

Uplink and Downlink Performance Analysis of OFDM Signals in Hybrid Radio-over-Fiber (RoF)

Links

Mikael Gidlund

Abstract - With the increasing demand for high data-rates in wireless networks, Radio-over-Fiber (RoF) systems could be a good candidate for physical layer infrastructure in the development of high speed wireless LANs (WLANs) in the future. The biggest limitation of RoF links in a wireless network is its limited dynamic range due to nonlinear distortions. In this paper, we aim to investigate the performance of OFDM signals in a hybrid RoF channel. The effects of AM/AM, AM/PM and AM/AM-AM/PM nonlinear distortions on the average bit error probability of the system in both uplink and downlink are considered. The obtained simulation result shows, as expected, that the OFDM system is quite sensitive to nonlinear distortion. For the downlink scenario, the system is mostly sensitive to fiber nonlinearities while for the uplink scenario, the fading channel increase the amplitude variations of the received OFDM signal at the fiber channel input which results in degraded system performance.