

## A discrete event modeling and simulation of wave division multiplexing unidirectional slotted ring metropolitan area network

### ABSTRACT

**Problem statement:** The lack of uniformity in the choice of simulation platforms for optical WDM networks stands behind the difficulty of developing a common simulation environment. Correlating WDM unidirectional slotted ring network to Discrete Event Simulation (DES) encompassing event definition, time advancing mechanism and scheduler has yet to be developed. **Approach:** The study focused on the proposed and the development of an event based discrete simulator for the WDM unidirectional slotted ring network to facilitate the reuse of the protocol modules under a common simulation environment. The proposed network architecture implemented for the developed simulator employs a separate wavelength as the control information channel. This control information enabled the nodes to monitor their access to the transmission media. Each node was equipped with a tunable transmitter and fixed receiver for data communication. Access nodes were equipped with a fixed transmitter and fixed receiver for the control information exchange. The developed simulator had derived the use of dividing the wavelength into slots. Nodes used these slots to transmit fixed size packets. Slots can be reused by the access node after receiving packets by the deployment of the spatial reuse scheme, thus enhancing the bandwidth utilization. The developed simulator had derived the set of the parameters, events, performance metrics and other unique WDM simulator elements according to a detailed analysis of the base model. **Results:** The network delay and packet loss were investigated and compared to a benchmark of the modeled domain. Successful deployment of the developed simulator was proven by the generated results. **Conclusion:** Extensive performance analysis of WDM unidirectional slotted ring network can be deployed using the developed simulator with low computational overheads. Further enhancements were to extend the developed simulator for bidirectional slotted ring supporting fairness control and considering both uniform and non-uniform traffic.

**Keyword:** Performance analysis strategies, optical networks, packet switching technique