ABSTRACT

One of the most important problems for routing in Mobile Ad-hoc Networks is to find a stable path for a long time. One of the characteristics of Mobile Ad-hoc Network is link break which occurs due to the mobility of nodes towards weak signal strength and instability due to random mobility of nodes.

Hence, it is very important to establish a stable route and maintain the path for long life time. Stability of nodes can be achieved with proper route discovery process. Stability based route discovery process was not predominantly addressed by researchers. To address this problem three new approaches have been developed in this research work, namely

i) Relative Link and Path Stability based Routing Protocol (RLPSRP),
ii) Relative Connectivity and link Stability based Routing Protocol (RCSRP),
iii) Transition rate and Relative Moving average trend based Stable Routing Protocol (TRMSRP).

In the proposed protocol RLPSRP, during route discovery process, each node is considered by computing relative stability factor, based on received signal strength at different positions for a stipulated time. The relative signal strength variation is a main indicator of the nodes mobility. The computation of relative stability factor as a metric for each node enables the selection of best node for the path. After path discovery, the proposed RLPSRP protocol closely monitors all the nodes in the data transmission path, and observes the nodes which are going towards the weak stability region. In such cases, switch over to strong stable node in the same path bypassing the weak node will take place.

In the proposed RCSRP protocol, during route discovery process, the relative connectivity along with the relative stability of each node is considered for selecting the node for the path to improve the stability of route in Mobile Ad-hoc Network. During the route discovery process, the node
which has got maximum number of inter connectivity among other nodes is selected. Along with relative connectivity, the stability of the route is achieved based on the Relative Stability Factor of each node. Thus the protocol reduces the overhead and enhances the stability of the route.

In order to enhance the stability of the path, a new approach named Transition rate and Relative Moving average trend based Stable Routing Protocol (TRMSRP) has been developed to discover a path. During a predetermined period, several samples of signal strength are collected from all neighboring nodes. The source node computes the rate of change of signal strength called transition rate for all sampling times and rejects the nodes which have got more transition rate to avoid instability. After filtering the nodes based on transition rate, the trend factor is computed based on moving average to find a stable node for the path.

The three proposed RLPSRP, RCSRP, and TRMSRP methods are tested using the Network Simulator (NS2). The responses are compared with AODV with respect to the different parameters, namely packet delivery ratio, end to end delay, and route life time under different mobility speeds and the number of nodes.

When compared with RCSRP, RLPSRP and AODV, the TRMSRP packet delivery ratio increased by 5%, 6% and 29%, the end to end delay reduced by 7%, 8% and 35% and the route life time increased by 4%, 5% and 30% at various mobility speeds. When compared with RCSRP, RLPSRP, and AODV, at the effect of varying number of nodes scenario, the TRMSRP packet delivery ratio increased by 6%, 7%, and 32%, the end to end delay reduced by 5%, 7% and 29% and the route life time is increased by 6%, 7%, and 34%.

The experimental results confirm that the TRMSRP performs well in compared with the RCSRP, RLPSRP, and AODV in terms of packet delivery ratio, end to end delay and route life time.