An Adaptive Resource Scheduling Approach to Improve the Throughput and Reliability of Shuffle-Exchange Networks

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Various approaches are introduced to increase the throughput and reliability of multi-stage interconnection networks (MINs). When multiple sources in such a network try to send data, collisions of packets and blockings are inevitable. Time division multiple access (TDMA) protocol are used to address these problems. However, TDMA based on fixed slot allocation has low throughput and high delay in computer networks. In this work, we propose an adaptive slot allocation strategy for TDMA using Monte Carlo random sampling method in shuffle-exchange network (SEN), a well-known MIN, to improve performance. We simulate the proposed approach for 4000 times using Network Simulator version 2. Experimental results show that the proposed adaptive TDMA solves packet collision and blocking problems to some extent. It is also observed that the SEN and its variants (SEN+ and SEN+2) perform better in terms of throughput and reliability, while the new SEN+2 outperforms the other networks.