Abstract

Mobile Ad hoc Networks are wireless networks established by a group of mobile devices on a shared wireless channel without any infrastructure. The rapid deployment and self-organizing nature make these types of networks completely different from any other type of networks. However, low bandwidth and frequent disconnections caused by node mobility make high data accessibility a challenging problem in mobile ad hoc networks. Caching is a technique that has been deployed in networks to reduce network traffic and provide better response time for data accesses. The dynamic nature of ad hoc networks poses new problems for reliable cache management. As the nodes move arbitrarily, disconnection and network division occur frequently. In addition, the mobile devices have relatively limited computing resources and battery life. Therefore an effective caching technique should consider these issues to arrive at an optimal solution. A variety of cooperative caching protocols were proposed for MANETs to address the problem of data accessibility. Most of the available literature in cooperative caching concentrates on improving the user response time. However, in most of these studies, they have neglected the cache overhead and network scalability issues. An important requirement for the successful implementation of cooperative caching in ad hoc networks is to make a balanced use of computation and communication resources. In the light of this, the purpose of this research work is to focus on several aspects of cooperative caching and in particular to devise a cooperative caching scheme that achieves high data accessibility with reduced cache overhead. The proposed scheme addresses cache management and cache discovery problems of cooperative caching. For
cache management, a new cache replacement algorithm to improve cache hit ratio is presented and a cache placement policy to enhance the effective capacity of the cooperative cache is proposed. The main goal of the cache discovery algorithm introduced is to get the data correctly and efficiently with minimum overhead and bandwidth consumption. Another important criterion in cooperative caching is network scalability. The performance of various cooperative caching schemes degrades when the network size increases. The present work focuses on this issue and presents a scalable solution for cooperative caching. The performance of the proposed cooperative caching schemes was compared with the existing techniques.