Abstract

Moustafa Hussein Aly

Relay Selection Schemes for FSO Communications over Turbulent Channels

Free Space Optics (FSO) Communication has attracted the attention of the researchers in the last decade due to its high data rate, security, and low cost. Relay-assisted techniques are used to divide the distance to shorter hops in order to mitigate the effects of turbulence, weather attenuation, pointing error, and geometric loss. Choosing an active relay per time slot has been proven to enhance the performance of the system and decrease the loading effect on the system when compared to all active relays. This paper investigates the best relay that can be Selected according to the source to relay (S-R) channel coefficient, relay to destination (R-D) channel coefficient, and source to destination (S-D) channel coefficient. A comprehensive comparison is applied to the three following cases: (a) Broadcast phase from source to relay to Select the best (Proactive-Relay) (b) Broadcast phase from relay to destination after broadcasting to all relays then Select (Reactive-relays) and, (c) Direct link from source-to-best relay-to-destination to conclude which method is better for different scenarios, such as turbulence regime, number of relays, different pointing error effect, and severity of S-R as compared to R-D and vice versa. The Selection methods regard to four aspects: (1) Number of relays (two three relays) (2) Distance between Source-Relay and Relay-Destination (D = 400–600 m, 500–500 m, and 600–400 m) (3) The different turbulence of Log-normal channel and Gamma-Gamma channel (with a refractive index coefficient(C2n = 0.5 10?14, 2 10?14 and 5 10?14)) and finally, (4) Beam waist wz(pointing error).