EFFICIENT CLUSTER BASED CONGESTION AVOIDANCE ROUTING PROTOCOL FOR WIRELESS MESH NETWORKS

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ABSTRACT
Clustering approach has been proven to be effective for load balancing and overhead reductions, therefore, various proposals have been developed for routing protocols which proved to be effective in terms of routing communication overheads reduction and load balancing but existing cluster based routing protocols still lacked in buffer occupancy rate control, adaptability of various link qualities to data packet transfer and load balancing to avoid node level congestions. Thus, it is imperative to develop efficient cluster based congestion avoidance routing protocol by considering WMN characteristics. This research first proposes fuzzy logic-based distributed clustering algorithm (FLDCA) to perform WMN node clustering and cluster head selection based on node distance, node degree, relative node mobility and average number of transmission a node needed to transmit packets criteria in an uneven node distribution. Secondly, it proposes fuzzy logic control for the buffer occupancy rate control (BOR) to control the rate of incoming data traffic to the node buffer by taking traffic characteristics such as available bandwidth, node distance into consideration. Thirdly, this research will develop a cluster based congestion avoidance routing protocol (CBCARP) to route real time traffics through an optimal routing path within the community networks. The designed FLDCA and BOR protocols are to be simulated in a rational WMNs environment scenario with real time traffics respectively and it will then be compared with standard routing protocols. The CBCARP under development will be evaluated in a simulated community WMNs environment and it will also be compared with a standard AODV routing approach using OMNet++ network simulator. It is expected that the simulation results will show improvement on the clustering stability, mean cluster population, and clustering overheads of the FLDCA protocol over DCA in WMNs. The fuzzy logic BOR approach will reduce both buffer occupancy overflows and end-to-end data packet delays within an unreliable wireless channels in community network scenarios. The proposed CBCARP will provide high network throughput and packet delivery ratio when compared with standard routing protocols in reasonable WMNs environment and realistic wireless channels.

KEYWORD
Cluster, Routing, Fuzzy, Wireless Mesh Networks