Efficient Scheduling Algorithms for Bluetooth Scatternets

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Abstract

When more than seven devices are connected in a Bluetooth scatternet, bridge
devices are used to connect two piconets to the scatternet. To deal with possible data transmissions between different piconets, the bridge device must frequently switch to different masters. Suppose, however, that a bridge is serving a piconet and the master in another piconet is calling it at the same time, the calling master has to wait until the bridge completes the previous service. Such transmission delay may accumulate over a long period and the performance of the whole Bluetooth network will degrade significantly. In this work, two new scheduling protocols, namely the static schedule and the hybrid schedule were implemented in an effort to smooth this kind of transmission delay in Bluetooth networks. In this static schedule the rendezvous points between piconets are coordinated by distributing them by using a graph edge coloring technique. In case of a heavy traffic load, the static schedule is expected to perform well. On the other hand, in case of a light traffic load, the static schedule may cause long and unavoidable routing delays even when there is no transmission between piconets; in this case a naive random round-robin (RR) schedule in each piconet is more appropriate. Thus, in the hybrid schedule, each master initially runs a RR scheme in its piconet. When the traffic load is heavier than a predefined threshold value, it runs the static schedule. Finally, simulations were conducted by using an ns-2 simulator and Bluehoc to demonstrate the efficiency and effectiveness of the proposed scheduling protocols.

Keyword：Bluetooth networks Scatternet Scheduling protocols Edge coloring