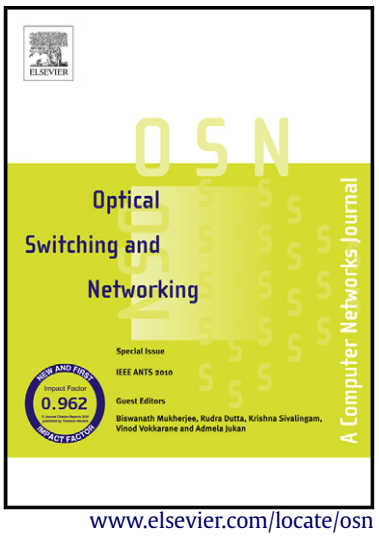

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Melkamu G. Bade, Mehmet Toycan, Stuart D. Walker

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Cost and Energy Efficient Operation of Converged, Reconfigurable Optical Wireless Networks

Melkamu G. Bade[1], Mehmet TOYCAN[1] and Stuart D. Walker[2]

[1] Cyprus International University, Faculty of Engineering, Department of Electric and Electronic Engineering, Nicosia, Northern Cyprus, Mersin 10, Turkey, email: mtoycan@ciu.edu.tr

[2] School of Computer Science and Electronics Engineering, University of Essex, Colchester, United Kingdom, CO4 3SQ, email: stuwal@essex.ac.uk

Abstract

This paper presents a converged fibre-to-the-home (FTTH) based access network architecture featuring wireless services. In order to fulfill the bandwidth demands from end users, a dynamic architecture is proposed with co-existence of LTE, WiMax and UWB technologies. Hybrid wavelength division multiplexing (WDM) and a time division multiplexing (TDM) based optical access network offer reconfigurable provision. This enhances the ability to allocate different wavelengths to different optical networking units (ONUs) on demand. In addition, two different channel routing modules (CRMs) are introduced in order to address the cost effectiveness and energy efficiency issues of the proposed network. Take-up rate adaptive-mode operation and traffic-adaptive power management are utilized to optimize the benefits of low investment cost with energy efficiency. Up to 26% power consumption reduction is achieved at the time of minimum traffic conditions while 10% consumption is achieved at the time of maximum traffic conditions. Besides, 23% energy saving can be achieved compared to conventional systems in fully operated stage.

Key Words: *Converged optical to wireless network; dynamic bandwidth allocation; reconfigurable access networks; cost effective network; energy efficient operation*

1. Introduction

Trends for evolving multimedia services over the last decade, such as high definition Internet protocol television, video on demand (VOD), etc., have driven the operators towards more bandwidth intensive network architectures [1, 2]. Not only do fixed access networks should