ABSTRACT

The advent of new telecommunication services resulted in a huge increase of data traffic in the transmission networks. New technologies were developed and implemented over the years to attend to this growing demand, and the optical transmission technology stands. It has advanced greatly, due to the optical fiber's large capacity of information transmission. Actually, the best technology to exploits the capacity of the fiber is the wavelength-division multiplexing (WDM), allowing the transmission of multiple signals over a single optical fiber. The WDM optical networks have become very complex, with huge capacity (terabits per second), to attend the ever growing need for bandwidth. In this context, it is extremely important to use the networks resources in an intelligent and optimized way. One of the biggest challenges in an optical network is choosing a route, and selecting a available wavelength on the network to attend a connection request using the least amount of resources. This problem is quite complex, and is known as the *routing and wavelength assignment problem* or simply *RWA problem*. Many studies were conducted in order to find an efficient solution to this problem, but it is not always possible to combine good performance with low execution time, a fundamental requirement in telecommunications networks. Genetic Algorithms have been used to solve hard optimization problems, as is the case of the RWA problem, and has produced remarkable results when compared to traditional heuristics found in the literature. This work presents an overview of the concepts of optical networks and genetic algorithms, and describes a formulation of RWA problem that is adequate for solution by genetic algorithm.

Keywords: Routing and wavelength assignment; Optical networks; Wavelength-division multiplexing; Genetic algorithm; Fitness function.