Research on improving AODV protocol performance using cross-layer routing techniques

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Abstract: This study proposes a cross-layer routing technique to enhance the performance of the Ad hoc On-Demand Distance Vector (AODV) protocol in Mobile Ad hoc Networks (MANETs). Traditional AODV relies solely on the network layer for route discovery, often leading to suboptimal path selection due to its ignorance of physical and link layer conditions. The proposed method integrates cross-layer information, specifically signal-to-noise ratio (SNR) and queue length, into the route discovery process. By enabling nodes to evaluate link quality and congestion status before forwarding Route Request (RREQ) packets, the algorithm selects more stable and less congested routes. Simulation results using NS-2 demonstrate that the enhanced AODV significantly improves packet delivery ratio and reduces end-to-end delay and routing overhead compared to the standard protocol. This approach effectively mitigates route breakages caused by node mobility and traffic congestion, offering a more robust solution for dynamic wireless environments. The findings confirm that cross-layer interaction provides a viable path for optimizing reactive routing protocols without requiring substantial architectural changes.

Keywords: AODV, cross-layer routing, protocol performance, ad hoc network