

Performance analysis on 16-channels wavelength division multiplexing in free space optical transmission under tropical regions environment

ABSTRACT

Problem statement: Wavelength-Division-Multiplexing (WDM) is a promising technique for meeting the growing demand for increased bandwidth and various types of services in the optical access network. For wide area or metropolitan networks, fibers are deployed to provide huge bandwidth. In access networks, the fiber-to-the-home will partially solve the last mile problem. However, some environmentally sensitive area such as housing areas, tower buildings and national parks are not allowed to deploy fibers. Therefore, Radio Frequency (RF) is normally used to overcome this problem. The incompatibility of RF and optical channels is now widely believed to be the limiting factor in efforts to further increase transport capabilities. Free Space Optical (FSO) communication is the technology that can address any connectivity needed in optical networks, such as core, edge, or access networks. **Approach:** In this project, the simulation software namely Optical System version 7 is used to simulate the design of WDM in FSO transmission. The total losses that have been considered in this design are geometric loss, transmitter and receiver loss and atmospheric attenuation which focus on nonselective scattering during heavy rainfall condition in Malaysian environment. Malaysian weather data are used to reflect the conditions particularly in tropical regions. **Results:** We have presented the results of 16-channels WDM at 100-GHz channel spacing. The simulated results show that this system can support a higher bit rate up to 2.5 Gbps over 2.4 km distance. **Conclusion:** Simulation results showed that WDM FSO system may be a good candidate to solve the last mile problem and also it has capability to accommodate the channels more than 16. By introducing the error correction code or balance detection, the transmission distance might be increased further.

Keyword: Bit rate; Division multiplexing; Free space optical; Geometric loss; Old topic; Receiver loss; Selective scattering optical access