

FSO Performance under High Solar Irradiation: Case Study Qatar

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Abstract : Free-Space Optics (FSO) is a wireless technology that enables the optical transmission of data through the air. FSO is emerging as a promising alternative or complementary technology to fiber optic and wireless radio-frequency (RF) links due to its high-bandwidth, robustness to EMI, and operation in unregulated spectrum. These systems are envisioned to be an essential part of future generation heterogeneous communication networks. Despite the vibrant advantages of FSO technology and the variety of its applications, its widespread adoption has been hampered by rather disappointing link reliability for long-range links due to atmospheric turbulence-induced fading and sensitivity to detrimental climate conditions. Qatar, with modest cloud coverage, high concentrations of airborne dust and high relative humidity particularly lies in virtually rainless sunny belt with a typical daily average solar radiation exceeding 6 kWh/m² and 80-90% clear skies throughout the year. The specific objective of this work is to study for the first time in Qatar the effect of solar irradiation on the deliverability of the FSO Link. In order to analyze the transport media, we have ported Embedded Linux kernel on Field Programmable Gate Array (FPGA) and designed a network sniffer application that can run into FPGA. We installed new FSO terminals and configure and align them successively. In the reporting period, we carry out measurement and relate them to weather conditions.

Keywords : free space optics, solar irradiation, field programmable gate array, FSO outage

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