Chapter 3
Recent and Future Node Deployment Strategies in the Underwater Sensor Network (UWSN)

Krishna Pandey
University Institute of Engineering and Technology, Kurukshetra University, India

Manish Kumar
University Institute of Engineering and Technology, Kurukshetra University, India

ABSTRACT

The chapter focuses on the recent development in the field of the sensor node deployment in the UWSN (under water wireless sensor network). In the chapter, the technical challenges during the node deployment of the sensor nodes in the UWSN (under water wireless sensor network) are represented with prefacing the background. The chapter focuses on the different methods of node deployment and presents a generalized model for ensure the reliability. A view of analyzing the deployment of sensor nodes is also shown in the example by following the recent researches in the domain. Finally, the future scope and conclusion is represented with the idea of new paradigms in the deployment of sensor nodes in the UWSN.

INTRODUCTION

First, under the water communication scenario was introduced after the II-World War, the underwater phone was designed by the US Navy for communication (Almalkawi et al. 2010). Electromagnetic waves, optical waves, and acoustic waves can have more potential than radio frequency waves because of the high attenuation factor in underwater communication. Transmission power always plays a crucial role when uses the RF waves for the underwater communication and applications of the Underwater Wireless Sensor Network (UWSN). Many researchers use the optical waves to ensure more reliability in case UWSN and others use a large number of modems.

DOI: 10.4018/978-1-7998-3640-7.ch003

Nowadays, underwater WSN plays a vital role in the field of oceanographic observations, marine surveillance, and water quality monitoring. The advancement in the UWSN technologies results in the bright scope for the researchers. Due to the requirement of low transmission power and sensor autonomy nature of UWSN, it becomes a master key for the oceanographic observations. UWSN has several advantages when used for underwater solutions. It provides large area monitoring by using GPRS/GSM technologies and can be designed with low cost having low power consumption abilities (Albaladejo et al. 2010). UWSN provides an innovative and efficient way to the deployment of sensor nodes having low cost and proposed the idea of the network using logical and physical topologies of the sensor node to form a network and communicate the information with the base station (Akyildiz et al. 2002).

UWSN has several applications in the field of environmental monitoring such as water quality monitoring (Postolache et al. 2014). In recent days, UWSN technologies are also utilized for monitoring natural areas such as lakes, rivers, ponds, and small marine areas (Seders et al. 2007). As the underwater sensors are expensive, the implementation cost of the UWSN monitoring system may be high. Consequently, there are several factors like failure and location of the sensor node must be taken as primitive of the implementations. To avoid failure during underwater monitoring, a good network topological design must be implemented to reduce energy consumption by increasing reliability and for ensuring the security of the nodes in the underwater condition (UWSN) with safe communication, the secure authentication and secure data aggregation methods can be utilized (Goyal et al. 2020).

Figure 1 depicts a UWSN model having sensor nodes with gateway node and AUV (automated underwater vehicle). The surface sink does monitoring of UWSN and sends the desired data or information to the earth station via satellite for communication.

Figure 1. Underwater wireless sensor network (Nadeem et al. 2015)