ABSTRACT

Interest in Mobile Ad Hoc Networks has increased rapidly due to the immense growth in wireless communication technologies. The aim of the research work is to improve data availability and gaining efficiency by pooling resources of mobile nodes using local and global update mechanisms.

In this research work, a Cluster Based Cooperative Caching Technique (CBCCT) based on mobility prediction is proposed to handle mobile disconnections. The network is divided into clusters and the cluster head is selected based on the power level and connectivity. The details of the cached data items in the cluster and its adjacent clusters are maintained in the local cache table and the global cache table respectively. Experiments are conducted using Network Simulator-2 by varying the number of nodes and mobility speed. The proposed CBCCT increases packet delivery ratio, decreases data access delay and control overhead than the existing Global Cluster Caching (GCC) technique since it avoids the frequent cache updates.

The cluster mobile nodes accessed the desired data from the remote source and cached in its local cache. The source updates the origin data frequently and cluster mobile nodes should ensure the consistency with the source to avoid the staleness. The Enhanced Push Pull Algorithm (EPPA) has proposed to improve the consistency maintenance in cluster based MANET
and compared with CBCCT. The source pushes the updates to the caching nodes through cluster head which maintains the details of cached data with TTL. The cluster head renews the TTL in advance based on data access rate using pull approach which avoids delay in TTL renewal and improves the valid data accessibility. Thus the proposed EPPA enhances the data consistency, reduces the data access delay and decreases the control overhead by avoiding unnecessary TTL renewal.

Mobile nodes caches the newly arrival data if sufficient free space is available in cache. Otherwise existing data should be evicted for new data. A novel Memetic Algorithm (MA) inspired by the foraging behaviour of ants followed by a local search heuristic is proposed for optimizing the cache replacement. This research work is proposed to enhance data replacement based on geographical and semantic dimension. The MA based replacement technique is compared with EPPA. The proposed MA improves the packet delivery ratio, decreases the data access delay and control overhead respectively than EPPA.

The real time scenario is simulated in the case study based on the stock market updates and results are analysed by varying the mobility speed for various cache size 50KB and 100 KB. CBCCT with MA improves the hit ratio than CBCCT with Least Recently Used (LRU) replacement.