ABSTRACT

This thesis provides routing and assignment mechanism for green optical networks governed by GMPLS. The motivation behind proposing the new methods of this thesis is to cope with, and decrease the energy usage and emission production. The suggested routing mechanism of this thesis are intended for Control Plane of the GMPLS network however they could also be used with other Control planes such as Control plane of SDN networks.

After introducing the related work in chapter 1 and 2, Chapter 3 presents two Table Driven routing mechanisms that can increase the throughput of the Control plane of the GMPLS network by 6-fold. This increase means that with the same hardware Control plane can server up 6-times more dynamic connection requests. The Forward-Looking Emission Aware and SLA Based routing mechanism (FL-EASB) mechanism introduced in chapter 3 uses the predicted information about energy and emission and can prepare a routing table that can be used 3 to 6 hours later. With compiling and preparing the routing table beforehand, there is less chance of blocking a connection request due to downtime of calculating the routing table.

Chapter 4 studies the effect of adding Green SLA on the behavior of key parameters of the GMPLS network. Chapter 4 suggests more investment on green energies and developing better green routing mechanisms. This chapter shows that adding Green SLA to non-green mechanism of routing the traffic decreases the resource efficiency with a justifiable amount of reducing emission.

Chapter 5 introduces a Multi-SLA aware routing mechanism that considers Availability and Delay Service Level Agreements and uses a set more practical and realistic energy and emission values for testing the proposed mechanism. Results show 100% SLA satisfaction for both Availability and Delay SLA while providing 35% less emission compared to non-green mechanism.

Chapter 6 introduces a new resource assignment mechanism that provides up to 8% more success rate compared to First Fit (FF) method with Continuity Constraint while being 36% energy efficiency compared to FF without the Continuity Constraint.