Next generation marine data networks in an IoT environment

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Abstract:

Packet data networks at sea offer the potential for increased safety, connectivity and meteorological data acquisition. Existing solutions including satellite communication are expensive and prohibitive to most small vessels. In this paper, an Internet of Things (IoT) application is proposed as a marine data acquisition and cartography system over Ship Ad-hoc Networks (SANET). Ships are proposed to communicate over Very High Frequency (VHF) which is already available on the majority of ships and are equipped with several sensors such as sea depth, temperature, wind speed and direction, etc. On shore, 5G base station nodes represent sinks for the collected data and are equipped with Mobile Edge Computing (MEC) capabilities for data aggregation and processing. The sensory data is ultimately aggregated at a central cloud on the internet to produce public up to date cartography systems. We discuss the deployment limitations and benefits of the proposed system and investigate it's performance using four different MANET routing protocols which are Ad hoc On-Demand Distance Vector (AODV), Ad hoc On-Demand Multipath Distance Vector (AOMDV), Destination-Sequenced Distance Vector (DSDV) and Dynamic Source Routing (DSR) protocols. Simulation results illustrate the efficiency of the proposed system with packet delivery rates of up to 60 percent at shore base stations.

Keywords

- Routing protocols,
- Marine vehicles,
- Ad hoc networks,
- Mobile communication,
- Routing,
- Edge computing