International Journal of Recent Technology and Engineering (IJRTE)
ISSN: 2277-3878 (Online), Volume-8 Issue-4, November 2019

# Underwater MANETs: A Specialized Protocol (RANR) for Routing the Packet

**M.Srinivasa SeshaSai, R.Ramesh**

***Abstract:*** ***Underwater remote communication can beuseful for submerged condition observation, Communication between the boats, vessel sinking investigation, and research and so on. In any case, unliketerrestrial remote correspondence, submerged wirelesscommunication ought to consider factors like, long propagationdelay, constrained and unconstrained transmission limit, error rate due to external and internal influence, flow control, throughput, performance attenuation etc., by virtue of the characteristic properties of water. Along these lines, in this, we propose a proper protocol that applies to correspondence in underwater conditions.We additionally check performance issues in theproposed system.This paper depicts Region Attentive NeighborRouting (RANR), improvised version of the dynamic source routing (DSR) and aintegration of PURE ALOHA protocol with handshaking MAC protocol. The proposedprotocol is required as a result of the interesting challenges ofunderwater data delivery or communication: radio links doesn't effects in the water, and the acoustic links that are utilized rather have a lot of lower information rates and greater delay. RANR describes how a proposed protocol performs better than the existing protocols.***

***Keywords:*** ***Underwater remote communication, Region attentive neighbor routing, PURE ALOHA protocol, handshaking MAC protocol, acoustic communication;***

## I. INTRODUCTION

Several local applications are made in the time of universal where everyone can instantly get to the system from any place. Remote sensor network(RSN) area is aespecially basic development from the omnipresent time. It is considered in programming and hardware areas turning alloverZigbee, Tiny OS, etc. Another palce of Submerged WSN that blends WSN in the underwater is being contemplated. This examination is very much helpful for disaster avoidance, sea assets investigation, sea life form look into, vesselsinking investigation, submerged condition perception, etc [1-6].Terrestrial remote correspondence can give get to any area on the planet, however earthly radio waves utilized interrestrial remote correspondence can't be utilized in submerged correspondence because of the unavoidable attributes of water.

Manuscript published on November 30, 2019.
* Correspondence Author
**M.Srinivasa SeshaSai*,** Professor, KKR & KSR Institute of Technology and Sciences, Guntur, A.P, India.
**R.Ramesh,** Professor, KKR & KSR Institute of Technology and Sciences, Guntur, A.P, India.



Thus, strong waves must be used for submerged correspondence. In any case, owing to the straight forwardness back and troublesome correspondence as a result of noise, there is a necessity to design the Medium Access Control protocol thinking about the submerged condition. MAC show uses of channelization protocol, self-assertive access protocol, etc.In possible remote transmission, Channelization convention [12] is a numerous entrance technique inwhich the accessible data transfer limit of a links will takes with in the time, irregularity, or via coding, between non identical stations. Frequency division Multiple access (FDMA); the accessible transmission capacity is isolated into repeat gatherings. Each station is assigned a band to transfers the data. In any case, this isn't acceptablefor submerged correspondence attributable to constrained data transfer capacity. InTDMA(time-division multiple access), the nodes directly share the data transfer capacity is with in time. Each node is assigned a period opening when it can transfer the data. Each node transfers its information when its allocated schedule is opened. This system for data transmission has in like manner ended up being prohibited at whatever point it linked to submerge. Since it is a critical task to synchronize center points, in the absence of general packet services(GPS) the holding up time ends up being longer if a couple of hubs are incorporated.Code-division different access (CDMA) wasdeveloped a very long while back, wherein one channel conveys allTransmissions all the while. In any case, alike the actualize submerged is not easy for CDMA.There rely upon protocols of handshaking MAC protocol and ALOHA protocol in irregular access conventions. In case of the ALOHA protocol, every node transfers a packaging at whatever point it needs. The ALOHA-based protocol can be described into slotted ALOHA, pure ALOHA, ALOHA with collision avoidance, with half duplex, with carrier sensing and with advance notifications, etc. [7-8]. If any low movement, then this convention conveys greater throughput because of poor over-weight and poor rate of collision. Nevertheless, in the midst of high movement, the throughput is extremely poor. The inferable from extensive sum of data re-transmissions results data crash. One more issue is more delay in data transfers, the transmitter may experience a deferral in accepting an acknowledgement (ACK) inferable from a mistake, despite the fact that the data was gotten precisely by the recipient. The result of this makes transmitter to re-transmit the information by formulating the length of packet long. The MAC of handshaking-based protocol is a approach that interchange Request to Send (RTS) as well as Clear to Send (CTS) information transmits prior to the original data is collided. Medium access collision avoidance (MACA) consists of various protocols, like CSMA/CA carrier sense multiple accesswith collision avoidance with advance notifications, etc [8-10].

Previously transferring the data by decreasing information impact by using request-to-send and clear-to-send, the performance of the MAC-handshaking-dependent protocol is greater than the ALOHA-based protocol if there should be an occurrence of great overflow in the network and practical methods for reducing terminal issues. It additionally appropriate with remote LANs of IEEE 802.11 anyway it can reduce the performance if it has over-load of request-to-send and clear-to-send in instance of low overloads. Thusly, in this, we designed a reasonable protocol of MAC that which utilizes a mix of ALOHA protocol and protocol of handshaking MAC for submerged conditions. We designed a numerical examination demonstrate that which considers end-to-end delay and performance of the network. Moreover, here we check execution enhancement in the recommended conspires by contrasting it and the protocol of the existing medium access control. We further check execution enhancement in our plan in contrast with present MAC Protocol. One of the conflicts faced by participating submerged vehicles is the trouble of proper communication. In water the major problem facing with the radio beacons is solved by using acoustic beacons which is one of the best choices for submerged correspondence. A social affair of working together vehicles, it is good tended to an issue in MANETs. In past efforts [12], developed the Region Attentive Neighbor Routing (RANR) protocol, especially expected to use in submerged, and MANETs. This effort depicts testing to structure the affect-ability of the RANR protocol to various kinds of mistake in passkey segments. Disregarding the messages a MANET is the commitment of a directing protocol. The primary undertaking of the directing protocol is to discover great correspondence ways through the system. Ways rely upon the system topology, and staying up to date with the topology speaks to a great part of task completed by steering convention. Through-water acoustic correspondence connections are more latency and less data transfer capacity, particularly when contrasted with through-air radio connections. This presents troublesome issues in transfer of messages over an acoustic MANET.In spite of the fact that there is an abundance of present routing protocols of MANET, these were only produced for radio networking [12], and the protocols of radio don't stretch out wellto portable acoustic systems [13]. A prime reason is the considerable latency of the acoustic connections, particularly when contrasted with vehicle speed. RANR, similar to the well-knownprotocol called DSRprotocol which depends, utilizes origin courses. In contrast to DSR, RANR incorporates a connection topology forecast system and quality measures. Dynamic Source Routing protocol utilizes shortest path routingprotocol that has been appeared to implement inadequately in very portable systems [14]; RANR's utilization of the Conventional Transmission Count (CTC) interface quality metric enables it to settle on more-educated choices, giving better path through the network. Explicit data that which travels inprotocol header of aninformation is utilized to traverse the route and the topology information. The less-data transfer capacity of the acoustic connections, diminishing the header overhead is a need. This efforts depicts tests with various representation of qualities contained in the header of protocol.

RANRprotocol utilizes a model of mediumand a hub tracenetwork; two parts that which are not appear in several routing protocols. The model of medium is utilized to assess the nature of an acoustic connection, the range and an arrangement of ecological metrics. Tracing network is utilized to anticipate the present area of different types of vehicles in system dependent on one way, extend just estimations. These efforts are additionally performsexperiment to build up the execution necessities for tracking network and the model of medium network. By bringing mistakes into the model of medium computations, it conceivable to set up the affectability of routing system to inaccuracy in the model of medium. System execution was creating to endure more when the model of medium over-evaluated correspondence quality under poor natural circumstances. This channel display has been particularly intended to precisely speak to the DPAM's FSK [14] execution over an extensive variety of ecological parameters.

## II. RELATED WORK

### *A. Overview of ALOHA*

The straightforward Aloha or pure ALOHA, it doesn't require any complicated access but it performs fine for the light wait load. On established assumptions the information appearance will follow a poisonappropriation, highest performance is accomplished by the pure ALOHA is only 18% (Abramson, 1977).However, there is just a single carrier accessible for use; there is a probability of frame collisions from various nodes. Along these lines, the ALOHA protocol depends on replies of the receiver called acknowledgment. At the point when a station transmits a packet, the sender awaits for thethe acknowledgment from the receiver, if the sender does not receives the acknowledgment with the time limit then the sender retransmits the packet again.

Figure - 1 demonstrates the position for pure protocol of ALOHA and Figure - 2 demonstrates theflow chart of Pure Aloha

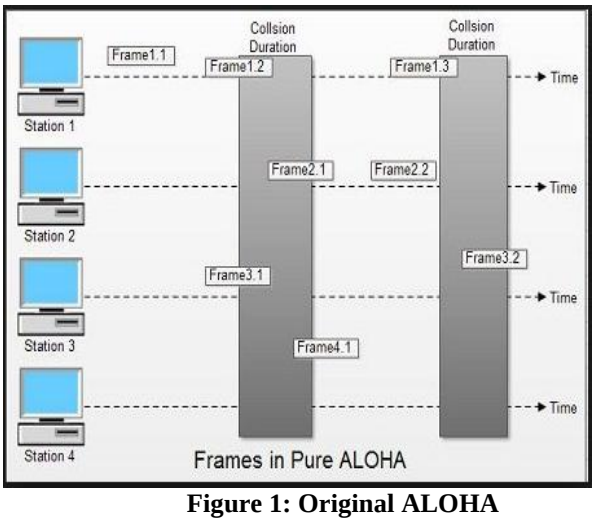


**Figure 1: Original ALOHA**

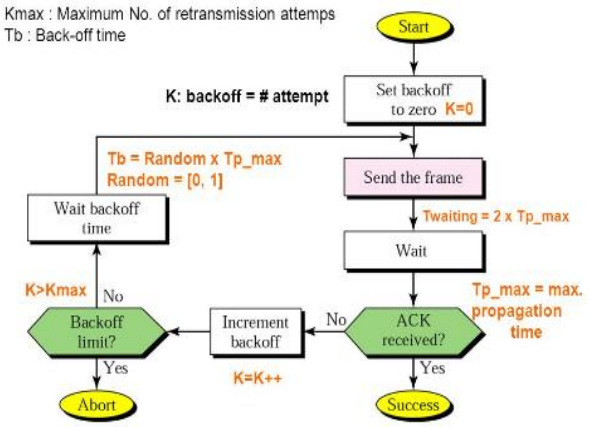


**Figure 2: Pure ALOHA Flow Chart Diagram**

***B. Overview of Carrier Sense Multiple Access with collision Avoidance (CSMA/CA)***

CSMA/CA is utilized to increase the performance of the CSMA technique by isolate the channel tooequally among the nodes.

**Carrier Sense:**Instead of directly transmitting the packets to the carrier through the channel it first checks whether the medium is free or not. If the medium is free then it starts transmission else it waits for random amount of time and then it again retries until the medium gets free. Using CSMA/CA we can give the solutions to problem of Hidden terminal and problem of Exposed terminal.RTS/CTS may alternatively be utilized now to mediate access to the shared medium. However, wireless 802.11 usages don't ordinarily implement RTS/CTS for all transmissions; they may turn it off totally, or possibly not utilize it for smaller networks.

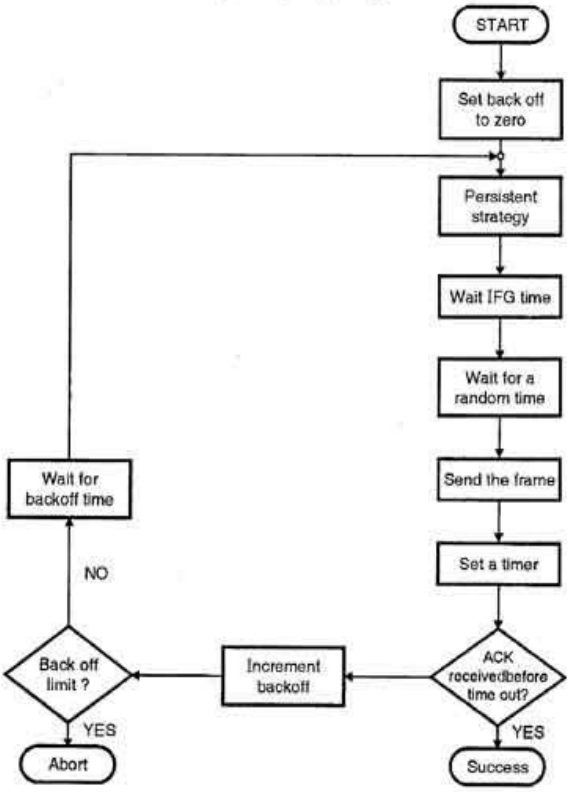


**Fig 3: Flow Chart Diagram for CSMA/CA**

## III. NEW PROTOCOL

### A. Quality of Connection

A significant change in RANR was the presentation of backing for a quality metric powerful connection to change the hop count. There are four important parameters related with every connection in RANR: two end points, quality of connection and a timestamp of RANR utilize the Conventional Transmission Count (CTC) as its measurement of quality connection. It is measured from the models of medium FER gauge as opposed to with test packets. The model of medium gauges the FER gives the range and the Conventional Transmission Count (CTC) is estimated from the FER. The changes that a text and its ACK will cross a connection effectively is $(1 - FER)^2$, the way, the CTC is determined as the conventional estimation of the negative binomial appropriation.

$$CTC = 1/ (1\text{-}FER)^2$$

The path of CTC is determined by the summation of CTCpath of every host. For sample,If CTC of one-hop path with FER = 0.5 is also 4(that is 50% of chance is there for transmission error). If the CTC of a 4-hop path with FER = 0.0 is 4(that is for transmission error, no chance); RANR don't memorize the CTC, rather it remember the range and determines CTC as it is required. This suggests the fields of quality connection that which contain the separation in meters between the nodes of the connection, as evaluated at the period of timestamp. To decrease the size of the convention header, the separation is considered as 8 bits (octet), yet it is treated as a 12 piece number with 4 certain zero-bits to right hand side that is 8 bits with 0000 towards right hand side. This leads us to indicate the distance from 0-4080 meters in additions of 16 m. The timestamp is utilized to guarantee that just the newlyconnected information are utilized and to guarantee that stale connection information are perfectly discarded. It is memorized similarly as the connection quality, however like a flash, instead of meters.

### B. Benefits of the Protocol

Majorly this Region Attentive Neighbor Routing (RANR) protocol has four benefits

i) Path Request: The behavior of the RANR protocol is similar to path request of DSR protocol. Only the difference is RANR maintains the path from initial host to last host using connection qualities and timestamps

ii) Path Reply and Senders path: Again, it is also similar to DSR protocol. The pathmaintainsconnection qualities and timestamps.

iii)PathInformation: Replaces DSR's path-error choice andcarries updated data about each and every connection.

iv) StraightforwardACK: This ACK will send when we have an acknowledgement from a packet or aprotocol option. Internal acknowledgementsare favored, but there are not constantly conceivable.

**Algorithm 1:**

```
while (true)
{
if (data is true)
{
sensing the node
transfer_data
start a timer
}
else if(date received is true)
{
```

```
if(own IPadd)
{
sensing the node
transfer acknowledgement(ack)/
transfernegitive acknowledgement(nack)
if(nack is transfer)
{
start a timer
}
if(time expired)
{
comes to idle state
}
}
}
else
{
state a timer
}
}
```

Algorithm for proposed Protocol

**C) Region Attentiveness**

Neighborhood topology is majorly gathered from the internal data of transmissions received, it is gathered from the two destinations: the modem thatwhich gives the get time of the incoming communication, and TDMA, which, depends on slots for time, gives the transmitter identity and transfer time. When the time of-flight is accessible, the model of medium can assess the range. At whatever point another range estimatesbecomes accessible, it is utilized to refresh the connection store. The connection store additionally transfer it to the tracking network. The FAU-DPAM [14] utilized in the proposednetwork introduces every message with anaccepted recognition succession that is utilized to recognize atransmissions received. Unlike whatever is left of the information which consists coded client information, the discovery succession is totally known, so it is significantly less demanding to recognize. Thus, the identification arrangement can be decidedly recognized even in extremely feeble transmissions, even transmissions excessively powerless, making it impossible to effectively decode.There are three levels of incoming transmission strength: strong enough to identify, strong enough to decipher. The identification sequence can be dependably distinguished even over a connection with a greatly high FER, permitting understood topology estimation even past the valuable scope of the modem.

**D) Estimate Probability of Underwater Packet Delivery**

In this, the probability of underwater packet delivery can be estimated that is P(n,k) of n bits for each pair of nodes with a distance k, used for neighbor node subset forwarding selection procedure. The connection loss that explains the attenuation on a one connection over a separation k for a frequency bandwidth $f_0$ of a signal because of large scale fading is given by

$$X(k, f_0) = k^s \; a(f_0)^k$$

Where s is spreading factor anda($f_0$) is the absorption co-efficiency.

Generally the propagation geometry is given by the spreading factor s. If s=1 then it is cylindrical spreading, if s=2 then it is spherical spreading but here for practical scenario the value of s is taken as 1.5 and the absorption co-efficient a($f_0$) is in db/km for the frequency is in khz by Throp's formula given by

$$10 \log a(f_0) = [(0.11 * f_0^2)/(1+f_0^2)] + [(44 * f_0^2) / (4100+f_0)] + (2075 * 10^{-4} f_0^2 + 0.003)$$

## IV. CONCLUSION

We designed a RANR protocol that utilizesanincorporation of protocols that are handshaking and original ALOHA protocol for underwater surroundings. If there are no errors in the transmission, the delay of end-to-end system of the existing ALOHA is low and the throughput is high, respectively. If there are errors in the transmission then the poor throughput and greater end-to-end delay.Interestingly, in existing handshaking-based MAC protocol, if there is an error in the transmission the poor end-to-end delay is and throughput is high. This is expert by decreasing collision rate through RTS-CTS (Request - to- Send and Clear - to-Send). When there is an error the end-to-end delay is high and the throughput is low owing RTS-CTS overload.Thus, we proposed a Region Attentive Neighbor Routing protocol that which leads low end-to-end delay and high throughput without errors. We will also reduce the end-to-end delay by removing the unnecessary processing time.

## REFERENCES


1. "Protocol design issues in underwater acoustic networks" Paolo Casari and MicheleZorzi Vol.34, Issue 17, November 2011, pp. 2013-2025.
2. "Nibble-CRC for Underwater Acoustic Communication" Imtiaz Ahmed Khan, Nam-Yeol Yun, and Soo-Hyun Park pp. 550–558, 2012.
3. "Sync MAC Protocol to Control Underwater Vehicle Based on Underwater Acoustic Communication" Nam-Yeol Yun, Yung-Pyo Kim, Soo-Hyun Park, December 2011, DOI: 10.1109/EUC.2011.81
4. "OCA-MAC: A Cooperative TDMA-Based MAC Protocol for Vehicular Ad Hoc Networks" Yao Liu, Hongjing Zhou andJiawei Huang, Vol.19, Issue.12, June, 2019
5. "RET-MAC: A new fair MAC protocol for underwater acoustic sensor network" Xiong, Shuming, Yuan, Cheng Tian, Lixin Zhan, Yongzhao, June, 2013,DO - 10.1155/2013/385471
6. "A multi-channel MAC protocol in underwater acoustic sensor networks" Junho Cho and Ho-Shin Cho Proceedings of the 11th ACM International Conference on Underwater Networks & Systems Article No. 25, Shanghai, China — October 24 - 26, 2016.
7. "Throughput and Delay Analysis of an Underwater CSMA/CA Protocol with Multi-RTS and Multi-DATA Receptions" Ho Young Hwang and Ho-Shin Cho, May, 2016, https://doi.org/10.1155/2016/2086279.
8. "A MAC Protocol for Underwater Acoustic Network" Liu Xun,LiYu,FangDongZhang Chun-HuaHuangHai-Ning Proceedings of the 2012 International Conference on Communication, Electronics and Automation Engineering pp 1291-1297.
9. "A CSMA/CA-based MAC Protocol for Underwater Acoustic Networks" Jingjing Wang, JieShen, Wei Shi, Gang Qiao 2 Shaoen Wu and Xinjie Wang4 Sensors (Basel). Jan, 2019(1): 183.
10. Published online 2019 Jan 7. doi: 10.3390/s19010183.
11. "Dynamic Source Routing in Ad Hoc Wireless Networks" David B. Johnson and David A. Maltz Part of the The Kluwer International Series in Engineering and Computer Science book series (SECS, volume 353) pp 153-181.
12. "Shortest Path Routing Protocol Based on the Vertical Angle for Underwater Acoustic Networks" Meiju Li, Xiujuan Du, Xin Liu and Chong Li, Journal of sensors, volume 2019, article ID 9145675, https://doi.org/10.1155/2019/9145675.
13. "Energy-Aware Topology Control And Qos Routing In Ad-Hoc Networks" panel Fadoua and AbdellahIdrissi, Procedia Computer Science Volume 56, 2015, Pages 309-316, https://doi.org/ 10.1016/j.procs.2015.07.213.

14. "High-Frequency Underwater Acoustic Propagation in a Port Modeled as a Three-Dimensional Duct Closed at One End Using the Method of Images" Pierre-Philippe J. Beaujean and Matthew D. Staska Advances in Acoustics and Vibration, Volume 2012, Article ID 929174, http://dx.doi.org/10.1155/2012/929174.
15. "Impact of Interference on Multi-Hop Wireless Network Performance" Kamal Jain, JitendraPadhye, Venkata N. Padmanabhan, LiliQiu, july, 2005, volume.11, issue.4, pp 471–487.

## AUTHORS PROFILE

**Dr. M. Srinivasa Sesha Sai**, received B.Sc. degree from Acharya Nagarjuna University, India in 1994, Master of Computer Applications from Acharya Nagarjuna University, India in 1997, Master of Philosophy in Computer Science from Alagappa University, India in 2004, Master of Technology in Computer Science & Engineering from Dr. M.G.R. University, India in 2007 and Ph.D. in Computer Science & Engineering from Acharya Nagarjuna University, India in 2011. He is currently working as Professor in the Department of Computer Science & Engineering, in KKR & KSR Institute of Technology & Sciences, Guntur, India. He is a DEL-EMC certified Data Associate in 'R' Language. His area of interests is Data Science, Data Analytics and Internet of Things & its applications.

**Prof. R. Ramesh** received B.Tech . Degree from Acharya Nagarjuna University, India. Master of Technology in Computer Science & Engineering from J.N. University, India He is currently working as Head of the Department & Professor in the Department of Computer Science & Engineering, in KKR & KSR Institute of Technology & Sciences, Guntur, India. He is a DEL-EMC certified Data Associate in 'R' Language. His area of interests is Computer Networks, Java Programming, Data Analytics and Machine Learning & its applications.