Joint Core and Spectrum Allocation in Dynamic Optical Networks with ROADMs with no Line Changes

I. Viloria, R.J. Durán[0000-0003-1423-1646], I. de Miguel[0000-0002-1084-1159], L. Ruiz[0000-0001-6241-5998], N. Merayo[0000-0002-6920-0778], J.C. Aguado[0000-0002-2495-0313], P. Fernández[0000-0001-5520-0948], R.M. Lorenzo[0000-0001-8729-3085] and E.J. Abril[0000-0003-4164-2467]

Optical Communications Group. Universidad de Valladolid.
Paseo de Belén, 15, 47011, Valladolid, Spain

ivan.viloria.vazquez@alumnos.uva.es, rduran@tel.uva.es

Abstract. Future metro networks will connect many multiaccess edge computing resources (MEC) working in a coordinating fashion to provide users with cloud computing capabilities with very low latency. That highly distributed computing architecture has to be connected by a network that provides high bandwidth and flexibility. Elastic optical networks (EONs) are currently the best option to perform that task. In a next step of optical network evolution, EONs can increase the bandwidth that they provide by using multicore fibers (MCF). When dynamic optical circuits are established in these networks, the routing, core and spectrum assignment (RCSA) problem must be solved. In this paper, two algorithms are presented in order to solve the RCSA problem considering continuity constraints in both the spectrum and the core (as we consider a cost-effective metro network architecture based on ROADMs without line changes). One of these versions explores the full spectrum of all cores in order to grant the best solution when solving the RCSA problem. The results of a simulation study show that exploring all the cores when solving the RCSA problem can reduce the blocking ratio of those networks and, therefore, increase its performance at the expense of a slight increment of the computing time required to provide a solution.

Keywords: RCSA, Routing, Spectrum Assignment, Core Assignment, Multicore Fibers, Elastic Optical Networks.

1 Introduction

The explosion of paradigms like the Internet of Things (IoT), Tactile Internet or Industry 4.0 are inducing an evolution of communication infrastructures. The new application and services as well as the number of connected devices impose stringent requirements that current networks cannot satisfy [1]. 5G is a promising technology for that evolution, as it supports a high number of connected devices and enables

show that the blocking ratio is reduced when using the joint allocation at the expense of slightly increasing the computing time required to find a solution. In any case, the computing time of both versions is low enough to use them in the described architecture. This work establishes the first step for more complex studies in which networks with higher number of cores will also be explored.

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