ABSTRACT

Wireless Mesh Networks (WMNs) are formed by the grouping of relatively static routers and dynamic clients. Mesh routers constitute the backbone of mesh network which comprises of multiple wireless network interfaces. WMNs provide high connectivity among the mesh clients.

The routing protocols for WMNs are not much different from those of wireless ad hoc networks. Way-point routing is one routing technique in MANETs. In Way-Point Routing (WPR), a set of intermediate nodes along the route are designated as waypoints which divide the route into segments. Providing Quality of Service (QoS) in WMN satisfying the constraints like delay, bandwidth and service availability is challenging. A crucial issue in QoS - based multicast routing is to determine practical paths for the QoS traffic.

A Way-Point Multicast Routing Framework (WPMRF) is designed for improving the QoS in Hybrid Wireless Mesh Networks. In multicast Routing, load balanced multicast routes are established between the gateway and receivers to balance the uneven traffic load. In WPR, way point nodes are selected and the route from the gateway to the receivers are segmented into sub routes. On-Demand Multicast Routing Protocol (ODMRP) is applied along the path from gateway to waypoint nodes and Multicast Ad hoc On-demand Distance Vector routing (MAODV) protocol is applied along the path from waypoint to receivers. Here, the best load path is chosen to avoid heavy loaded nodes. The multicast path between the gateway and source is repaired using route repair mechanism which is based on the Expected Route Disconnection (ERD) metric. The route with minimum ERD value is chosen, as it is less congested route with minimum workload.

As WMNs supports streaming-media applications like Video on demand (VoD) and Voice over IP (VoIP), it requires QoS guarantees in terms of minimum bandwidth and maximum end-to-end delay. In addition to this, QoS aware service selection with multiple constraints in WMNs is a crucial task. Hence a QoS aware Service Selection algorithm is proposed over the Way-Point Multicast Routing Framework. The core-selection algorithm is applied for the selection of center nodes.
Ant Colony Optimization (ACO) technique is used to determine the most effective path to the destination. The QoS broker forwards the service requests of mesh clients to the service provider which determines the service provider using ACO technique. Once the feasible paths are determined, then the service provider selects a single best path based on the cost effective metric.

Mobility management in WMN has been an active research area in recent years. The objective is to enable seamless handover when a mobile client moves from one network to another network. Location management keeps track of the location information of mesh clients through location registration and location update operations. In Handoff management, the current connectivity information of current mesh clients will be maintained whenever their locations are changed. Hence a Dynamic Mobility Management Scheme for inter domain handoff in WMN is proposed. In this scheme, inter-domain mobility management is provided using pointer forwarding to reduce the overall signaling traffic.

The proposed techniques are evaluated using NS-2 Simulator and the simulation results show that the proposed techniques have reduced end-to-end delay and packet drops with increased throughput when compared with the existing techniques.