Aqua Underwater Wireless Communication & Research Challenges

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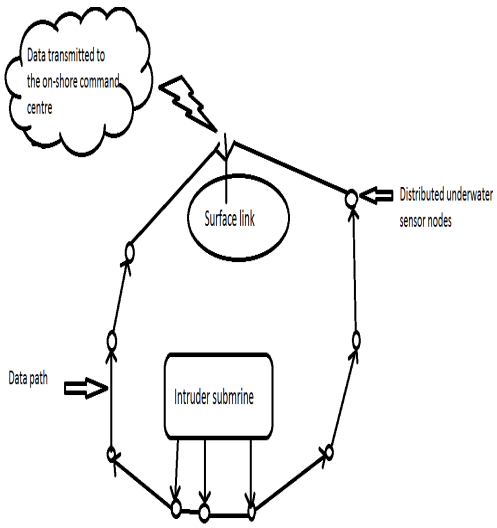
Abstract- *Nowadays, wireless communication technology has become part of our daily life and the idea of underwater wireless communications may be appear unbelievable. The important progress has been made in the world of sensor networks to modernize the communication way. To bring the concept of long-lived underwater communication, solid sensor networks are used in underwater environment. Now, the underwater communication is possible through the underwater channels.*

Keywords- UWCN (Underwater Wireless Communication Network), AUVs (Autonomous Underwater Vehicle), SUWCN (Securing Underwater Wireless Communication Networks), RSS(Received Signal Strength), TOA (Time of Arrival) and TDOA (Time Difference of Arrival).

I. INTRODUCTION

Underwater audio communication is a technique of sending and receiving messages below water [1].The underwater wireless communication is too difficult, because the expensive or complicated equipments are used. All processing is done by the sensors, after the underwater communication planning, the most difficult work is how to discover the sensor network underwater. In Wireless communication, operations like self arrangement and local processing are energy consuming. Our expectations for underwater wireless communication are counting support during underwater construction, pipeline and leakage & natural data collection. At the beginning of the 20th century, some ships communicated by bells, the system being competitive with the primal sea radio navigation service of the time [2].

The main challenge of underwater wireless communication is sound communication. The multipath reflections are present, and there can be some propagation paths due to the rough temperature distributed by the various interference, like bubbles and noise which formed by man-made objects. Communication between sensors and AUVs makes the condition more security challenging. The sea environment is particularly helpless to harmful attacks due to the large and variable propagation delays, high bit error rates and low bandwidth of audio channels. The underwater sound channels, and the different underwater sensor networks and their ground based counter parts require the efficient and reliable security mechanism.



II. SECURITY REQUIREMENTS

In Securing under water wireless communication networks the following security requirements should be considered:

1) VERIFICATION

Verification is a process which is used to send the data by valid correspondent. It is useful to securing the data in military and safety-critical applications. In the verification system we use the keys. The Verification and key organization are launching one or more secret keys over the open sound channel to exchange information securely [3]. Updated algorithms and fixed solutions for key generation should be adapted to better address. Key generation system requires only lightweight calculations, entrance detector and communication costs. It develops deep lose colours, randomness extractor, and strong secure Blurry information re-agent.

2) PRIVACY

Our first priority is a private communication channel. Privacy means that information is not accessible to unofficial

third person. Therefore, in the sea inspection the privacy in critical applications should be guaranteed.

3) RELIABILITY

A reliable communication channel is the main concern always. It ensures that information has not been distorted by any challenger. Many underwater applications include sensors for environmental protection & water quality checking etc all are dependent on the reliability of the information[4].

4) AVAILABILITY

The data should be always available only when needed by an official user. Lack of availability due to rejection-of-service attacks would especially affect time-critical water searching applications such as calculation of seaquakes.

III. RESEARCH CHALLENGES

The security issues and open challenges are described in the following sections.

1. SECURE TIME ORGANIZATION

Time organization is an important factor in many sensing tasks for aqua underwater wireless networks. TDMA require exact timing between nodes to adjust their power saving. Achieving exact time organization is especially difficult in underwater communication. For this reason, the time organization mechanisms are used[5].A multilateration (use for measuring the difference in distance between two stations)algorithm is proposed for localization and organization in 3D under water sound sensor networks. Time organization disturbance take place due to cover-up, replay and message manipulation attacks[6]. If a belonging of the window of data is below an entrance, it is an outlier value. Node mobility modifies the propagation delays.

2. SECURE LOCALIZATION

Localization is a very important issue for data security. Sensors are mostly used for reporting the occurrence of an event by using localization information. It can also help in making routing decisions. Localization does not work well underwater because long Doppler effects, propagation delays, multipath and fading cause variations in the sound channel. Localization estimation is affected by bandwidth limitations, node mobility, and light deployment of underwater nodes. Proposed terrestrial localization schemes based on RSS[7]. TOA and TDOA measurements require very accurate time organization. In the localization schemes used are: range-based schemes, anchor-based schemes, distributed positioning schemes, range-free schemes.

3. SECURE ROUTING

Routing is important for packet delivery in UWCNs. While there are many papers on ad hoc routing for wireless radio networks, routing design for underwater networks is still being actively studied[8].Due to the large propagation delays low bandwidth, difficulty of battery refills of underwater sensors and the dynamic topologies makes the routing more challenging for UWCNs[9].Many routing protocols are required for underwater wireless sensor networks.

IV. CONCLUSION

In this paper we have discussed security in UWCNs, underlining the specific characteristics of these networks and their respective counter measures. The main research challenges related to secure time organization, localization, and routing have also been surveyed. These research issues remain wide open for future investigation.

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