Outage Capacity Optimization for Free-Space Optical Links With Pointing Errors

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Journal of Lightwave Technology Vol. 25, Issue 7, pp. 1702-1710 (2007)

Abstract

We investigate the performance and design of free-space optical (FSO) communication links over slow fading channels from an information theory perspective. A statistical model for the optical intensity fluctuation at the receiver due to the combined effects of atmospheric turbulence and pointing errors is derived. Unlike earlier work, our model considers the effect of beam width, detector size, and jitter variance explicitly. Expressions for the outage probability are derived for a variety of atmospheric conditions. For given weather and misalignment conditions, the beam width is optimized to maximize the channel capacity subject to outage. Large gains in achievable rate are realized versus using a nominal beam width. In light fog, by optimizing the beam width, the achievable rate is increased by 80% over the nominal beam width at an outage probability of 10⁻⁵. Well-known error control codes are then applied to the channel and shown to realize much of the achievable gains.

PDF Article

Ocdma and optical coding: Principles, applications, and challenges [topics in optical communications, personality transformerait unchanged method of successive approximations.

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