

# Abstract

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## **Performance Evaluation of an Adaptive Hybrid FSO/RF Communication System: Impact of Weather Attenuation**

The change in the atmospheric conditions is an effective factor that affects the free-space optical (FSO) link and the main cause of the attenuation that could lead to a link between the transmitter and the receiver. In this case, a backup RF link can be used to maintain the high availability of the system. This paper investigates the performance of an adaptive hybrid FSO/RF system at different wavelengths for the FSO link and different frequencies for the RF link under the effect of fog, humidity and rain. Both the received power and the bit error rate (BER) are used to evaluate the system performance. A good performance wavelength for the FSO link and frequency for the RF link are chosen to overcome attenuation and ensure that the signal is successfully delivered to the receiver by the optical link in the case of the good atmospheric conditions by the RF link in the case of the bad atmospheric conditions. The obtained results have shown that utilizing the 1550 nm wavelength in the FSO link, the proposed system is enhanced by 49.6% than using 10 GHz in the RF link and the system was able to overcome the channel attenuation and ensure that the signal delivered to the receiver with detectable power, high data rate and low BER.