Availability Analysis Of Shared Backup Path Protection Under Multiple-Link Failure Scenario In WDM Networks

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ABSTRACT
Dedicated protection and shared protection are the main protection schemes in optical wavelength division multiplexing (WDM) networks. Shared protection techniques surpass the dedicated protection techniques by providing the same level of availability as dedicated protection with reduced spare capacity. Satisfying the service availability levels defined by the user's service-level agreement (SLA) in a cost-effective and resource-efficient way is a major challenge for networks operators. Hence, evaluating the availability of the shared protection scheme has a great interest. We recently developed an analytical model to estimate network availability of a WDM network with shared-link connections under multiple link-failures. However, this model requires the information of all possible combinations of the unshared protection paths, which is somehow troublesome. In this paper, we propose a more practical analytical model for evaluating the availability of a WDM network with shared-link connections under multiple link-failures. The proposed model requires only an estimate of the set of shared paths of each protection path. The estimated availability of the proposed model accurately matched with that of the previous model. Finally, we compare the previous model with the proposed model to demonstrate the merits and demerits of both models illustrating the threshold at which each model performs better based on the computational complexity. The proposed model significantly contributes to the related areas by providing network operators with a practical tool to evaluate quantitatively the system-availability and, thus, the expected survivability degree of WDM optical networks with shared connections under multiple-link failures.