

fast facts

Project: Efficient and Reliable GPS Wireless Ad-hoc Sensor Networks for Marine Monitoring, Searching and Rescuing (MSnR)

Lead Organization: Bac Ha International University

Country: Vietnam

Budget: 34,819 AUD



situation

While large ships are often equipped with advanced communication devices, small fishing boats are unlikely to be able to afford such devices. In Vietnam, the existing radio system is only adequate for the forward link (land-to-sea). The return link (sea-to-land) often breaks down due to weather or distance, which in turn ceases all communications from small fishing boats at sea to the central stations. As a result, monitoring becomes impossible, thus making search and rescue far more difficult in the event of natural disasters -- there is no way those in a state of emergency can request assistance.

solution

The goal of this project is the creation of a wireless ad-hoc network that supports the sea-to-land link from small fishing boats to the central base-stations located near the shoreline in order to provide an efficient monitoring and positioning service for fishing boats. The wireless ad-hoc network is built upon an existing high frequency (HF) coastal radio system and integrated with a Global Positioning System (GPS) receiver for a real-time location monitoring. The proposed network is efficient, reliable and more cost-effective than other commercially available satellite-based systems.

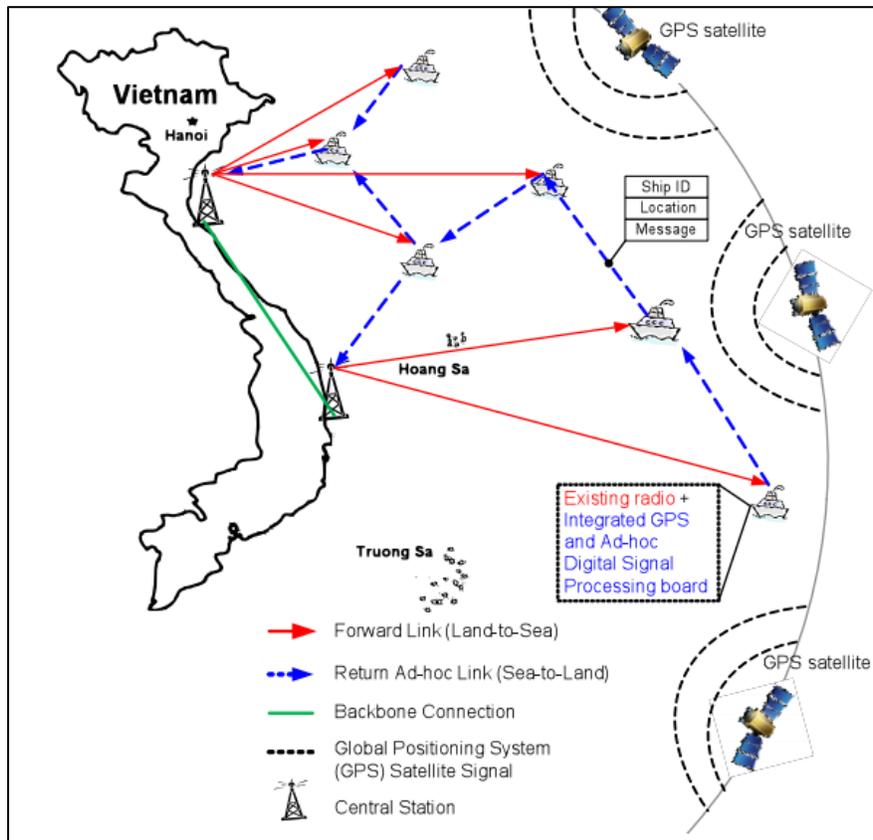
The pilot phase of this project consisted primarily of modeling a wireless ad-hoc network composed of small fishing boats, followed by the construction and evaluation of the network routing protocol and algorithm, and network medium access control. These solutions were then evaluated in a small, laboratory-scaled ad-hoc network of 10 nodes in order to test the viability of a hybrid wireless network.

The wireless ad-hoc network solves this problem for small fishing boats by replacing a long range, unreliable link to base stations with multiple short range and reliable links between boats, which are in closer proximity to each other. At least one boat is closest to the base stations, and this boat is the final link between the fleet and land. As with most mesh network systems, the sea-to-land signal may take a circuitous route but has a higher probability of reaching the base stations than current systems allow. An additional GPS receiver and Digital Signal Processing (DSP) control board integrated into the existing radio equipment provide the location and monitoring service by periodically updating the central base stations with ships' current location.

As a result of this project, the location of fishing boats (as identified by the GPS devices) is made available to individual fishermen, and can be transmitted, along with other critical information, via short-range communication within the ad-hoc radio network. For the land-to-sea communication link, this solution utilizes the existing coastal radio network. This solution is expected to provide continuous reporting and monitoring of all boats and its exact locations for searching and rescuing process during emergency situations.

broader impact

This project provides an effective tool to monitor fishing boats and helps the industry reducing its the annual loss from natural disasters. It is expected to have a high impact on the fishing industry in Vietnam, and may directly affect international fishing industries as well. Not only does the technology act as a valuable resource for domestic fishermen, but may create spillover secondary effect on the larger market as a whole. While this project will have an immediate effect on low-income fishermen, as it provides them a means through which to communicate effectively with central base stations, its success under these experimental conditions confirms that the 3-node wireless ad-hoc network may be ready for a larger commercial deployment.



MSnR mesh network configuration

project contact

Dr. Do Duc Dung
Email Address: dddo@bhiu.edu.vn
Bac Ha International University (BHIU)
My Dinh I, Tu Liem
Ha noi, Viet nam
Tel: +(84)-4-6269-0558
<http://www.bhiu.edu.vn>

ISIF Asia Secretariat
Asia Pacific Network Information Centre (APNIC)
6 Cordelia Street, South Brisbane, QLD, 4101 Australia | PO Box 3646
Tel: +61 7 3858 3100 | Fax: +61 7 3858 3199
<http://www.apnic.net>