ABSTRACT

In this work, we investigate the construction of new symmetric codes which have weight equal 8 and the new codes are derived from prime sequence codes on GF (p),where p is any prime number larger than 7. The main advantage of optical CDMA LANs using the new codes is that practical encoder/decoder can be designed based on the serial structure which allows to reduce optical loss. In addition, a large number of simultaneous users can access the transmission channel while maintaining a good BER performance and the network can have a large number of potential users due to the large number of available code sequences. We present the algorithm for generating the new codes and design computer programs to generate the codes, to calculate the cross-correlation function and the probability distribution of the cross-correlation, and to evaluate the BER performance. Symmetric codes on GF(p) for $11 \leq p \leq 31$ are generated and we found a class of symmetric codes of length equal p(2p-1), weigh equal 8 with maximum cross-correlation equal 4. For $17 \leq p \leq 31$ the number of new symmetric code sequences is larger than the number of prime code sequences. We also show that all-optical CDMA networks using the new codes can support a larger number of simultaneous users at a required BER of 10^{-9} than the networks using prime sequence codes and symmetric code of weight equal 4 .