

Abstract

Radio over Free Space Optics (RoFSO) is a remarkable technology for seamless integration of wireless and optical networks. In this work: Amplitude shift keying (ASK), Quadrature amplitude modulation (QAM), and Quadrature phase shift keying (QPSK) of digital modulation are simulation design by (OptiSystem v7). This is for study the transmission of RF signals over FSO and comparing the three modulation techniques into RoFSO system. Using RF signals with the frequency range from (20 to 60) GHz in RoFSO system and many carrier optical signals where the higher RF has a wider bandwidth to carrying larger information. Wavelength division multiplexes (WDM) technology is used to increase the transmission of data rates, where every optical signal carrying a modulation signal by uses MZM. However, the transmission of many signals may cause fading, due to interference between the two or more signals. Two independent channels are transmitted 20 Gbps over free space optics these two channels have (263 m to 6.55 km) ranges under different weather conditions by (2λ WDM RoFSO), while four channels of (4λ WDM RoFSO) are transmitted 40 Gbps over distance from (255 m to 5.9 km), and 80 Gbps are transmitted by eight independent channels (8λ WDM RoFSO) over ranges from (200 m to 5 km). This explains to us when increasing the transmitter channels this would decrease the transmission ranges that could signal passes. Finally, when transmission 10 Gbps by QPSK modulation format over (5 km) with clear air and (250 m) with heavy fog weather conditions, their BER were (2.5×10^{-33} and 5.1×10^{-27}) respectively, these values of BER are the good indicator for system enhancer.