

# Design and Simulation Analysis of a Cross-Layer Energy Efficient Routing Protocol for Underwater Wireless Sensor Networks



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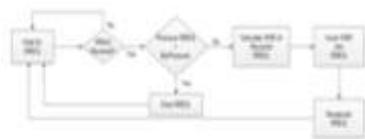
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**Abstract:**

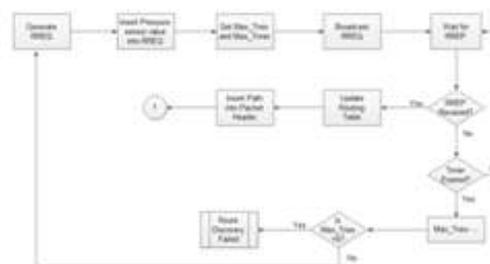
Underwater Wireless Sensor Networks (UWSNs) are finding multiple applications in pollution monitoring, offshore exploration, disaster prevention, assisted navigation and tactical surveillance. While advances in underwater acoustic communication enable most of these applications, energy efficiency remains a roadblock in the large scale deployment of UWSNs. This is because UWSN nodes tend to be battery powered, and solar recharging and battery replacement is not viable in an underwater deployment scenario. Since routing is a major component of inter-node communication, there is a need for an energy efficient routing protocol that can be deployed for communication in UWSNs.

This project deals with the development and simulation analysis of SNR-DSR, which is a source routing based energy efficient routing protocol for UWSNs. SNR-DSR optimises the energy consumption of path searches by directionally flooding the search packets from bottom to top. Any path establishment search packets coming from a lower to higher pressure (as indicated by the Y-co-ordinates of the nodes receiving them), are dropped. The path establishment search packet header is edited to accommodate the Y co-ordinate of the transmitting node. The receiving node drops the path establishment search packet, if needed, after comparing its Y co-ordinate to that in the packet. The SNR-DSR protocol also calculates the cumulative SNR in each path available between a given source-destination pair. The transmitting path is chosen as the one that has highest cumulative SNR.

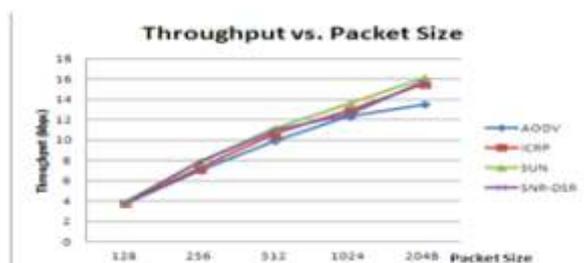
SNR-DSR was functionally validated and its performance, in terms of energy efficiency and PDR, was compared against ICRP, SUN and AODV routing protocols. SNR-DSR has the least energy consumption among the protocols, and its PDR was found to be better than that of AODV and ICRP. One interesting area of future work that can be looked into would be a more exhaustive residual energy based characterization of SNR-DSR.



**Flow chart for RREQ propagation**



**Flow chart for path discovery at RREQ generation**



**Throughput vs. packet size**