

Multimedia Messaging with Underwater Acoustic Wireless Networks

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In this abstract, we propose a demo to demonstrate the capacity of underwater networks enabled by the combined efforts of the software and hardware platform developed by the Underwater Sensor Network (UWSN) Lab at the University of Connecticut.

Effective and reliable communications for underwater use require two critical components, namely an efficient acoustic communication link and a well-designed underwater network protocol stack.

In the demo, we integrate Aqua-Net [4] and the high-speed OFDM modem [2], [3] into a networked acoustic modem system (NAMS). The new integrated system will not only enjoy the advanced features of both OFDM modems and Aqua-Net, but also create a great potential for performance improvement through cross-layer design provided Aqua-Net. NAMS integrates the latest underwater acoustic communication device and the protocol stack designed for underwater networks. As shown in Fig. 1, the system uses the OFDM modem for high performance underwater communications and Aqua-Net to provide medium access control and reliable data transfer.

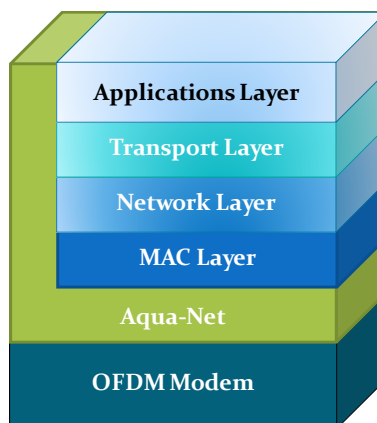


Fig. 1: The network system components

This demo reveals the possibility of providing multimedia messaging services in an underwater wireless acoustic network. It will work similar to an Internet chatroom program but people can exchange text messages underwater. Additionally, it has a whiteboard feature that users can draw simple figures and

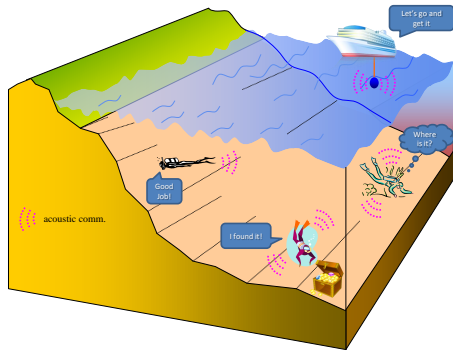


Fig. 2: The demo scenario

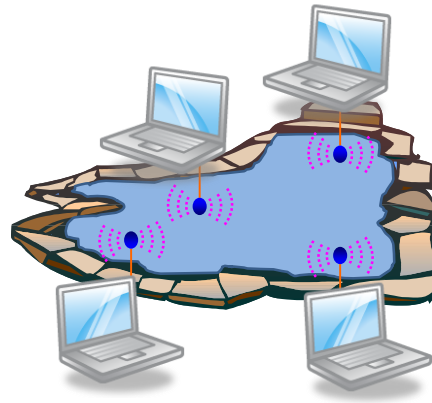


Fig. 3: The demo setup

share with others. An potential application could be a diver communication system. As shown in Fig. 2, the divers can utilize this system to communicate with other divers or the ship wirelessly. They can report their findings in the water or call for help if any assistant is needed.

This demo will be led by Zheng (James) Peng, a graduate student from the University of Connecticut. The demo setup will take around one hour and need large space. As shown in Fig. 3, four laptops will be placed around a plastic swimming pool. Each laptop will be connected to an acoustic modem. The acoustic modems will be powered by DC power sources. Four acoustic transducers will be deployed in the portable swimming pool.

Facilities needed include:

- Demo tables
- Power supplies for laptops
- A poster stand
- Water faucet and long hose
- Water and air pumps
- Buckets if no nearby water source

To summarize, in this demo, we present an underwater multimedia messaging system, which integrates the OFDM modem and the underwater network protocol stack framework, Aqua-Net. Our integration efforts have the great potential to open the doors for various new applications that were previously considered unfeasible for underwater operations.

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