Abstract

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Fuzzy-based Adaptive Cross layer Routing Protocol for Delay Sensitive Applications in MANET

In order for Mobile Ad hoc Networks (MANET) to support service requirements of multimedia and real-time applications, the underlying routing protocol must provide Quality of Service (QoS) in terms of average End-to-End Delay (ETED). Towards this end, we investigate a number of conventional routing protocols, such as AODV (reactive routing) and DSDV (proactive routing), under different traffic and mobility conditions to obtain the lowest average ETED. Then, we develop a new routing protocol that enables each mobile node to separately switch between reactive routing mode and proactive routing mode based on the current node status. It utilizes a fuzzy-based routing mode whose inputs are the number of link breaks (LB), the interface queue (IFQ) length, and the type of application for each node (whether Delay-Tolerant "DT" Delay-Sensitive "DS"). In this paper, applications of interest are delay-sensitive and, therefore, the type of application of each node is set to be Delay-Sensitive ("DS"). Since the ion of the routing protocol (which belongs to Layer 3) is determined based on Layer 1 information (LB), Layer 2 information (IFQ Length) and Layer 7 information (type of application), it is called Adaptive Cross-layer Routing Protocol (ACRP). Using ns-2 network simulation package, it has been shown that the new adaptive routing protocol outperforms AODV by up to 95.3% in average ETED, and up to 84.5% in Route Discovery Latency. Likewise, it outperforms DSDV by up to 95.5% in average ETED, and up to 85.7% in Route Discovery Latency. Moreover, when compared to other QoS-MANET routing protocols, the new protocol achieves improvement in average ETED of up to 83.8% (in case of AMDR), up to 75% (in case of NQoS AODV) and up to 32% improvement in Packet Delivery Ratio (PDR) (in case of NQoS AODV).