MULTIPLE NETWORK COMMUNICATION SYSTEM FOR MARINE FISHERMEN

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Abstract: Wireless Mesh Networkhelps for fisherman communications. Nowadays, WMN communications are more and more important to the development of the society, not only in land, but also in the sea. When discussing about communications in maritime environments the scenario is different and harder, because of several factors, such as, the movement on the surface of the sea. Offshore internet access is a big help to the marine fishermen who spend 5-7 days in the oceans on a single fishing trip. Analyzing fishing trip it maps the coverage area with the attainable data rates at various distances from the base station. This is done using a combination of field trial results and antenna specifications. They were face communication problem when they were not in the network range, and also they were facing other network issues while communicating. This paper planned to propose the *swarming algorithm* for other network information exchange and also focused on voice clarity approach using Voice over Internet Protocol (VoIP) method for clear information transmission and also it implements the alert and rescue process in marine environment using RSSI and GPS.

Keywords: ***WMN, Fishermen Communication, Multi Network Port, RSSI,GPS,Swarm and VOIP.***

I. INTRODUCTION

Wireless Mesh Networks (WMNs) are differentiate by active organization, self-healing and self-configuration to permit versatile combination, fast exploitation, simple preservation, low cost, and should even be used to progress the concert of multi-hop ad-hoc networks [1]. WMNs also can enable wireless web property at lesser price than the standard wireless fidelity (Wi-Fi) networks. Wireless mesh networks (WMNs) are unceasingly obtaining vital attention as a probable means that of providing seamless knowledge property, notably in urban surroundings. Such networks develop from classic mobile unplanned networks, objective long-range broadcast with significance on network output and property. These networks cannot achieve distinguishable popularity and success in the technological world unless providing overwhelming security and reliable services to their users. Security schemes that have been developed for WLANs are not suitable enough to be incorporated in WMNs as there is no centralized trusted authority in WMNs to distribute the public key [2]. Thus there is need of new security protocols and schemes should be developed for WMNs. Due to dynamic change of network topology, distributed network architecture and shared wireless mediums WMNs lacks in security solutions. Attacks can occur on different protocol layers which can harm the network traffic and data.

WSNs have become widely available from the early 2000s, as sensing components and communication modules were already becoming cheap and small [3]. Monitoring the environment with such low cost devices became since then efficient, with a large volume of research having been conducted in the last almost two decades. By now, WSN solutions are deployed in large scales and in various places and are being widely used in a variety

of applications ranging after military to agriculture and from healthcare to traffic management.

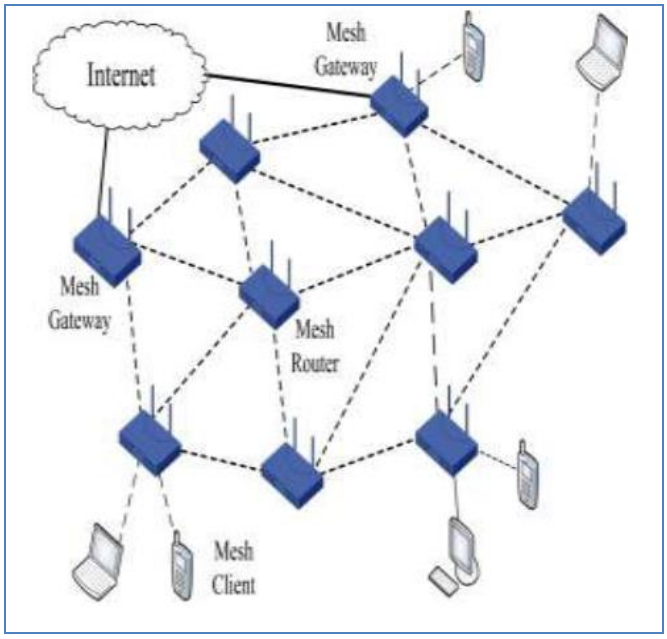

Figure 1: WMN Architecture

A WSN typically comprises a set of sensor nodes equipped with limited, low-power/short-range communication capabilities.Similarly, any other emergency information cannot be passed to the shore by the fishermen. Alert information regarding occurrence of any storms or cyclones at sea cannot be conveyed to the fishermen from the shore [4, 5].But not providing an effective communication in the sea areas. Currently, this is a main research field in every researcher. By providing effective communication is our main aim. By providing an effective communication to fisherman, is by establishing the communication to the nearest other network too. To focus this work, this thesis to propose the *swarming algorithm* for other network information exchange and also focused on voice clarity approach using Voice over Internet Protocol (VoIP) method for clear information transmission.

II. LITERATURE REVIEW

Xiguo Ren et al [6], The marine controlled source electromagnetic transmitting method could greatly improve the success rate of the offshore drilling and reduce drilling risk greatly. So it has been widely used in the abroad exploration industry of marine oil and gas in recent years. As a primary means of subsea communications, power line communication (PLC) system plays a major role in the marine electromagnetic exploration system. The communications platform of marine controlled source electromagnetic transmission system has been built by PLC system and the LabVIEW software in this paper. The GPS module has been used for time synchronization in this platform. The communication between the deck control platform and subsea uses the PLC system. And marine transmitter control platform could timely display and save the information of the operating, operating current and operating frequency in the subsea system. The experiment results verify that this platform could work stably for a long time and have the high transmission rate about 1kb/s.

Yong Bai et al [7], To support maritime voice service for mobile users on ocean fishery vessels, it is a promising approach to integrate heterogeneous wireless and wireline networks including maritime wireless mesh network (WMN), satellite mobile network, and Internet. In such a networking environment, the ship-to-ship and ship-to-shore VoIP calls traverse different networking paths. When applying traditional Mobile IP and SIP protocols directly without differentiating these two kinds of VoIP services, it is challenging to support them cost-effectively with acceptable QoS. To deal with the faced technical challenges, this paper proposes to employ dual IP addresses and dual SIP addresses for user mobility and VoIP session managements. With such a proposal, best data path selection can be achieved during VoIP call setup and data delivery by differentiating two kinds of VoIP calls. The reduced involvement of satellite link with best data path selection yields the benefits of decreased data transmission delay and lower calling charge for maritime VoIP services over such an integrated wireless/wireline network.

M. Sudhakar [8], Wireless mesh networks (WMNs) promise to extend high-speed wireless property on the way aspect what is getable with this WiFi-based infrastructure. However, their distinctive field choices leave them notably at risk of security threats.

Throughout this text, they tend to tend to explain varied forms of refined attacks launched from adversaries with internal access to the WMN. They tend to tend to any confirm getable detection and mitigation mechanisms. Whereas most external attacks could also be slaked with a combination of crypto graphical mechanisms and robust communication techniques, internal attacks are voluminous harder to counter as a results of the antagonist is tuned in to the network secrets and its protocols. Jamming-resistant broadcast communications among the presence of among jammers remains a troublesome downside. Current solutions conceive to eliminate the use of common secrets for safeguarding broadcast communications. Such secrets could also be merely exposed among the event of node compromise. However, the heightened level of security comes at the expense of performance, as a results of broadcasted messages need to be compelled to be transmitted multiple times and on multiple frequency bands to make sure robust reception.

Mehta, Mirav T [9] Current technology assistance to Indian Fishermen for coastal communication consists mainly of handheld radios, which only enables broadcast communication over a short range. In order to overcome these limitations, a cost effective marine communication infrastructure based on long range Wi-Fi backhaul, called OceanNet, has been developed at our research centre, where fishermen would be able to have Internet access until 60 km. This work aims to carry out traffic analysis and modelling of this marine communication network for Fishermen, OceanNet. This exercise will help us model and understand the behavior of the network, once it is scaled up when the OceanNet deployment is done on several boats and the number of end user devices (smart phones and tablets) increases. It will also help us to identify bottlenecks in the network and identify ways to overcome these bottlenecks. This work is based on real world traffic data collected from the field trials conducted over the Arabian Sea and an experimental network set up over the backwaters.

Vijayan, DeepthyM.[10] communication link between fishing vessels or with the sea shore using Wi-Fi is explored in this paper. For effective communication a high gain antenna is mounted at the sea shore which acts as base station (BS). Although narrow band directional antenna used in the Base Station (BS) ensures the connectivity for a long distance, the coverage will be poor without any steering mechanism, as the antenna beam is fixed in a particular direction. The proposed smart antenna with adaptive beam forming and multiple access technique can ensure the coverage without losing connectivity at long distance. The main objective is to find the Direction of Arrival (DoA) of the received signal from the fishing vessel moving at a constant velocity for adaptive steering of the antenna beam. The DoA parameter gives the phase and amplitude of the signal transmitted from the fishing vessel. The same phase and amplitude help to calculate the beam forming vectors in the smart antenna and it adaptively steers the beam towards fishing vessel. This paper describes how DoA estimation can apply to a beam forming Wi-Fi antenna array which is used for marine communication, and give a mathematical model of DoA estimation.

III. PROBLEM STATEMENT

The maritime WMN between ships is set up for ship-to-ship communications it affects the network topology and can cause the network to partition, which may completely disrupt the applications or missions that depend on the network. Fishermen usually spend an average of 4–6 days at sea, travelling upto 120 km away from sea shore to obtain optimum profits. One of the major problems faced by Indian fishermen is lack of communication with the shore. Cellular connectivity is available only within 15 km from the shore. Other means of communication such as satellite radio are very expensive and getting any spectrum is subject to Government regulations [11]. The technology assistance to Indian Fishermen for coastal communication consists mainly of handheld radios, which only enables broadcast communication over a short range.

IV. PROPOSED WORK

The Marine Corps implemented VoIP in their deployments to provide integrated and seamless communications to all levels of command. The main

purpose of using the VoIP technology is to provide voice communication down to the last unit, combined with data exchange and without the need to deploy extra infrastructure wherever the unit is deployed. When a unit is deployed and interconnected with a data network to the main information grid, members of the unit can communicate with one another and also with any senior authority as needed. Furthermore, the extra bandwidth remaining beyond speech communication can be used to automatically send additional battlefield information in the form of video or data. Some examples of such information are temperature, level of supplies, and other relevant sensor data. Even though deployment of VoIP in battle conditions is more spectacular and draws attention immediately. The swarm operates in communicative and non-communicative mode. In communicative mode, automatic service discovery is applied: the fishermess find peers to help them. The wireless network also enables the fishermess to support a human squad leader operating within nearest range using Swarming algorithm and provide a clear voice by using a VoIP protocol.

a. Path Selection for network Channel

In a typical WMN, one or more channels are reserved for broadcasting control information. These channels, referred to as control channels, facilitate operations such as network discovery, time synchronization, coordination of shared medium access, routing path discovery and others, without interfering with the communications of STAs with MAPs. An adversary who selectively targets the control channels can efficiently launch with a fairly limited amount of resources (control traffic is low-rate compared to data traffic). To launch a channel selective communication, the adversary must be aware of the location of the targeted channel, whether defined by a separate frequency band, timeslot, or PN code [12, 13]. Note that control channels are inherently broadcast and hence, every intended receiver must be aware of the communication. The compromise of a single receiver, be it a MAP or an MP, reveals those secrets to the adversary. Example: We illustrate the impact of communication on CSMA/CA-based medium access control (MAC) protocols for multi-channel WMNs. A multi-channel MAC (MMAC) protocol is employed to coordinate access of multiple nodes residing in the same collision domain to the common set of channels. Channel selection can be done by using these identities.

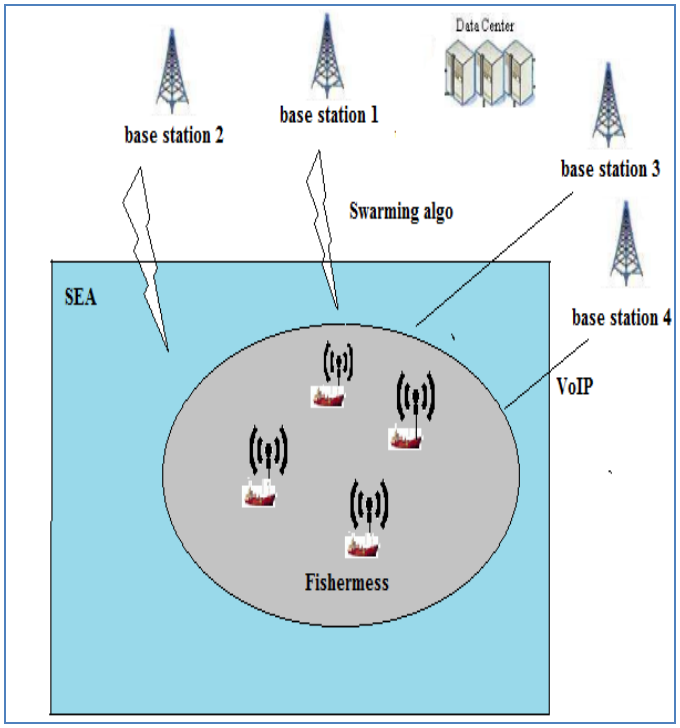

Figure 2: Proposed Architecture

b. Multi Network selection using Swarming Algorithm

The development of ocean fishery prompts user requirements on information delivery for mobile users at sea. It is desirable for fishery mariners to be aided with maritime and fishery-related services such as navigation, weather forecast, fish finding and notification, ship identification & tracking, urgent maritime safety information distribution, voice calls, and Internet access [14]. To support these various information services, both ship-to-ship and ship-to-shore communications are needed. Regarding the information services for fishery mariners, major user requirements are effective other network communication also to help to find the fishermen's communication [15]. Swarm algorithm in order to solve the problem of mesh router placement in WMNs. Best fitness locations with those of one or

more members of the swarm, with some random perturbations.

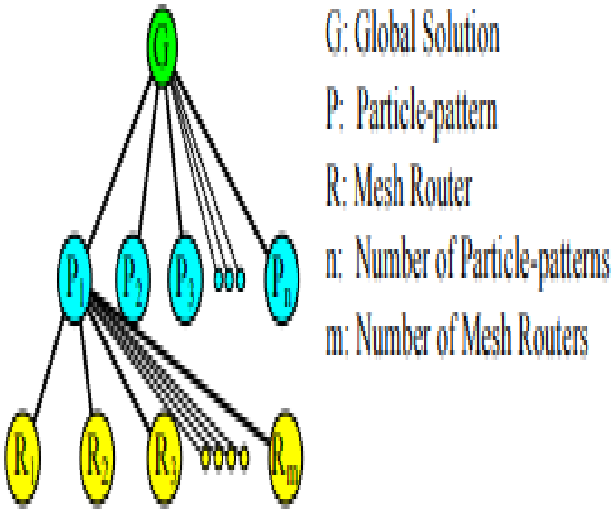

Figure 3: Swarm Method of Communication

The next iteration of the algorithm takes place after the entire networks have been moved. Eventually, the swarm as a whole will likely move closer to an optimum of the fitness function. Each individual in the swarm is composed of three D-dimensional vectors, where D is the dimensionality of the search space. These are the current position $\vec{}xi$, the previous best position $\vec{}pi$ and the velocity $\vec{}vi$. In the Swarm process, the velocity of each particle is iteratively adjusted in such a way that the particle stochastically oscillates around $\vec{}pi$ and $\vec{}pg$ locations.

c. VOIP for Clear voice

The maritime WMN between ships is set up for ship-to-ship communications. Mesh Network (WMN), satellite mobile network, and Internet. For ship-to-shore communications, mobile terminals onboard first access the WMN and then access satellite mobile network via a shipborne satellite gateway (SGW). For clear voice for the communication VOIP were proposed in WMN [16]. From the perspective of onboard mobile users, the ship-to-ship voice service within a maritime fishery ship fleet is called a local VoIP call in this paper, and the ship-to-shore voice service outside of the maritime fishery ship fleet is called a remote call. VoIP services in the integrated maritime networking system, with dual IP addresses (i.e., local and global IP addresses) to maritime mobile hosts for mobility management and IP data delivery. Furthermore, dual SIP addresses (i.e., local and global SIP addresses) are suggested to be used by maritime mobile hosts for SIP session registration and setup [17]. Then, both local and remote maritime VoIP services can be supported by utilizing dual IP addresses and dual SIP addresses for VoIP session setup and data routing. With our proposals, the involvement of satellite mobile network is reduced as much as possible to improve cost-effectiveness and transmission efficiency. Moreover, there are no significant modification of current network elements and signaling procedures with our proposals. To evaluate the feasibility and validity of the proposed system and the relevant technical solutions, a testbed system is under development.

d. Alert and Rescue System

Range-based confinement plot is utilized to figure the separation and edge among stay and obscure hubs with in a settled zone while Range free restriction conspire is utilized to ascertain the separation or position between different obscure hubs. Range-based confinement plan can evaluate the separation between the obscure and reference hub while run free limitation plan can gauge the area of obscure hub without deciding the separation. It has no earlier information about the hub. It is typically taking a shot at the premise of installed framework. A GSM transmitter is settled on the ship or vessel, as needs be a GPS collector is settled on the ocean shore territories. At the point when the ship or the pontoon cross the universal sea ocean line or disregarded the ocean zone of every Nation, the transmitter detects the position (compass sensor) and the predefined longitudinal and vertical qualities will send to the controller which esteems are contrast by the smaller scale controller and pre put away by picture preparing innovation. What's more, abruptly the notice message ready will get show on the LED Display in drift watch

office additionally in the ship and Alarm will blow. The controller gives the flag and starts to get back the ship in to wellbeing area. By utilizing Received Signal Strength Identifier (RSSI) RSSI is a Radio-Frequency term which is fundamentally utilized for separation estimation among transmitter and collector. It is most prevalent procedure for indoor and outside condition for enhance exactness. It is most reasonable for WSN because of minimal effort, low power utilization, straightforward equipment, and so on. RSSI accomplishes high precision in short separation.

V. EXPERIMENTAL RESULT

In our proposed scheme, a VoIP phone user has two SIP accounts: one is called local SIP account (user A), and the other is called global SIP account (user B). In other words, a VoIP mobile user has dual SIP addresses. The local SIP account is used for handling VoIP call occurred between two users in a same maritime WMN. The global SIP account is used for handling VoIP call occurred between two users when one of them is in a terrestrial network.

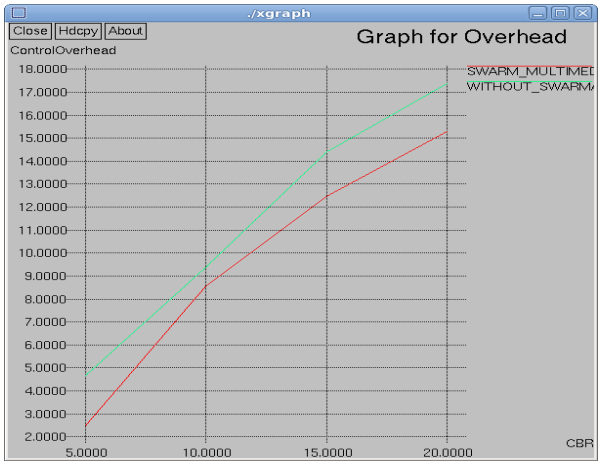

Chart 1: Overhead result

With these parameters, simulations are created in NS2. The performance level of planned theme was evaluated simply before the trust issue is applied and once trust issue is applied.

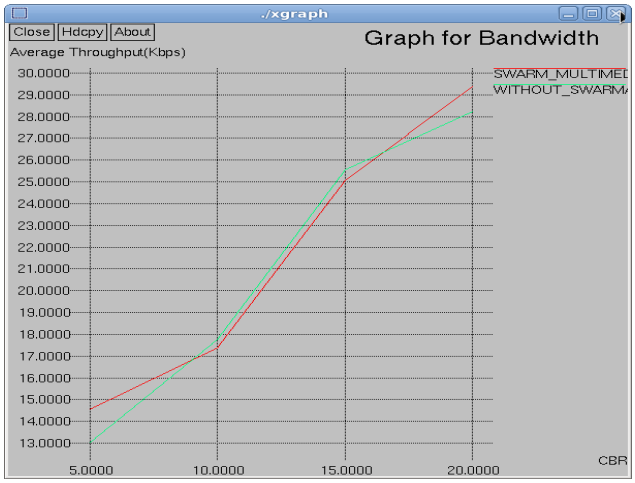

Chart 2: Bandwidth difference

Packet delivery ratio is distinct as the ratio of data packets established by the destination to those make by the sources. Mathematically, it can be distinct as: PDR= S1÷ S2 Where, S1 is the sum of data packets established by the each destination and S2 is the sum of data packets produce by the every source. Graphs show the portion of data packet that are productively distribute during simulations time against the number of nodes.

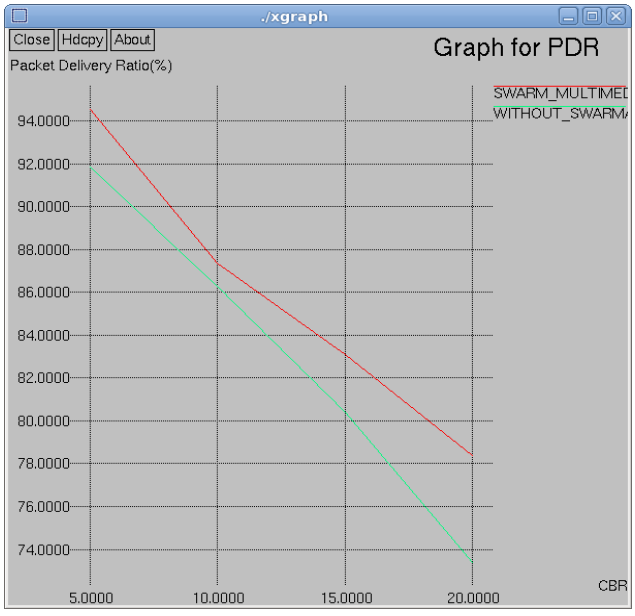

Chart 3: Packet Sent Ratio

In existing method, we have used the frequency hopping technique for the packet transmission for the different source to destination communication problem may occurs.

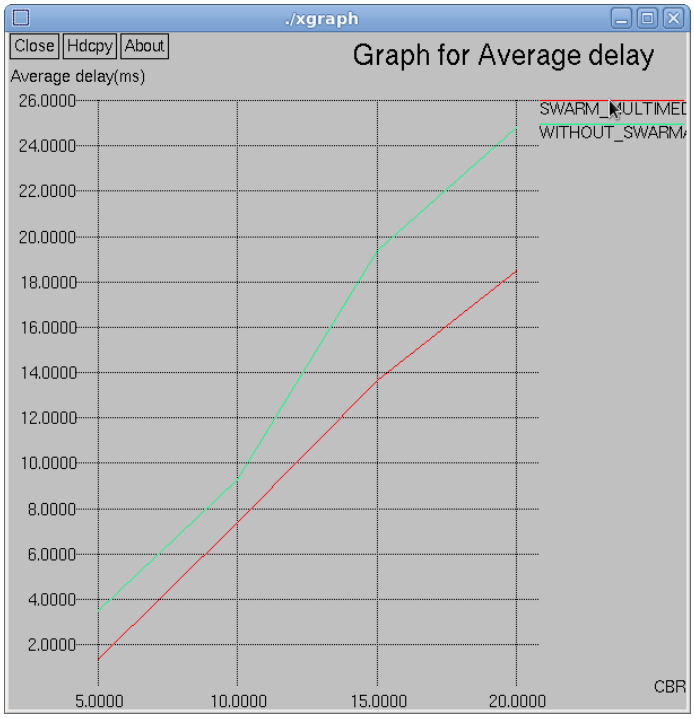

Chart 4: Delay calculation

Every boat will be having on-boat GPS device for finding its location. So, using the GPS device, every boat will be getting its location co-ordinates (latitude and longitude co-ordinates). The maritime border for a country is always fixed and constant. Also, the border is not a straight line, which will be a well defined imaginary curve through the sea (Figure 3). When a CPE associates with a base station, it will get the maritime border segment corresponding to that region as an array of coordinates. Thus by knowing the maritime border co-ordinates and its current location co-ordinates, a boat will calculate its displacement from the maritime border by doing a binary search of the array of maritime border coordinates.

VI. CONCLUSION

Offshore internet access is a big help to the marine fishermen who spend more than 10 days in the oceans on a single fishing trip. We have successfully developed and prototyped a novel and affordable communication network for marine fishermen. Marine fishermen community all over the world face a real problem when they have to spend more days in the middle of the ocean with no cost-effective means of contacting the mainland. This is more so in the developing countries where the financial constraints of this community are even more acute. In this thesis we have solve a viable economical solution to this problem using VOIP and Swarm algorithm in order to solve the problem of mesh router placement in WMNs. It also concerned in alert and rescue system in marine environment. Best fitness locations with those of one or more members of the swarm, with some random perturbations.

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