

# Abstract

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## **Bandwidth and Power Efficiency of Various PPM Schemes for Indoor Wireless Optical Communications**

Bandwidth and power efficiency of various pulse position modulation (PPM) schemes for wireless optical communication (WaC) indoor applications are investigated. These schemes include traditional PPM, multiple PPM (MPPM), overlapping PPM (OPPM) and differential amplitude PPM (DAPPM). This study is unique in presenting and evaluating bandwidth and power efficiency under wide range of design parameters such as symbol length,  $L$ , number of chips per symbol,  $n$ , number of chips forming the optical pulse,  $w$ , and amplitude level,  $A$ . For the DAPPM scheme, the power efficiency with respect to the on-off keying (OaK) power is introduced. A comparison among different modulation schemes is done. Relation with IrDA and IEEE 802.11 standardization is clarified. DAPPM was found to be the best modulation schemes in terms of power and bandwidth requirements under careful design aspects (i.e. lowest bandwidth requirement  $B/R_b = 0.375$ , is achieved at  $L = 2$ ,  $A = 8$  and lowest power requirement,  $PDAPPM/POOK = 0.013$ , is achieved at  $L = 32$ ,  $A = 8$ ).