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# Performance Analysis of Free Space Optics Link under the Effect of Rain Attenuation


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#### Abstract

Free space optical (FSO) networking has emerged as a promising technology for bridging the last mile gap in current high-rate fibre networks as well as for high-rate next-generation broadband wireless communication networks. This paper theoretically investigates the performance of the Free Space Optic system under rainy weather conditions using Optisystem software. Quality factor and eye-diagram analysis are used to analyse the FSO performance for several rain intensity and precipitation, following the Carbonneau model for rain attenuation. The results show that the link is completely lost when the distances are at 1.5 km, 1.2 km, and 0.8 km for light rain, moderate rain, and heavy rain, respectively. An optical amplifier is then introduced to improve the system performances and increase the signal intensity, which helps to mitigate the atmospheric effects easily. As a result, data transmission is sustained without interruptions, and overall connectivity is enhanced. Results show that the transmission range improves up to several meters, specifically under moderate rain weather condition when using the optical amplifier gain is applied. © 2021 IEEE.

#### Author keywords

Free Space Optical (FSO); optical amplifier; rain attenuation

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