Title: TTPM-An Efficient Deadlock-Free Algorithm for Multicast communication in 2D Torus Networks
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**Abstract:**

A torus network has become increasingly important to multicomputer design because of its many features including scalability, low bandwidth and fixed degree of nodes. A multicast communication is a significant operation in multicomputer systems and can be used to support several other collective communication operations. This paper presents an efficient algorithm, TTPM, to find a deadlock-free multicast wormhole routing in two-dimensional torus parallel machines. The introduced algorithm is designed such that messages can be sent to any number of destinations within two start-up communication phases; hence the name Torus Two Phase Multicast (TTPM) algorithm. An efficient routing function is developed and used as a basis for the introduced algorithm. Also, TTPM allows some intermediate nodes that are not in the destination set to perform multicast functions. This feature allows flexibility in multicast path selection and therefore improves the performance. Performance results of a simulation study on torus networks are discussed to compare TTPM algorithm with a previous algorithm.