Abstract

In Mobile Wireless Communication Networks, caching data items at the mobile clients effectively reduces the delay associated by accessing the data. Efficient cache invalidation strategies are used to ensure the consistency between the data in the cache of mobile clients and the database server. Cache Invalidation strategies are used to achieve cache consistency in mobile environment. Conventional schemes for maintaining cache consistency for mobile environments are based on periodic broadcast of invalidation reports (IR). Servers use IR to inform the updates of data to the mobile clients whenever it is updated. Several approaches for sending IRs are Broadcasting Timestamp, Amnesic Terminals, Signatures, Bit Sequences, Absolute validity interval, etc. These approaches have several advantages and disadvantages. The mobile clients can uplink to the server to know the current update of the data in which they are interested. But the uplink requires more bandwidth and hence it is not economical. Wireless Broadcast allows a huge population of clients to receive information without actively participating in communication. Although scalable and economical, broadcasting creates a lot of traffic on the network and also it is not sufficiently secure.
This research work proposes and implements a Data Transmitting Agent based multicast strategy for effective cache consistency in mobile environment using Predicted deviation in update interval (PDUI) as the cache invalidation scheme. The sequence of the proposed work is outlined as follows – When a query is received by the mobile client from the user it tries to resolve it by checking whether the data present in its cache is valid. If yes, then query is answered by using its cached data, otherwise the client queries the DTA (Data Transmitting Agent) for latest updates and the query is answered. If DTA doesn’t have the latest updates, it gets it from the server. The main idea in this approach is that the DTA will be multicasting updates to the clients (group of clients having similar interests) and they need not uplink to the server individually, thus preserving the network bandwidth. Another advantage of using DTA element is that the server is relieved of the burden of activities with respect to small population of clients. The scenario of simulation is developed in NS 2.34 by assuming multi-cell environment consisting of wired-cum-wireless network components for the communication as the Server, Base station, DTA and other clients. The results demonstrate that the traffic generated in the proposed multicast model that uses an enhanced multicast flow control protocol (MCAODV) is simplified and it is also effective to maintain cache consistency when compared to the existing methods that used broadcast strategy.
This model suggests an advanced CRP (Semantic Neural Network based Cache Replacement Policy for data caching) for the cache management of DTA for improving the results of proposed strategy still further as the DTA is responsible for handling huge data in order to maintain Cache Consistency.