

Offshore Communication for Coastal Region Using Mobile Infrastructure

Keerthana.V

Assistant Professor, Department Of Computer Science.
Kgcollege Of Arts & Science.

Abstract- Marine fishermen risk their lives once they go as far as one hundred twenty kilometers from the shore on a fishing trip lasting 5-7 days. They square measure utterly cut off from the earth. Cellular coverage exists solely up to 12-15 kilometers from the shore. In emergency things, the fishermen don't have any thanks to concern facilitate. Even underneath traditional conditions, prolonged isolation from their family and friends causes mental depression. Since the marine fishermen square measure not economically well off particularly in the developing countries, there has not been abundant industrial interest in addressing this downside. it's not seen as a profitable business proposition. However, addressing this downside can profit the marine fishermen community vastly. Our center conducted interviews with many fishermen to know this downside and came up with an economical resolution. the answer allows the fishermen to use the good phones that they own already to induce net puzzled exploitation Wi-Fi. The Access purpose (AP) on the boat connects over LAN to AN aboard entree to long vary Wi-Fi backhaul network. The onshore base station is put in on a tower at a height of 50-60 m. Boats are used as mobile base stations to extend the vary of the network. This resolution, once tested over the Arabian ocean, provided a variety of 40+ kilometers within the 1st hop and 20+ kilometers each future hop. This network are often operated on a cooperative community basis by the fishermen community

Keywords- Internet, long range(LR) Wi-Fi, base station, gateway, backhaul network, field trial, point-to-multi-point (P2MP) network

I. INTRODUCTION

Marine fishing may be a key contributor to the economy of the countries with an extended outline. There square measure varied communities of fishermen living on the coastal regions whose keep has relied on fishing for generations along. for instance, Asian nation contains a outline of over 8000 kilometers with 2000 fishing villages tenanted by seven million folks relying alone on fishing for his or her keep. Majority of those folks square measure used as daily wage earners by the boat homeowners.

Upto ten fishermen come into being in seventy foot long mid-sized boats called trawlers for marine fishing. These trawlers square measure equipped with cold storage to preserve the fish. every fishing trip lasts 5-7 days generally, typically even longer, so as to catch enough fish to create it profitable to the boat homeowners. throughout these fishing journeys, these fishermen square measure entirely isolated from their families and friends.

Collision with a ship may be a common downside long-faced by these fishermen that ends up in loss of lives and harm to boats. Accidental crossing of the maritime boundary is another common issue that leads to their arrest and arrogation of the boat by the neighboring countries' police investigation personnel. Currently, the fishermen use hand-held radios for communication that have a restricted vary at intervals the road of sight and don't work dependably underneath adverse conditions once the ocean state is rough. Researchers conducted in depth interviews with over 100 fishermen, boat homeowners and their families supported a form to achieve insight into the issues long-faced by them, their communication needs and their activity patterns. From their responses, it had been evident that that they had a true downside that they didn't have a reasonable resolution. Any resolution planned ought to return at nearly no value to them so as for it to be viable.

Based on these observations, it was decided that extending the Internet to the sea using the cheapest backhaul technology option would be the best way to develop a viable and cost- effective solution for connecting the marine fishermen to the mainland. A comparative study of various backhaul technology options based on several parameters revealed that long range (LR) Wi-Fi was the most suitable option for the backhaul network [3].

In order to overcome the unique challenges in the marine environment for achieving coverage and connectivity, an innovative backhaul network architecture which opportunistically stitches together several point-to- multi-point (P2MP) networks using Ethernet and Wi-Fi mesh networks was envisaged. The standard Wi-Fi access point (AP) on board the boats will enable the fishermen to connect to the

internet using their Wi-Fi enabled smart phones. The Wi-Fi mesh network for access is formed among a cluster of boats in a fishing zone. The on-board access points will be capable of routing the traffic within the Wi-Fi mesh network and also connecting to the backhaul gateway over Ethernet in order to provide internet access.

The common place Wi-Fi access purpose (AP) on board the boats can change the fishermen to attach to the web exploitation their Wi-Fi enabled good phones. The Wi-Fi mesh network for access is created among a cluster of boats in an exceedingly fishing zone. The on-board access points are capable of routing the traffic at intervals the Wi-Fi mesh network and additionally connecting to the backhaul entree over LAN

II. COMPARATIVE ANALYSIS OF BACKHAUL TECHNOLOGY

Our challenge was to spot an occasional value backhaul technology that may still offer the desired performance, vary and different options. The technology choices thought of were 2G/3G, Wi-Fi, Wi-MAX, psychological feature Radio and LTE. These technologies were evaluated supported the following parameters – spectrum licensing value, cost, vender support, communication vary, channel information measure, supported rate, latency and quality. Weights were appointed to the on top of parameters supported their perceived importance. All technology choices were stratified supported every of these parameters.

A utility operate was outlined because the normalized weighted total of the grades for every parameter. Exploitation this operate, a utility score (out of 10) was computed for every technology possibility, the same as a criterion [3]. Table one shows the relative weights appointed to numerous the varied the assorted parameters and Table a pair of shows the utility scores obtained for various technology choices. It are often seen that Wi-Fi scores abundant over future best choice, psychological feature Radio. Supported this analysis, long vary (LR) Wi-Fi is chosen because the backhaul technology of selection. LR Wi-Fi may be a variant of ordinary

Table 1: Relative Weights Assigned to Various Parameters

Parameter	Relative Weight
Spectrum licensing cost	3X
CAPEX	3X
Vendor support	2.5X
Transmission range	2X
Supported Data Rate	1.5X
Channel Bandwidth	1.5X
Latency/delav	1.5X

Table 2: Utility Scores for Various Technology Options

Technology	Utility Score (out of 10)
WiMAX	5.81
LTE	6.19
Cognitive Radio	6.41

III. RESOLUTION DESIGN

There square measure many challenges distinctive to this downside domain. Firstly, the planned resolution must be extraordinarily low-priced and additionally must be simple to use. Additionally, the coverage must be over a really long vary, as so much as one hundred twenty klick on some occasions. Security may be a massive concern too since these boats operate near the maritime boundary. correct authentication and authorization mechanisms got to be in situ. The boats square measure extremely mobile and are subject to undulating motion because of the waves. This may need regular localization of the nodes and reorientation of the antennas PRN.

The solution design stitches along many point-to-multi-point (P2MP) long vary Wi-Fi networks along. the first P2MP network is anchored at the bottom station on the shore. The shopper station on the boat connecting to the bottom station is stated as adaptive Backhaul instrumentation (ABE). This can be a result of the station can dynamically amendment its role between being a entree to the backhaul network and being a mobile base station. The secondary P2MP networks use the ABE on a ship as a mobile base station. The P2MP networks square measure sewn along over LAN and Wi-Fi mesh network.

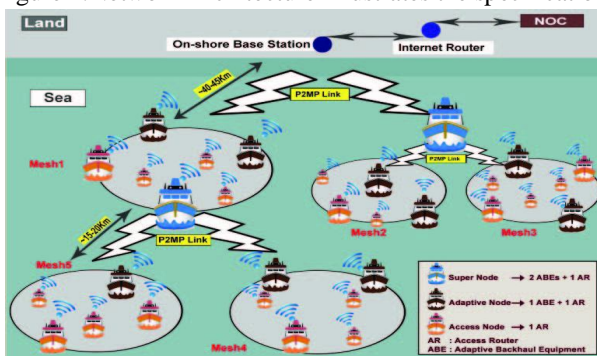
The Wi-Fi mesh network is fashioned among the boats in an exceedingly fishing zone. whereas the expected vary of primary P2MP network is 40-45 klick, the expected vary of secondary P2MP networks is 15-20 klick. the desired worst case vary of one hundred twenty klick is targeted by handicraft along many secondary P2MP networks with the first P2MP network.

The idea being created is that there'll be a minimum of one fishing zone with a ship at intervals the vary of every P2MP network. There will be AN 802.11 standards compliant Wi-Fi access purpose on board each boat. Since this access purpose is additionally capable of routing the traffic at intervals the Wi-Fi mesh network, it is notable as AN Access Router (AR). The good phones, tablets, etc., of the fishermen on board a ship can hook up with the native AR over Wi-Fi. Boats that have solely AN AR square measure called Access

Nodes (AcN). Boat with AN AR ANd an ABE square measure called adaptive Nodes (AdN). The ABE on board will act as either a entree to the backhaul network or as a mobile base station.

Its role can depend upon the placement of the boat at intervals a cluster and might amendment dynamically because the boat moves around. Some boats can have AN AR and 2 ABEs, one acting as a entree and therefore the different as a mobile base station. Such boats will extend the vary of the network single-handed. These square measure called Super Nodes (SuN). Note that the AR and therefore the ABEs aboard a ship square measure connected over LAN.

Figure 1: Network Architecture illustrates the specification.



802.1X primarily based authentication and authorization are accustomed address the safety needs. additionally, commonplace WPA2 primarily based 802.11i security protocol are used. Prior work done exploitation long vary Wi-Fi [4] [5] was supported point-to-point (P2P) links. This meant that there may well be multiple radios at one node and therefore the downside of interference had to be forbidden. During this design exploitation P2MP links, there'll at the most be 2 radios at one node and non-overlapping channels are often accustomed avoid interference. Also, the backhaul and access networks will operate in totally different spectrum (2.4 gigacycle versus five GHz) so as to avoid interference.

Long vary Wi-Fi depends heavily on directional antennas for vary extension. Therefore, during this extremely mobile setting, constant following of the placement of the bottom station and reorientation of the shopper station (ABE) antenna towards the bottom station may be a demand. The shopper stations ought to somehow localize the bottom station so reorient their antenna consequently to forever face the bottom station. additionally, an appropriate stabilization mechanism like a gyro or a gentle cam are often used for mounting the antenna so as to counter the rocking movement of the boats because of the ocean waves. A Network Operations Center (NOC) [10] can be deployed

onshore to watch and manage the network. The NOC also will host custom apps for fishermen's use like AN early warning system for collision detection alert, maritime border crossing alert, underwater hazard alert, rough weather alert, etc., mobile app for auction of daily catch, search and rescue portal, etc.

IV. CONCLUSION

Marine fishermen community everywhere the globe face a true downside once they have to be compelled to pay 5-7 days or additional at a time within the middle of the ocean with no cost-efficient suggests that of contacting the earth. this can be additional thus within the developing countries wherever the money constraints of this community square measure even additional acute. Our researchers will truly claim to possess found a viable economical resolution to the current downside exploitation AN innovative and distinctive network design that uses long vary Wi-Fi for backhaul.

REFERENCES

- [1] Sethuraman N Rao, Dhanesh rule, Aiswarya S and Siddharth Unni, Realizing cost-efficient Marine net for Fishermen, fourteenth International conference on Modelling and improvement in Mobile, Ad Hoc, and Wireless Networks (WiOpt), 2016
- [2] Siddharth Unni, Dhanesh rule, Kalyan Sasidhar and Sethuraman.Rao, Performance measuring and analysis of long vary Wi-Fi network for over-the-sea communication, thirteenth International conference on Modelling and improvement in Mobile, Ad Hoc, and Wireless Networks (WiOpt), 2015
- [3] Jennath H S, Anju Kaimal, Dhanesh rule, Sethuraman Rao, Comparative Study of Backhaul choices for Communication puzzled, Grenze International Journal of laptop Theory and Engineering , Oct 2015
- [4] Rabin Patra, Sergiu Nedeveschi, Sonesh Surana, Anmol Sheth, Lakshminarayanan Subramanian and Eric Brewer, WiLdnet: style and Implementation of High Performance WiFi primarily based Long Distance Networks, in Proceedings of the fourth USENIX conference on Networked systems style & implementation (NSDI'07)
- [5] K. Chebrolu, B. Raman, and S. Sen, Long-distance 802.11b links: Performance measurements and knowledge, in Proceedings of the twelfth Annual International Conference on Mobile Computing and Networking, ser.MobiCom 06. New York, NY, USA: ACM, 2006, pp.7485. [Online]. Available: <http://doi.acm.org/10.1145/1161089.1161099>
- [6] Ubiquiti Networks - Wireless networking merchandise for broadband and enterprise, ht tp s:// ww w. ub nt .c om /

- [7] N. Fuke, K. Sugiyama, and H. Shinonaga, “Long-range oversea wireless network exploitation a pair of.4 gigacycle wireless local area network installation and performance,” in the twelfth International Conference on laptop Communications and Networks, 2003, pp. 351–356
- [8] “Marcom: Broadband at ocean, net for coast, polar regions, offshoreand ocean farming.” [Online]. Available: <http://WWW.marcom.no/>
- [9] J. Pathmasuntharam, P.-Y. Kong, M.-T. Zhou, Y. Ge, H. Wang, C.W. Ang, W. Su, and H. Harada, “Triton: High speed maritime mesh networks,,” in IEEE PIMRC, 2008, pp. 1–5
- [10] J.Poornimha,A Survey on Performance Analysis of Tora with other Reactive Routing Protocols in Manets,Vol.5,Issue No IX.,International Journal For Research In Applied Science And Engineering Technology.