ABSTRACT

A Mobile Ad-hoc Network (MANET) is a collection of wireless mobile nodes creating networks without any physical infrastructures. There is no fixed topology, as the network topology changes randomly and rapidly, at unpredictable times. MANETs can offer multi-hop broadband communication for emergency, real time and rescue operations, there are challenges that currently limit their usefulness. These challenges are connected to the impact of mobility. Due to node mobility many impacts occur, such as node density, link failure and route instability all of which affect the throughput offered by the MANET. Therefore, providing an efficient way to systematically minimize the impact of mobility in MANETs is a challenging task.

This thesis investigates the impact related both to broadcast and multicast for group mobility environments in MANETs. The thesis deals with systematically minimizing the impact of mobility in the multicast domain by comparing with broadcast domain, which improves the throughput and also reduce the overheads in group mobility environment to select the best path from the source to the destination. The proposed routing technique has been simulated using the Network Simulator-2.34 (NS-2.34) under Linux platform. Initially, 50 nodes representing the students in the tour environment has been taken as model and the localized tree topology structures with the T-formation algorithms in the MANET network environment has been constructed in the similar fashion.

In the first approach, a new routing protocol Ad-hoc On demand Modified Distance Vector-Autonomous Reconfiguration System (AOMDV-
ARS) algorithm has been proposed for minimizing the impact of route instability in broadcast network environments with existing Ad-hoc On demand Distance Vector (AODV) routing protocols with Reference Point Group Mobility Model (RPGM) model in MANET. In this approach, the source node broadcasts the Route Request (RREQ) message to the intermediary nodes to select the shortest and the stabilized path to reach the destination node. If any node finds such path it replies with Route Reply (RREP) message and the destination node is reached. If data transmission cannot be done through that particular node, it passes the message to another intermediary node. If will not it reply with a Route Error (RERR) message to the source node that route considered as a failure route. Finally the most stable route is obtained by the process of new group formation, leader node selection, new plan generation and network reconfiguration. Results show that AOMDV-ARS shows higher throughput and reduction in overhead compared to AODV. The simulation results show promising ways for using AOMDV as a base protocol for designing a fresh network thereafter.

In the second approach, a new routing protocol named Improved Ad-hoc On demand Distance Vector-Local Route Repair (IAODV-LRR) algorithm has been proposed for minimizing the impact of link failure in broadcast network environments with existing Dynamic Source Routing (DSR) routing protocols with RPGM model in MANET. In this approach, source node finds a path to transfer data to the destination based on the shortest path, the beacon strength and stability of nodes.

Based on the beacon strength and threshold, Local Route Repair (LRR) algorithm is applied and shortest path to the destination is found and the results show that IAODV-LRR provides mode throughput and lesser overheads. IAODV-LRR is analyzed as the best protocol when link failure takes into consideration.
In the third approach, a new multicast routing protocol Multicast Ad-hoc On demand Modified Distance Vector (MAOMDV) has been proposed for minimizing the impact of node density in multicast network environments with existing Multicast Optimized Link State Routing Protocol (MOLSR) routing protocols with RPGM model in MANET. In this approach, a mobile node initiates the Route Request message once it decides to send data to the multicast group. Any node having a fresh route replies to Route Reply message and the node’s hop information is added to the table. If the path is viable, then the node replies with the Multicast Activation (MACT) message and the path is activated. The protocol finds the best path based on the hop sequence and activated the route from the source to the destination node. Simulation results show that MAOMDV protocol performed well in comparison to Multicast Optimized Link State Routing Protocol (MOLSR) protocol which has improved throughput and reduced overhead and seem to ignore the problem of impact in multicast environments.

Finally the broadcast routing protocols AOMDV-ARS and IAODV-LRR are compared with multicast routing protocols MAOMDV for group mobility environments with Reference Point Group Mobility (RPGM) model for analyzing the impact of mobility. Simulation result shows that performance metrics throughput is improved to 90 % and overhead rate is reduced 55% for a multicast protocol comparing to broadcast protocol. This proposed protocol comparison dictates its potential consistently to minimize the impacts of group mobility in MANETS.