Design and Simulation Analysis of an Efficient Routing Protocol for Underwater Acoustic Network (UANs)

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Keywords: UANs, RSS, Lambert W Function, Throughput, Delay

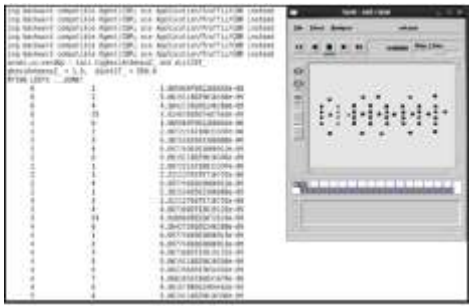
Abstract:

The underwater networks are established between sensor nodes present in the sea. They carry out life critical applications such as seismic monitoring, aquatic and environmental monitoring, robotic monitoring etc. These networks face challenges such as high propagation delay, high bit error rate, high absorption effect, high path loss, low bandwidth, and high-energy consumption. The RF and optical signals are not suitable for communication in underwater networks due high scattering effect, as under sea water is highly conductive medium. This leads to the use of acoustic mode of communication as the most suitable method for underwater communication. The nodes comprising an Underwater Acoustic Sensor Network (UW-ASN) rely on limited battery power. Therefore, to enable communication among nodes in UW-ASN, an energy efficient routing mechanism is required.

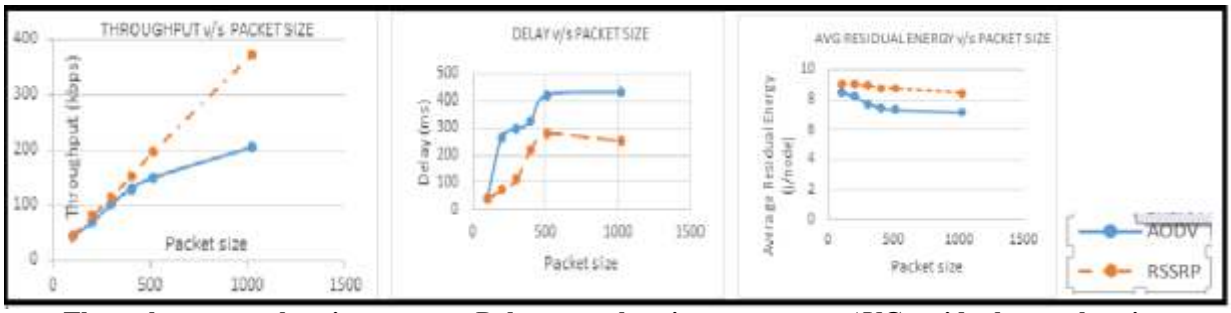
In this project, an RSSI based Routing Protocol (RSSRP) for UAN is designed, implemented and simulated in NS2 with DESERT patch. The RSSI based distance formula using Lambert W function is implemented in NS2 with DESERT patch. The performance RSSRP is analysed through simulations carried out in NS2 with underwater environment. The performance of RSSRP is compared with existing AODV protocol for UANs.

The performance of implemented RSSRP is analysed in terms of network throughput, residual energy and end-to-end delay, and compared with that of existing AODV protocol. From the simulation results it is observed that the newly developed RSSRP performs better than AODV with respect to studied performance metrics. In future RSSRP can be tested with different scenarios in UAN and real time implementation can be carried out. In this study the depth based analysis and traffic aware functionality is not considered. This can be included in future work.

RSSRP design



Distance between UANs node and NAM output



Throughput vs packet size **Delay vs packet size** **AVG residual vs packet size**

Performance analysis (RSSRP Vs AODV)