





Finding a suitable hop-to-hop busy traffic transmission approach for underwater acoustic networks: handshake-based vs. handshake-free MAC protocols

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Abstract

Any medium access control (MAC) protocol designed for underwater acoustic networks (UANs) must take some unique characteristics of underwater channels into consideration for apt functioning, such as long propagation delay, high bit-error rate, limited bandwidth and so forth. Already, many MAC protocols are designed for UANs, which have fully or partially taken these characteristics into account and could be classified as handshake-free and handshake-based protocols. In this paper, these two classes are investigated through a comprehensive simulation campaign by employing their prominent representative protocols, namely ALOHA, carrier sense multiple access (CSMA) and multiple access with collision avoidance based adaptive packet train (MACA-APT) protocol. The contribution of this paper lies as follows: (i) unearthing the optimum values of various parameters on which the performance of a protocol relies; (ii) investigating the performance of all three protocols through a realistic channel model simulator by varying a couple of network parameters, and (iii) discovering their effectiveness on various applications.

Keywords: UAN, underwater acoustic networks, ALOHA, carrier sense multiple access, CSMA, multiple access with collision avoidance based adaptive packet train, MACA-APT, handshake-based, handshake-free, MAC protocol, medium access control, DESign, simulate, emulate and realise test-beds, DESERT