2010)

“Performance Analysis of Point-to-Multi-Point (P2MP) Hybrid FSO/RF Network”

Department of Electrical and Computer Engineering

Wednesday, April 22, 2020
1:00 P.M.
Remote Defence

Supervisory Committee:
Dr. Fayez Gebali, Department of Electrical and Computer Engineering, University of Victoria (Supervisor)
Dr. Kin Fun Li, Department of Electrical and Computer Engineering, UVic (Member)
Dr. Keivan Ahmadi, Department of Mechanical Engineering, UVic (Outside Member)

External Examiner:
Dr. Esam Abdel-Raheem, Department of Electrical and Computer Engineering, University of Windsor

Chair of Oral Examination:
Dr. Francis Zwiers, Department of Mathematics and Statistics, UVic

Dr. David Capson, Dean, Faculty of Graduate Studies
Abstract

In this thesis, we present a detailed analysis of hybrid point-to-multipoint free space optical (FSO)/radio frequency (RF) wireless system. Hybrid FSO/RF systems have emerged as a promising solution for high data rate wireless transmission. FSO technology can be used effectively in multiuser scenarios to support Point-to-Multi-Point (P2MP) networks. In this P2MP network, FSO links are used for data transmission from a central location to multiple users. When more than one FSO link fail, the central node uses a common backup RF link to transmit a frame to a remote node using an equal priority protocol. The remote nodes have the same priorities in being assigned the RF link. We assume two traffic classes, a high-priority and low-priority classes. The base station reserves two transmit buffers of each user for the downlink transmission. Considering the downlink traffic from the base station to a tagged remote node, we study several performance metrics. We develop a cross-layer Markov chain model to study the throughput from central node to a remote node as well as the performance of the resulting system.