



## American International University-Bangladesh

### **Final Report for Advanced Computer Network**

**Group:** 9

**Section:** D+E1

**Date of Submission:** 17-12-18

**Submitted to:** SHAHRIN CHOWDHURY

## **Members List**

- **PRANTO, SHEEHAB HOSSAIN (15-30877-3)**
- **Uddin, Md.Borhan (15-29797-2)**
- **Islam, Rakibul (15-29594-2)**
- **Mahamud Chowdhury Md. Rabby (15-30760-3)**
- **TAZNINE ARA (15-30076-2)**

# Real Time Tracing System of Marine Automobiles

## **Introduction**

The general goal of our research is to develop an intelligent, network-based marine automobiles system that is able to interpret its surroundings automatically, robustly. Our system analyzes the whole marine scene. It collects its data from GPS, weather, water level etc and then visualizes the sea status. Also, it sends the data to the server in real time. Our proposed system does not need any initialization by a human operator, it collects the data and takes necessary updates from the server automatically. The data is processed in real time without any specialized tool. All we need is an ordinary communication device. Our system is based on GPS and WiMax network system.

Due to safety concerns, our proposed system must react to dangerous situations immediately. Not only must the system do its processing extremely fast, but it must also guarantee to react within a fixed time frame under all circumstances. With our developed system, we can instantly track a vessel and identify if vessels violate any route codes. However, this specialized system has integrated motion and orientation sensors. So, all data regarding the vessel's motion with heading and trimming conditions can be monitored from distant. This system can also detect any accidents and shipwreck instantly and notify the nearby vessels with the pinpoint location via intra communication also WiMax. As accurately designed marine vessels take considerably a long time to sink, this will give a chance to rescue the victims. In a recent research, it is shown how to measure a vessel's draft to detect overloading using simple motion sensors. This two systems, if integrated together, can give us a complete solution for monitoring and preventing inland ship accidents as well as empower the authority to take rapid rescue actions.

## Literature review

Very few number of related works exist on the application of Real Time Tracking System of Marine Automobiles. In one research paper, they proposed an upgraded version of vehicle tracking system for inland vessels. In addition to the features available in traditional VTS (Vehicle Tracking System) for automobiles, their system has the capability of remote monitoring of the vessel's motion and orientation. Furthermore, their device can detect capsize events and other accidents by motion tracking and instantly notify the authority and/or the owner with

current coordinates of the vessel, which is obtained using the Global Positioning System (GPS). their proposed system boost up the rescue process and minimize losses. They have used GSM network for the communication between the device installed in the ship and the ground control. So, that can be implemented only in the inland vessels. But using iridium satellite communication instead of GSM will enable the device to be used in any sea-going ships.

### **Enhance Maritime Safety and Guide Rescue Operations**

- Improve crew safety with panic buttons linked to shore systems to identify maritime emergencies and guide rescue operations.
- Send real-time weather and safety alerts to crews at sea.
- Track vessel location to comply with Long Range Identification and Tracking (LRIT) and Ship Security Alert Service (SSAS) regulations.

### **Simplify Vessel Monitoring System (VMS) Deployment**

- Accelerate time to market and reduce integration costs with a pre-certified VMS kit.
- Reduce total cost of ownership with cost-effective hardware, network services and professional support.
- Ensure compliance with existing fisheries regulations. Send required forms, logs, and files from a vessel to port authorities.

### **Reduce Vessel Fuel Costs and Monitor Engine Performance**

- Optimize fuel consumption and reduce costs by monitoring vessel fuel sensors in near real-time.
- Collect vessel engine performance data and ensure fleets are always operating at their best.
- Seamlessly integrate vessel tracking devices into existing fuel monitoring solutions.

### **Monitor Vessel Performance and Reduce Paperwork**

- Ensure all vessels are working at peak efficiency at all times through continuous monitoring of vessel performance data.
- Reduce paperwork with direct connections to onboard IT systems, telemetry reports, and information gathered on vessels.
- Transmit catch reports, fishing forms, e-mails and more with shore systems in near real-time.

### Tracking Ship:

We want to build a real time applications which will help ship sailor, NAVY Officer to track ships by using our ship tracking device.

#### Real time communication

Our ship tracking device will send data to NAVY's application using real time communication by GPS

Also share environment data in P2P network structure.

#### Alert, notification and control

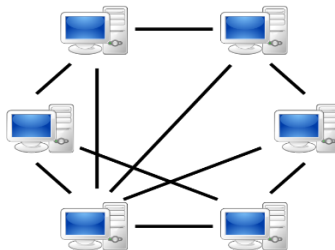
When ship movement occurs, NAVY officer will get notified and immediately can take actions (alert signal, send information) using this application.

### **Description:**

To implement this feature on the marine automobiles we need the following assets:

- A peer to peer network.
- A real-time server.
- Moderately powerful computing device capable of running real-time algorithm on data served.
- Intra radio signal receiver and broadcaster.
- WiMAX data connection.
- GPS connection on marine board.
- Navy control room.

**Peer to peer network:** Peer-to-peer (P2P) computing or networking is a distributed application architecture that partitions tasks or workloads between peers. Peers are equally privileged, equipotent participants in the application. They are said to form a peer-to-peer network of nodes



Peers make a portion of their resources, such as processing power, disk storage or network bandwidth, directly available to other network. Peers are both suppliers and consumers of resources, in contrast to the traditional client-server model in which the consumption and supply of resources is divided.

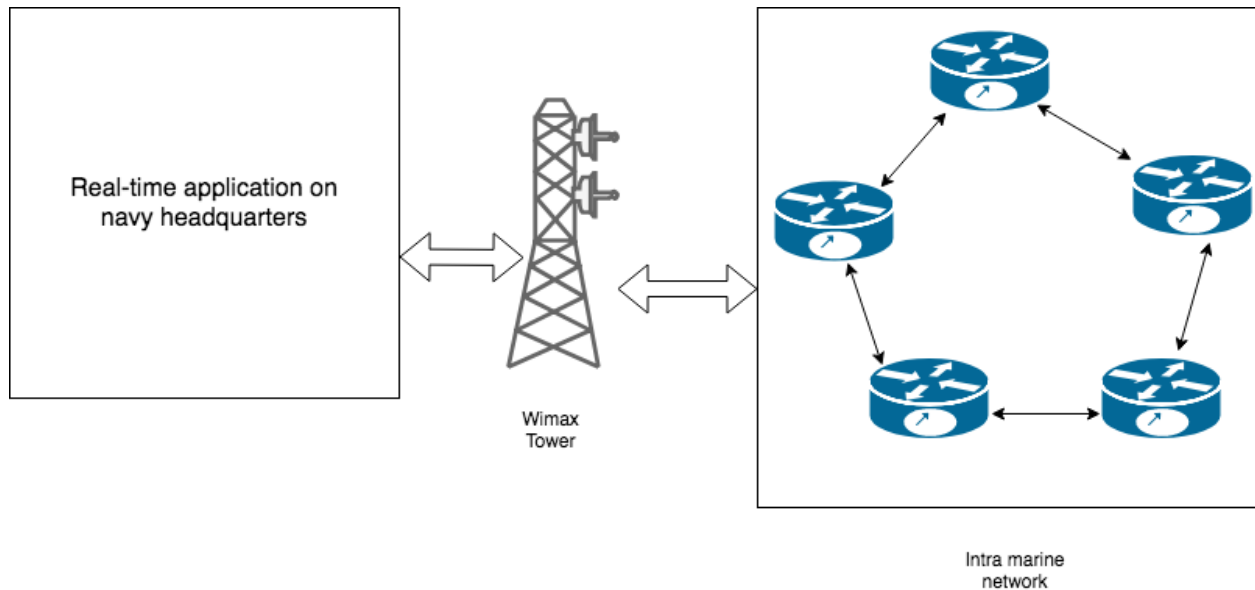
**Real time server:** A real time server is a server computer that reads the actual time from a reference clock and distributes this information to its clients using a computer network. The real time server may be a local network time server or an internet time server. The real Time servers are sometimes multi-purpose network servers, dedicated network servers, or dedicated devices. All a dedicated time server does is provide accurate time. The goal of server is to accept client connections from application (web app, mobile app, desktop app).

**WiMax:** WiMAX (Worldwide Interoperability for Microwave Access) is a technology standard for long-range wireless networking, for both mobile and fixed connections. While WiMAX was once envisioned to be a leading form of internet communication as an alternative to cable and DSL, its adoption has been limited. WiMAX has some great benefits when it comes to mobility, but that is precisely where its limitations are seen.

**GPS:** The Global Positioning System (GPS) has changed the way the world operates. This is especially true for marine operations, including search and rescue. GPS provides the fastest and most accurate method for mariners to navigate, measure speed, and determine location. This enables increased levels of safety and efficiency for mariners worldwide. It is important in marine navigation for the ship's officer to know the vessel's position while in open sea and also in congested harbors and waterways. While at sea, accurate position, speed, and heading are needed to ensure the vessel reaches its destination in the safest, most economical and timely fashion that conditions will permit. The need for accurate position information becomes even more critical as the vessel departs from or arrives in port. Vessel traffic and other waterway hazards make maneuvering more difficult, and the risk of accidents becomes greater.

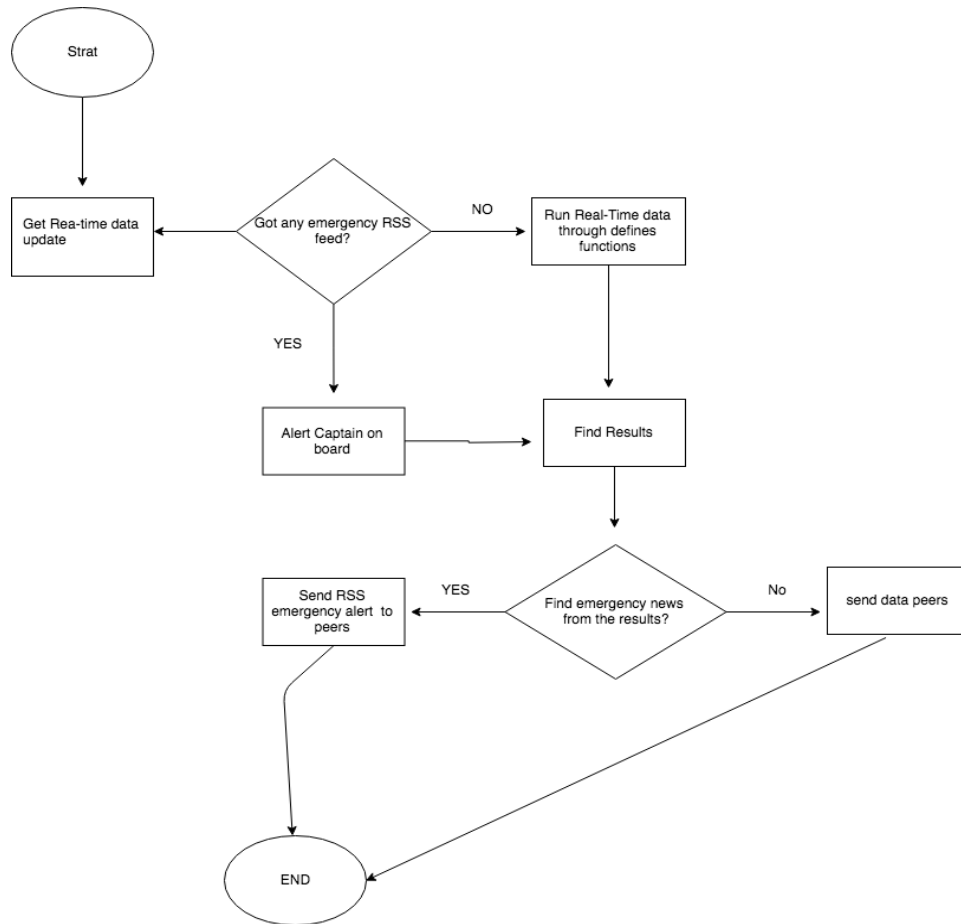
**Navy control room:** Navy control Rooms are widely depicted in film and television treatments, frequently with large maps, numerous computer consoles and radar and sonar repeater displays or consoles, as well as the almost ubiquitous grease-pencil annotated polar plot on an edge-lighted transparent plotting board. At the time the CIC concept was born, the projected map-like polar display (PPI scopes) with the ship at the center was making its way into radar displays displacing the A-scope which was simply a time-delayed blip showing a range on an oscilloscope Cathode ray tube.

## System Architecture



**Fig:** Marine network structure.

Here we implement a intra network between the marine vehicles which will communicate with each-other and keep all of them connected to the main RTS server in control room. They will send or sync with the server even if they are out of range with the WiMax tower. They can even send a distress signal through the intra marine network.



**Fig:** RTS architecture.

Here the nodes will try to connect with RTS server and get the feed and run through algorithms. If it gets anything out that is out of order then it will alert the captain on board. If it gets any distress signals then it will notify all the marine vehicles and alert the vehicles surrounding the location of distress signals.

## Discussion

**Network failure:** Network failure diagnosis should achieve three purposes:

- Determine the network point of failure to restore the normal operation of the network.
- Identify poor network planning and configuration to improve and optimize network performance.



- Observe the operation of the network, and timely predict the quality of network communications.

Network failure diagnosis is based on knowledge of network principles, network configuration and network operation. From the failure phenomenon, to network diagnostic tools as a means to obtain diagnostic information to determine the network failure point, find the root cause of the problem, troubleshooting, restore the normal operation of the network.

**GPS Failure:** The navigation apps we carry around in our smartphones may have made getting lost in foreign lands a distant memory, but our dependency on the Global Positioning System (GPS) runs far deeper than we realize. So, if the GPS were to fail, the ramifications would not be limited to airborne flights and the ships at sea finding themselves isolated from the rest of the world. Armies would lose all control over drones monitoring natural disasters or surveilling terrorist outfits. Weather forecasts would be totally off and digital television and radio will not be able to continue transmission. Essentially, a total collapse of GPS could wreak havoc on a large number of systems intrinsic to the smooth functioning of our lives.

### **Conclusion**

- The system provides high security of marine auto-mobiles by sending the location and other information.
- Use the system to gather data about marine parts of the world.
- Provide a secured intra communication system of marine auto-mobiles
- Centralized database helps in avoiding conflicts.
- Can generate required reports easily