

## Hybrid optical CDMA-FSO communications network under spatially correlated gamma-gamma scintillation - DTU Orbit (09/11/2017)

### Hybrid optical CDMA-FSO communications network under spatially correlated gamma-gamma scintillation

In this paper, we propose a new hybrid network solution based on asynchronous optical code-division multiple-access (OCDMA) and free-space optical (FSO) technologies for last-mile access networks, where fiber deployment is impractical. The architecture of the proposed hybrid OCDMA-FSO network is thoroughly described. The users access the network in a fully asynchronous manner by means of assigned fast frequency hopping (FFH)-based codes. In the FSO receiver, an equal gain-combining technique is employed along with intensity modulation and direct detection. New analytical formalisms for evaluating the average bit error rate (ABER) performance are also proposed. These formalisms, based on the spatially correlated gamma-gamma statistical model, are derived considering three distinct scenarios, namely, uncorrelated, totally correlated, and partially correlated channels. Numerical results show that users can successfully achieve error-free ABER levels for the three scenarios considered as long as forward error correction (FEC) algorithms are employed. Therefore, OCDMA-FSO networks can be a prospective alternative to deliver high-speed communication services to access networks with deficient fiber infrastructure.

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