

# Satellite-Based Vessel Tracking and Communication Solution



Fisheries is one of the most important sectors of the global economy. According of an estimate by Food and Agriculture Organization (FAO), a specialized agency of United Nations around 60 million<sup>1</sup> people are directly employed in the fisheries sector globally. Global fish production was estimated at 179 million tonnes in 2018 with total first sale value of USD 401 Billion. Around 37.6% of the production estimated at USD 164 billion is exported.

## Need for Technological Solutions

Sustainable fisheries development is an important part of the UN Sustainable Development Goals<sup>2</sup>. The Goal 14 calls to *“Conserve and sustainably use the oceans, seas and marine resources for sustainable development”*

FAO is also providing assistance to lay down guidelines for safety at sea for fishermen and fishing vessels. The objective is to make vessels and practices safe and attractive to people.

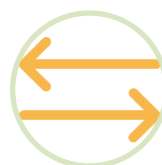
Technological solutions can help in improving the working of the industry – making it more sustainable, increasing the safety, and enhancing the efficiency of the processes.

Maritime Fishing is a major part of the fishing industry. Fishermen regularly go it in deep sea to catch fishes. They maybe in the sea for 15-20 days a month. Effective communication when in deep sea is very critical. Satellite

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based communication solutions can help in providing secure and reliable communication to fishermen as well as authorities like coast guard, fisheries department and weather department.

## Communication in Deep Sea



Fishermen may go 100–200 NM in deep sea while fishing. There is no mobile network in that range.

Fishermen who travel in smaller boats may not have powerful radios to communicate with shore or with other boats in the area. They require a secure and reliable communication solution. A dependable satellite-based communication solution is an essential service that is expected by the fishermen.

## Emergency Broadcasting



The weather at sea can change drastically in a matter of hours. The weather department continuously monitors the weather and they

require technology solutions that can

help them broadcast weather alerts to all the boats in the area.

### Real Time Asset Tracking



Real time location tracking of fishing vessels is essential for coastal security purposes. It also helps in locating vessels during the search and rescue operations in case of any emergency. Real time location tracking and monitoring can help the coast guard to reach the distressed vessel quickly.

### Geofencing



There are areas in the sea which are out of bounds for fishing activities. These include areas reserved for naval operations, ecologically sensitive areas like coral reefs or nesting zones and international boundaries. Satellite-based Vessel tracking solutions can mark these areas on map and warn the fishermen when they approach it.

### Potential Fishing Zones



The government agencies and scientists have analysed and mapped out areas where there is high number of fishes. The fishermen can get real time alerts for these Potential Fishing Zones when they are in deep sea.

### Central Monitoring and Control

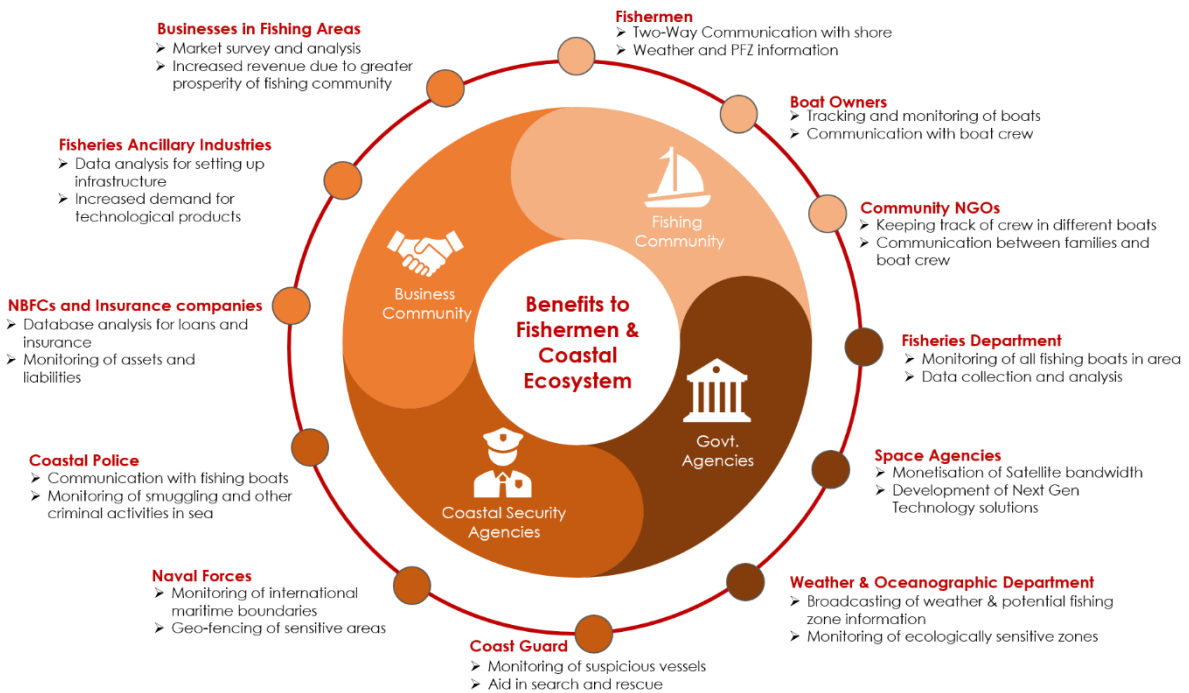


The government agencies have a need to monitor all fishing activities in their respective areas. This helps in data analysis, controlling overfishing, monitoring of fishing zones, supporting multi-stakeholder values. The entire stakeholder business ecosystem needs to be benefited and values needs to be delivered. The Command and Control System shall ensure these services are provided.

### Benefits to Stakeholders

One of the technological solutions to address all these needs is a satellite-based vessel tracking, and two-way communication solution. The solution is developed keeping in mind the requirement of all the stakeholders. The end goal of the solution is to make fishing safe and sustainable while also ensuring the focus on the coastal security of the nation.

There are multiple stakeholders in the fishing ecosystem. The fishermen and boat owners are the primary beneficiaries of the solution. The solution helps the fishermen and fish boat owners to have a more efficient and safe fishing operations. The fishermen are able to keep a constant touch with the shore. They are also provided timely weather updates and Potential Fishing Zone alerts. The boat owners are able to do a real time tracking of their fleet



Benefits to stakeholders

The community NGOs are the link between government and the fishing community. They are responsible for last mile delivery of the government services in the fishing villages. They also help in many community events in the fishing villages. The satellite-based solutions help these community NGOs to effectively work with the fishing community and provide them with required assistance.

The government agencies help regulate the fishing in the territorial waters. They are also responsible to make sure that the fishing is safe and profitable for the fishermen and sustainable for the environment. They give important information to fishermen including potential fishing zones and weather updates.

The coastal security agencies like coast guard, navy and coastal police are responsible for the safety and security of the coastline of the nation and prevention of terrorist attacks. They also keep track of illegal activities like smuggling and piracy on the high seas. The satellite-based vessel tracking solution also help in the identifying the friendly boats in the area. The coastal security agencies are also able to effectively monitor the international maritime boundaries

Number of businesses and industries in coastal areas are dependent on fishing. These include boat repair and maintenance industry, the fish trading industry, the banks and insurance companies who work with fishing communities. All these can benefit from increased data availability from the technological solutions.

## Satellite-Based Vessel Tracking & Communication Solution

To address the challenges mentioned above, Saankhya Labs has developed NETRA an end to end satellite-based vessel tracking and communication solution. The solution has been extensively field tested. It is being deployed on fishing vessels in India.

The solution consists of

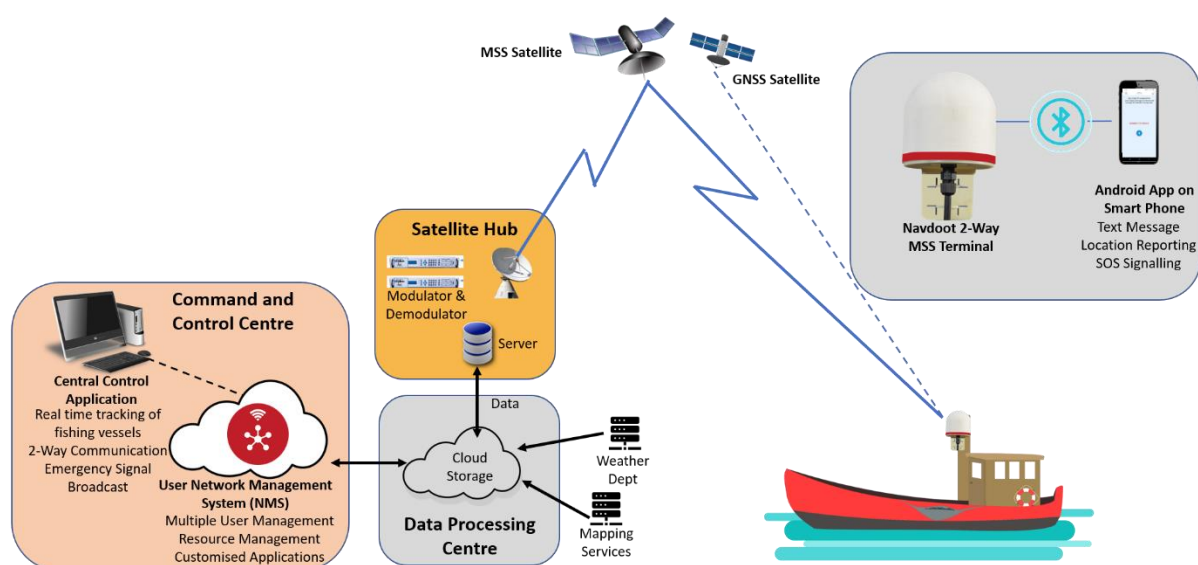
1. Two-Way Mobile Satellite Service (MSS) terminal installed in fishing vessels
2. Mobile apps for fishermen and boat owners
3. Hub-side modulators and demodulators
4. User Network Management System (NMS) and spatial technology solutions
5. Comprehensive, secured, IT Infra for data management and analytics

In India, Saankhya Labs has tied up with ISRO to provide satellite connectivity services for the solution. The solution can also be customised to operate with local satellite service provider as per requirement at particular location.

### Navdoot 2-Way MSS Terminal

This is an S-Band vessel tracking and 2-way communication terminal installed in fishing vessels. The compact terminal has an RF frontend, Software Defined Radio (SDR) chipset, an RF Transceiver IC, Baseband controller and other peripherals like Bluetooth, UART. It is IP-67 compliant and has built in rechargeable battery.

The terminal can be connected to a smart phone via Bluetooth. The smart phone has a specially developed mobile app



Concept diagram for Satellite-Based Vessel Tracking Solution



## Mobile App for Fishermen, Boat Owners and Fisheries Department

Saankhya Labs has developed specialized apps for fishermen, boat owners and the fisheries department. The fishermen app communicates via Bluetooth with the two way MSS terminal installed in the fishing boat. The app has features like two-way messaging via text messages, transmission and reception of distress alert messages, reception of broadcast messages like weather alerts and potential fishing zones, mapping services including real time location tracking, saving of routes, geo fencing etc.

A specialized app is developed for boat owners. It allows the boat owner to track real time location of all his boats, communicate directly with the crew, maintain log of trips for the boats, emergency communication etc.

The app for fisheries department is designed to give them a real time view of what is happening in the area. They can communicate with individual boats or send a broadcast message to all the boats in the zone.

## Hubsid Modulators and Demodulators

The modulators and demodulators are installed at the satellite hub. These are compact software defined radio (SDR) based multi-channel, multi-rate burst modulators and demodulators. These equipment are capable of supporting wider variety of standard and

customised waveforms by way of software change.

One Hubsid modulator/demodulator can support up to 48 individual channels.

The data from central command and control is modulated and transmitted via satellite to fishing vessels. Similarly, the data from fishing vessels is demodulated and sent to central hub for processing.

## User Network Management System (NMS)

An integrated User Network Management System (NMS) is installed in the command and control centre. It can be used for fisheries department or coast guard.

It provides tools for tracking of vessel location, viewing of vessel track in real time, GIS and mapping application, geofencing of international boundaries and restricted areas. It can generate situational awareness alerts when a boat approaches a restricted area.

It can be used for two-way communication with fishing boats. The authorities can also broadcast emergency alert messages including weather alerts to all the boats in an area.

The User NMS is a web-based software which is hosted on a cloud. It uses SSL based encryption. The User NMS can be accessed via standard browsers on desktop computers or via a specialized mobile app.

There is a provision for report generation and analysis. These can include periodical reports on vessel movements, reports on messages etc. The NMS can also help in the statistical analysis of data which is very beneficial to the various stakeholders.

### IT Infrastructure for Database Management and Processing

A cloud-based datacentre is provided for the command and control centre. It hosts all non-spatial data like boat owner information, crew members and spatial data like boat location, mapping and GIS data etc. It also has provision for regular backup and recovery.

It is a 3 tier architecture comprising of presentation layer, application layer and the database layer

### Conclusion

The Saankhya Labs' NETRA satellite-based vessel tracking and communication solution is a secure and reliable lifeline for fishermen. It helps them to stay connected with the shore even when they are 100's of nautical miles away in deep sea.

The solution is also helpful for fisheries department and other government agencies like coast guard and navy to regulate the fishing and enhance the coastal security for the country.

The solution helps in making fishing safe and ecologically sustainable. The adoption of this technological solution can help nations in the achievement

of the United Nations Sustainable Development Goals.

### About Saankhya Labs

Saankhya Labs is a premier wireless communication solutions company. We offer a wide range of solutions, technologies and platforms across 5G Open RAN, Broadcast and Satellite IoT systems. The communication solutions are based on our award winning, patented, ultra-low power, small footprint ,fully programmable Software Defined Radio (SDR) chipsets and platforms.

Saankhya Labs has developed Next-Gen Satcom and Satellite IoT Solutions. We have strategic partnerships with wide spectrum of satellite enterprises including national space agencies such as ISRO and leading satellite operators like Ligado Networks.

We have developed frontline Satellite IoT Solutions for real time tracking of fixed and mobile assets, two-way communication in remote locations, emergency communication systems, and secure encrypted, defence communication. Our solutions include Two-Way MSS Terminals, Hub-Side Equipment, Receive Only Terminals and Satellite-to-Terrestrial Gateways for 5G Broadcast

<sup>1</sup> [FAO. 2020. The State of World Fisheries and Aquaculture 2020. In brief. Sustainability in action. Rome.](#)

<sup>2</sup> [UN Sustainable Development Goals](#)