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Broadcast Algorithms for OTIS K-ary n-cube

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Abstract - Literature review revealed parallel broad coast algorithm for an OTIS (Optical Transpose Interconnection System)K-ary n-cube parallel computers. In the resent years ,OTIS model has become one of the popular interconnection patterns for optoelectronic parallel computer architectures. The all- to-all broad coast of the message, held by each processor, is the basis of many computational problems. The polynomial interpolation, matrix -matrix multiplication, matrix -vector multiplication, extreme finding and decentralized consensus protocol are some of the common problems that inevitably require all-to-all broad coast. We propose two versions of one-to-all and all-to-all broad coast algorithms for OTIS K-ary n-cube network. The first version of these algorithms is based on some basic data routing techniques, where as the second version is based on the Hamiltonian cycle. Based on the former technique, one-to-all broad coast algorithm requires $2n \lceil k/2 \rceil$ electronic + 1 optical moves whereas the all-to-all broad coast algorithm takes $K \lceil K/2 \rceil - 1$ electronic moves + $2(K - 1)$ OTIS moves. The one-to-all algorithm requires $K - 1$ electronic moves + 1 optical move where as the all-to-all broad coast requires $0.5 K (K - 1)$ electronic moves + $0.5 K$ OTIS moves based on the latter approach. This result can be compared with that obtained for gossiping on OTIS – Hypercube in [14].