

# Abstract

**Moustafa Hussein Aly**

## **20-Gb/s Transmission Over 25-km in Wavelength Division Multiplexing Passive Optical Network with Centralized Light Source**

In this study, a full duplex of 16-channel wavelength division multiplexing passive optical network (WDM-PON) architecture is designed and investigated using a centralized light source (CLS). A 20-Gb/s downstream bit rate is achieved without using a digital signal processing (DSP) unit active elements. A carefully designed Mach-Zehnder modulator (MZM) operates as a pulse carver to refine single channel spectrum is utilized at each optical line terminal (OLT). More channels, a maximum bit error rate (BER) of  $10^{-13}$  and at least quality factor (Q-factor) of 7.0 are achieved. An on off keying (OOK) format of 5-Gbit/s is used for the upstream transmission. This is done with low complexity and a transmission distance of 25 km.