

UNIVERSIDAD NACIONAL DE ASUNCION

FACULTAD POLITECNICA

A Multi-objective Evolutionary Algorithms Study applied to Routing and  
Spectrum Assignment in EON networks

Keywords: RSA, Elastic Optical Networks, Multi-objective Optimization, Genetic Algorithms, WDM Networks, RWA,

The increase in network traffic and the need to increase the capacity and performance of the stretches of transport networks, born the interest in elastic networks. At present, the optical transport technology used in optical networks is Wavelength Division Multiplexing (WDM); this technology has the capacity to transport, route and assign (Routing Wavelength Assignment) multiple channels in a same fiber based on carriers of different wavelengths. This implies that channels with little demand than the maximum supported, underutilize resources. Therefore, the flexibility of the spectral grid would be the solution, allowing transmission, routing and allocation. (RSA - Routing and Spectrum Allocation) of channels with variable bandwidth that adjust to the demand. In WDM networks, routing planning and wavelength allocation algorithms (RWA) search for a physical route through the network and assign a wavelength for transport, the selection of that wavelength is conditioned to be the same during the route of the physical route, this condition is called a condition of continuity. In the elastic optical networks, the algorithms of routing planning and spectrum allocation (RSA), apart from the aforementioned condition, there is a new condition, which is the condition of contiguity in the spectrum. This condition stipulates that the frequencies slots that occupy each channel must be together in the spectrum. The RSA problem can be attacked as routing and spectrum allocation together. With this approach to the RSA problem, the greatest difficulty that arises is the large number of conditions posed by the problem; a greater computational complexity is introduced when calculating the optimal path for each request while optimizing the spectrum allocation. The heuristic proposed in this paper is a multiobjective evolutionary algorithm that determines a set of optimal Pareto solutions that are not dominated with respect to the others for the RSA problem. The different tests performed with this algorithm show promising results with respect to the paper presented in [16].