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International Journal of
Electrical and Electronics Research (IJEER)
Research Article | Volume 11, Issue 1 | Pages 15-24 | e-ISSN: 2347-470X

Improved Hybrid Routing Protocol (IHRP) in MANETs Based on Situation Based Adaptive Routing

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ABSTRACT- Without the need of a fixed foundation or base station, the Mobile Ad hoc Network creates its own wireless network. One of the most troublesome aspects of Mobile Ad hoc Network (MANET) is the occurrence of unexpected loss of network connectivity. As a result of this problem, packets continue to drop, and we must restore the connection by sending Route Request (RREQ) and Route Reply (RREP). As a result, network performance will suffer yet another setback. We used the scenario routing technique to combine the Dream Multipath Routing (DMR), Ad hoc on-demand multipath distance vector (AOMDV), Optimized link-state routing (OLSR), and Ad-hoc on Demand Vector (AODV) routing protocols to build the IHRP routing protocol in this work. According to previous studies, (AODV) is more suited when node motion is high. The purpose of DREAM Multipath Routing (DMR) is to maintain node mobility and location information coordinated. Route packet flooding is prevented by computing the expected chance of node relocation. The number of mobile nodes in the wireless network fluctuates, and the DMR operates on each one individually. In the network, each node maintains a list of nearby nodes and their current locations. Using the AOMDV routing protocol is effective for load balancing and preventing congestion on the network. OLSR is a good fit for networks that priorities link reliability above other considerations when routing traffic. When using the aforementioned (DMR, AODV, AOMDV, and OLSR) protocols to create the IHRP routing protocol, we are capable of better regulation of network behavior and perform.

In the case of 100 nodes, **data is sent for** analysis for The Improved Hybrid Routing Protocol (IHRP), Zone Routing Protocol (ZRP), AOMDV, AODV, and OLSR routing protocols. For data send, the performance of IHRP, ZRP, AOMDV, AODV, and OLSR is 11513, 10240, 10225, 10558, and 9184, respectively, and for 50 nodes, the performance of IHRP, ZRP, AOMDV, AODV, and OLSR is 11151, 9807, 9636, 9586, and 7470, respectively. Thus, with 100 and 50 nodes, the Improved Hybrid Routing Protocol (IHRP) outperforms the AOMDV, ZRP, AODV, and OLSR routing protocols.

In the case of 100 nodes and 50 nodes, the **data receive** analysis for IHRP, ZRP, AOMDV, AODV, and OLSR routing protocols is 11513, 10240, 10225, 10558, and 9184, respectively, **and** 9367, 8714, 8370, 6730, and 7298, respectively, **So IHRP also receives data faster than ZRP, AOMDV, AODV, and OLSR routing protocols. The IHRP outperforms AOMDV, AODV, ZRP, and OLSR routing protocols in terms of data transmit, receive, data drop, PDR, throughput, E-E latency, and NRL.**

Keywords: IHRP, DMR, AOMDV, OLSR, NS-2, ZRP, MANET, AODV.

ARTICLE INFORMATION

Author(s): Advin Manhar and Dr. Deepak Dembla;
Received: 11/09/2022; **Accepted**: 31/01/2023; **Published**: 02/02/2023;
e-ISSN: 2347-470X;
Paper Id: IJEER 1109-44;
Citation: 10.37391/IJEER.110103
Webpage-link:
www.ijeer.forexjournal.co.in/archive/volume-11/ijeer-110103.html

Publisher's Note: FOREX Publication stays neutral with regard to Jurisdictional claims in Published maps and institutional affiliations.

1. INTRODUCTION

Mobile ad hoc networks (MANET) are a self-coordinated wireless network that is worked without perpetual foundation and base station endorsement. In Mobile ad hoc networks for sending & receiving of data packets wireless surface is used by the mobile nodes. Ad- hoc networks [16] comprise of a set of mobile nodes associated remotely with a self-designed network without having a fixed foundation. Ad hoc network mostly used by the laborers in a hazardous situation, soldiers for enemy territory or a gathering of chiefs at an outside area. *Figure 1* shows an exemplary MANET. In a customary fixed structure network, direct need to pass on with from everyone others need to initially contact the closest base station, which advances their solicitations to the base station nearest to the target nodes. The entire message is steered directly the way acknowledged by the improper station. In Mobile ad hoc networks (MANETs), every one of these errands is performed by the actual nodes themselves.

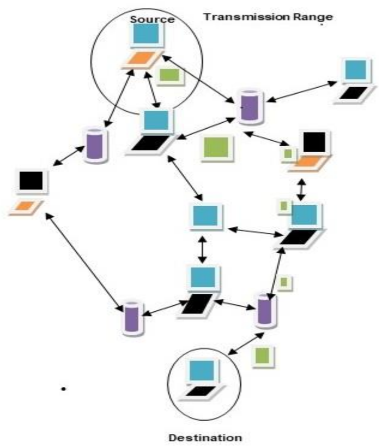

Figure 1: Mobile ad-hoc network

2. ROUTING PROTOCOLS

2.1 Hybrid Routing Protocol (HRP)

HRP uses the zone idea for routing, so the routes discovered its fast, and it is a hybrid routing protocol that combines reactive and proactive routing protocol characteristics. ZRP is one example of a hybrid routing protocol.

2.2 On-Demand Routing Protocol

RREQ packets are sent by sender nodes to find receiver target nodes, and then the connection is made and the data transferred. Reactive routing systems like AODV and DSR (Dynamic Source Routing) are examples [18].

2.3 Table driven Routing Protocol (TDRP)

TDRP methods are sometimes known as table-driven protocols. Proactive routing methods save routing table information on each node. Table-driven routing protocols carry data packets based on a routing table path. Because the whole path must be calculated before forwarding data, table-driven routing methods have the highest minimum latency and routing overhead. A couple of examples include Wireless Routing Protocol and DSD [8].

3. LITERATURE SURVEY

[1] DREAM Multipath Routing (DMR) in MANET was proposed by Kamlesh Chandravanshi *et al.* The DREAM protocol boosts the performance of routing by tracking mobile nodes' whereabouts. The DREAM protocol decreases network time and cost. The DMR route presented outperforms the AOMDV route. Location data updated with node mobility speed. Flooding of routing packets is minimized, and node migration is calculated. Package flooding happens at the intended destination. The DREAM operates on every node network, which changes continually. Every node saves the location. Routing packets is minimized during Flooding, and node migration is calculated. Package flooding happens at the intended destination. The DREAM operates on every node in the network, which changes continually.

[2] Anindya Kumar Biswas et al. (2020) developed a secure routing (hybrid) protocol. For route establishment, this protocol used both proactive and reactive strategies. The spanning (minimum) tree and MANET architecture are constructed proactively in this protocol. Furthermore, M-S-T, which is gathered in the proactive section, is used to build data transmission networks.

[3] Omar Barki presented A survey study of a collection of procedures and tools *et al.* (2020). It was about the OLSR protocol adjustments that improved the MPR selection method. It also boosted the network's durability by allowing network nodes to exchange more reliable data for extended amounts of time.

[4]. The HAODV approach was proposed by Ankur Goyal et al. (2021). The MFR methodology is used in this strategy to find the shortest path. The MFR mechanism was used to find the best route; meanwhile HAODV was used to find the adjacent node. The Firefly algorithm is also used in the HAODV to identify the shortest route premised on the dynamic equation.

[5]. Abdul Majid Soomro et al. presented a hybrid strategy for route finding mechanism in the year 2022. In terms of speed variations, a minimum link breakage was proposed, which determines an efficient communication path in a normal-to-disaster situation. This is relied on the MPR nodes' distance values. The suggested approach uses MPR node distance values as the basic metric for selecting routes that lessen route failure and connection breakage.

[6] To improve MANET routing protocols, Ahmed Adnan Had *et al.* (2022) suggested a hybrid edition of the swarm optimization form. The proposed optimization determines the MANET networks' ideal parameters. Cat Swarm Optimization and Particle Swarm Optimization are combined in this model.

[7]. Mostafa E. A. Ibrahim *et al.* (2022) presented a WSN routing protocol that saves energy. To select the ideal route, the suggested protocol considers the energy level of sensor nodes as well as the distance to the base station. Data aggregation is also used in the plan to increase energy efficiency and save communication costs. Finally, the analysis revealed that in terms of overall energy consumption, stability period, and network endurance, the offered routing protocol excels.

[8] The HRP was proposed by S.R. Biradar *et al.* in 2008. (Hybrid Routing Protocol) It combines the benefits of proactive and reactive routing methods in a single solution. The results of the HRP are compared to proactive and reactive methods. They presented the results of simulations of networks with 50 mobile nodes using the ns-2 network simulator. The authors used the most prevalent MANET routing protocols, DSDV and DSR, to conduct their research. DSDV is preferable for heavy traffic, while DSR and HRP perform moderately in low traffic, they discovered during the investigation. Overall, HRP outperforms DSDV, with DSR claiming the top spot.

[9] Anupam Kumar Sharma *et al.* examined the AODVDR, ZRP and AODV protocol implementation based on the pause time (PT) vs. average end-to-end (E-T-E)) latency and PT versus PDR. In simulations, ZRP beats AODVDR, and AODV. Use AODVDR when the network has less than 25% nodes. However, AODVDR outperforms the further 2-routing methods when the connections of network exceed 40% of total nodes. It is tough to say which protocol is the best performer when network connections range from 25% to 40%.

[10] Ranjana R Nair improved the MANET hybrid routing protocol through appropriate design to increase node mobility and power management. This innovative method to routing in MANETs is based on the notion of polymorphic behavior and allows mobile nodes to operate the routing procedure selectively based on their existing condition. The proposed THRP protocol outperforms the existing ZRP performance. The THRP's security system, particularly for military applications, must be strengthened as well.

[11] Bhabani Sankar Gouda and colleagues compared the performance of DSR, ZRP, and AODV with varying pause

time. The DSR outperforms ZRP, and AODV routing protocols in terms of data transmit, receive, data drop, PDR, and NRL. RAODV has the greatest normalised routing load, whereas ZRP has the highest packet delivery ratio. Bytes Received and First Packet Received.

[12] Priyanka Sarkar *et al.* introduced DSR, GZRP, and AOMDV in 2014. Control overhead, packet delivery, and end-to-end latency are all factors in performance. The final findings reveal that GZRP is extremely successful for network fault tolerance and load balancing.

[13] Dong-Won Kum *et al.* suggested MAHR in 2012. Although reactive AODV routing is the usual protocol for a node. The MAHR outperforms AODV, Tooska design and OLSR routing protocols in terms of PDR, throughput and NRL. By combining reactive and proactive routing, MAHR performed very well.

[14] To compare, DSR, FSR and AODV, Avni Khatkar et al. used three performance indicators in 2012: PDR, E-to-E latency and throughput (average). Its PDR outperforms other routing algorithms with varying node counts. ZRP has a lower average end-to-end delay than other routing protocols with different node counts. Finally, based on the afore mentioned analysis, hybrid routing protocols for ad hoc networks outperform AODV, DSR, and other routing protocols.

[15] According to S. Gandhi *et al.* (2012), under unique mobility situations caused by the chaotic Waypoint form, hybrid routing protocol outperforms DSDV and AODV. The three-routing protocol's performance is compared in terms of PDR, throughput, E-E latency, and NRL. This cram's main goal is to assess the popular MANET routing protocol [9].

[16] DSDV and ZRP under Random Waypoint model. The 3 different RP recitals are unhurried using PDR, throughput, E-E latency, and NRL. This study's main goal is to analyse the performance of the popular MANET routing technology. Mi-Seon Kang et al. developed an MAHR where center nodes depending on the number of changing neighbors per node.

[17] By lowering the amount of control packets delivered while ZRP searches for new routes, Sree Ranga Raju et al. reduced network strain. For MANET interacting in urban terrain, the second technique aims to enhance query control performance (ZRP). It gathers paths to targets ahead of the forwarding zone reactively while maintaining routing information for a local area. This hybrid routing outperforms ZRP. But without suitable query control mechanisms, the ZRP cannot reduce control traffic.

[18] Annapurna P. Patil *et al.* (2010) used the described network simulator NS2 to simulate the routing protocols AODV and ZRP. The network performance measures of convergence time, packet delivery ratio, and turnout are used to assess these two protocols. Its ZRP was not up to the challenge and it failed all simulation sequences, eliminating it from the competition. Specifically, ZRP has a much lower packet delivery ratio and turnout than AODV. AODV converges faster than ZRP. The results also provide an opportunity to go deeper into the ZRP protocol and discover an algorithmic rule that enhances ZRP performance.

4. PROBLEM STATEMENT

Sudden node link breakdowns are a major concern with MANET. Finding and reviving methods take a lot of time and Degradation in network performance will continue. When a pathway is segmented, data packets are extinct or late until the route is repaired, causing transmission to be disrupted. A preliminary route decision is made prior to the knowledge transfer and does not ensure data delivery. Not understanding that a location requires additional energy and time to detect and enlist a pathway. Mobile networks have their random architecture since we can't validate the placement of nodes.

5. PROPOSED APPROACH

IHRP aims to use the advantages of reactive and proactive routing protocols. Using proactive and reactive protocol techniques for route identification can help minimize floods and save time. Network predictability is harmed by flooding. Route-finding should be accomplished swiftly to avoid floods. The IHRP protocol addresses flooding by combining AOMDV, DMR, OLSR and AODV with network situation-based routing adaptation. The technique is based on a hypothetical energy use situation. AODV is superior for network load balancing and congestion control in dynamic situations (with more node mobility), whereas OLSR is preferable for constant networks with highest link fixture-based routing. DREAM Multipath Routing (DMR) keeps track of node location and mobility. Building the IHRP routing protocol employing the above protocols efficiently handles network behaviour with higher performance in all conditions (AODV, AOMDV, and OLSR). Node migration is assessed, and route packet flooding is avoided. The DMR operates on each of the network's nodes, which vary continually. Each and every node stores the catastasis of all the network nodes in its vicinity. This packet is sent out to detect a pathway from the origin to the target. The choice of routing protocol is based on the network's state. This is handled by the AODV protocol, which finds the shortest path between the communicator nodes. To identify a route and transport data faster than 10 M/sec, an OLSR routing protocol is utilized. The proposed IHRP uses the AOMDV routing protocol to control network load and alleviate congestion. If any installed link is finding out as keeping an oversize load on the network, several channels are developed to handle or balance the network load (i.e., higher use of resources). Reactive and proactive protocols are used to guarantee that node relocation does not affect network performance.

Re-transmission rate, NRL, and E-to-E latency is lower compared to MANET's available hybrid routing protocol, while PDR, network throughput and data transmission rate, are increased.

The sender sends the Route Request Packet (RREQ) to locate the target (T) in the network. If the sender (S) finds the destination, it keeps the node's energy, speed, and direction (T). Continue broadcasting the RREQ packet to neighbours until the target is not discovered, then record the node's movement, speed, and energy, along with its direction of travel. The sender (S) node chooses a routing protocol after storing node information (OLSR or AODV). If node movement is greater than ten (10) M/S (indicating node engagement in the network is improbable), AODV is picked since it has the property to control this status. The RREP data packet is transmitted to the sender node once the destination node picks a routing protocol. Following connection setup, it will decide on a single path route and check for congestion in the node. If the node is congested, the AOMDV routing protocol is used to clear it, and data is transferred from source to destination to finish the transmission. If the movement of the node is less than 10 M/S, the node movement determines the routing protocol. So, they picked OLSR as their proactive routing protocol. After selecting a routing protocol, the RREP packets sent by the target node to the origin to establish a connection. It will then decide on a single-path route and check for congestion. The AOMDV routing protocol resolves congestion by moving data from source to destination and terminating transmission, or by sending data packets straight from source to target and terminating transmission.

```
Total Mobile Nodes = NNn
 Source nodes = Sn //Sn € NNn
Set Destination Nodes = Dn // Rn € NNn
Intermediate Nodes = (NNn - (Sn + Dn ) ) = In
Movement of Nodes = Mn //Mn € NNn
Next Hope  = Hn
Routing Protocol =ZRP, AODV, AOMDV, OLSR
Location Protocol=DMR
Congestion on Nodes = Cn
Route Table = Tr
Data packets = Pd
Routing (Hybrid) = IHRP
Simulation time Start = t0
Simulation Time End = tn
Node Radio Range = NRRange; //Initialize 250meters

DMR Broadcast RREQ (NR Range, S, R)
{
If ((RRange <=550) && (Next_hop information == True)//
Next hop available
{
Hn to RREQ by Sn
Tr1->insert (Tr-1->Hn); //
Hn  to RREQ to Dn;
Tr- 2 …… …… …….
Tr-n ->insert(Tr-n -> Hn); //
Hn to RREQ d Dn
RREP In to S n || RREP In +1 to In
if (Destinatio==Found)
{
 Store Location and Speed of Nodes coordinate value)
with Tr1;
Pd (Sn, Hn, Dn) //
Sn, Dn , In Maintain Location through DREAM;
}
else
{
Forward RREQ packets and receive RREP till destination
is not found
}
Selection of routing protocol//

If (Mn > 10%)
{
Use AODV routing protocol//
aodv_Path*
aodv_retu_entry::path_findMinHop(void)
{
aodv_Path*p=retu_path_list.lh_first;
aodv_Path*path=NULL;
u_int16_t min_hopcount = 0xffff;
for(;p;p=p->path_link.le_next){
if (p->hopcount < min_hopcount){ path = p; min_hopcount
=p->hopcount;
}
}
AODV Broadcast RREQ (S, R, NRRange)
{
If ((RRange <=550) && (Next_hop information == True)//
Next hop available
{

Hn to RREQ by Sn
Tr1->insert (Tr-1->Hn); //
Hn  to RREQ to Dn;
Tr- 2 …… …… …….
Tr-n ->insert(Tr-n -> Hn); //
Hn to RREQ d Dn
RREP In to S n || RREP In +1 to In
If(Cn)
{
Use AOMDV
Forwarding the data packet from source to end
Else
{
 Transmit the data from source to destination
}
}
Else
{
 If (Mn <= 10%)
{
 Use OLSR routing protocol//
OLSR Broadcast RREQ (S, R, NRRange)
{
If ((RRange <=550) && (Next_hop information == True)//
Next hop available
{
Hn to RREQ by Sn
Tr1->insert (Tr-1->Hn); //
Hn  to RREQ to Dn;
Tr- 2 …… …… …….
Tr-n ->insert(Tr-n -> Hn); //
Hn to RREQ d Dn
RREP In to S n || RREP In +1 to In
```

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Research Article | Volume 11, Issue 1 | Pages 15-24 | e-ISSN: 2347-470X

```
 If (Cn)
{
Use AOMDV routing protocol
Transmit the data from source to destination

                    Else
{
 Transmit the data from source to destination
}
              }
            }
        }
```

Our implementation founded on:

Packet delivery ratio (PDR)
In other words, the ratio of actual packets received by destination nodes to total packets given by origin nodes.

End to End Delay (E-E-D)
In **(E-E-D)**, the total wait is determined from the origin to the destination.

Routing load
Routing load is the number of supporting control packets provided to each data packet's destination.

Throughput
The number of packets transferred to the destination node is referred to as throughput.

6. SIMULATION PARAMETERS

Table 1 lists the simulation restrictions for building the routing protocol image. Simulator-2 (2.31) [19] is used for the thorough simulation model.

Table 1: Simulation Parameters

Parameters	Configuration Value
Routing Protocol	IHRP, ZRP, AOMDV, AODV, OLSR
Simulation Area	800*800
Network Type	MANET
Nodes/Devices	50, 100
Physical Medium	Wireless
Node Movement	Random
Simulation Iteration	100
Queue Length	10
MAC Layer	MAC 802.11
Traffic Type	CBR, FTP
Propagation radio model	Two ray ground
Rate	Random

6.1 Simulation Results for 100 Nodes

6.1.1 Data Send Analysis

Figure 2 represents the data send analysis for IHRP, ZRP, AOMDV, AODV, and OLSR routing protocols. The data send performance of IHRP, ZRP, AOMDV, AODV, and OLSR is 11513, 10240, 10225, 10558, and 9184, respectively. Here we clearly show that the maximum number of data packets sent was 11513 by **IHRP,** where both IHRP and ZRP included reactive and proactive routing protocol characteristics. So, compared to ZRP, AOMDV, AODV, and OLSR routing protocols, IHRP has a faster data transmission rate. In *figure 2***,** the colors cyan, purple, blue, red, and green describe the performance of IHRP, ZRP, AOMDV, AODV, and OLSR routing protocols, respectively.

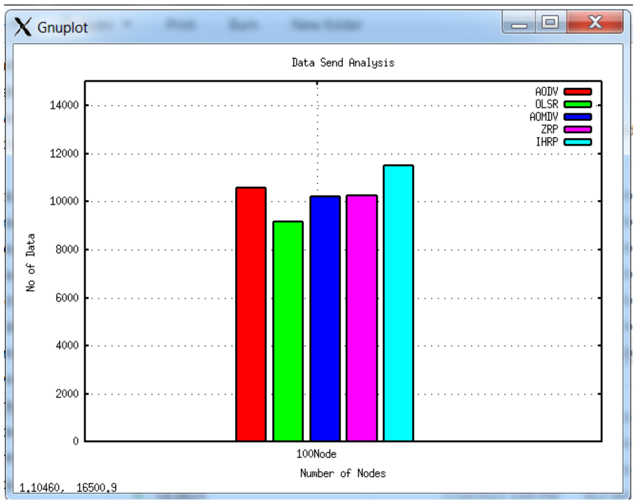

Figure 2: "Data Send" Analysis for IHRP, ZRP, AOMDV, AODV and OLSR

6.2.2 Data Receive Analysis

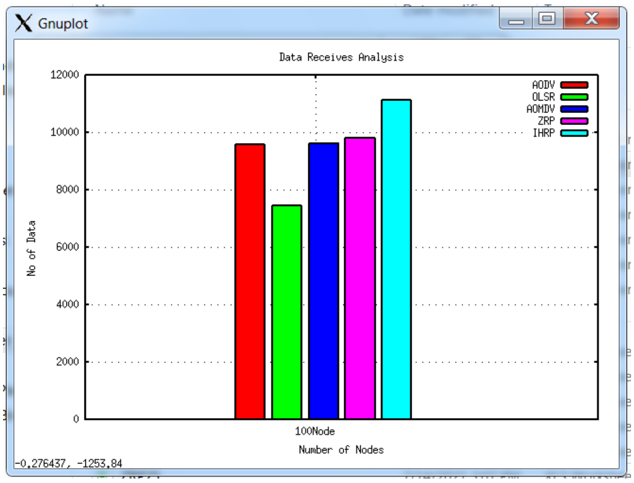

Figure 3: "Data Receive" Analysis for IHRP, ZRP, AOMDV, AODV and OLSR

Figure 3 represents the **data received** for IHRP, ZRP, AOMDV, AODV, and OLSR. The performances of IHRP, ZRP, AOMDV, AODV, and OLSR for **data received** are 11151, 9807, 9636, 9586, and 7470, respectively. The maximum data received is 11151 **by IHRP**. So, we can say that the **IHRP** data receiving rate is much better than ZRP, AOMDV, AODV, and OLSR.

Research Article | Volume 11, Issue 1 | Pages 15-24 | e-ISSN: 2347-470X

6.1.3 Packet Drop Analysis

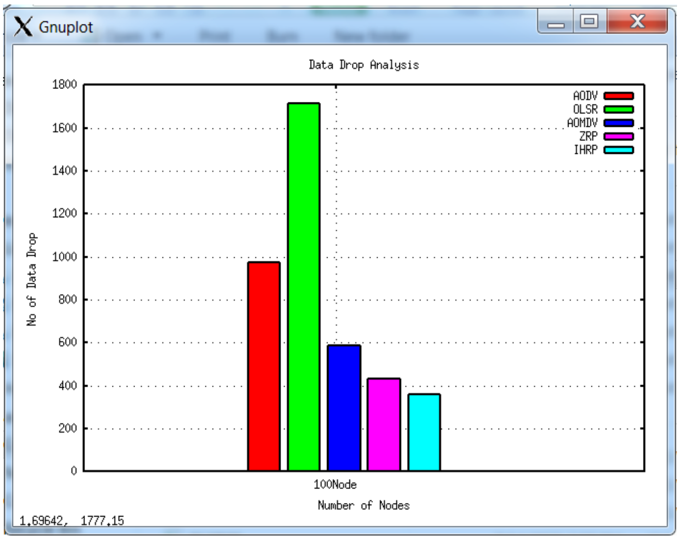

Figure 4: "Packet Drop" Analysis for IHRP, ZRP, AOMDV, AODV and OLSR

AOMDV, AODV, and OLSR are shown in *figure 4*. Any routing protocol that drops the fewest packets is better to all others. IHRP drops data packets at a rate of 362 per second, which is better than the above-mentioned routing system. In the aforementioned scenario, IHRP outperforms IHRP, ZRP, AOMDV, AODV, and OLSR Routing Protocols.

6.1.4 Packet Delivery Ratio Analysis

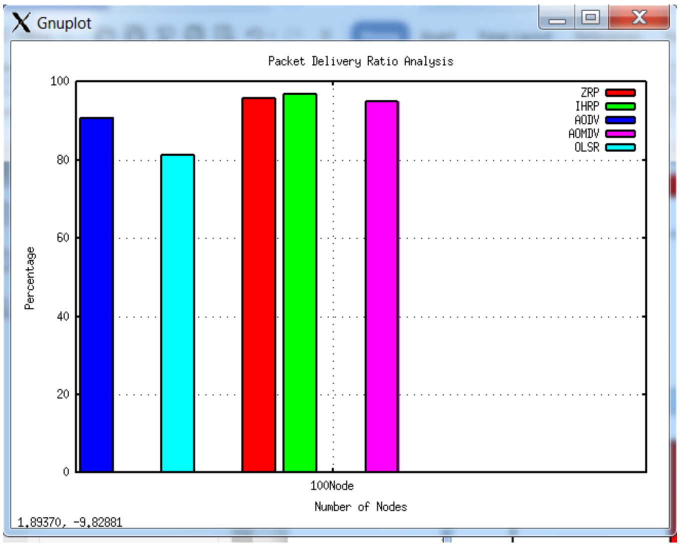

Figure 5: "Packet Delivery Ratio" Analysis for AOMDV, AODV, IHRP, OLSR and ZRP

An IHRP, ZRP, AOMDV, AODV and OLSR PDR study. The IHRP has a PDR of 96.86 percent, compared to 95.77 percent for ZRP, 94.85 percent for AOMDV, 90.79 percent for AODV, and 81.34 percent for OLSR.

6.1.5 Throughput Analysis

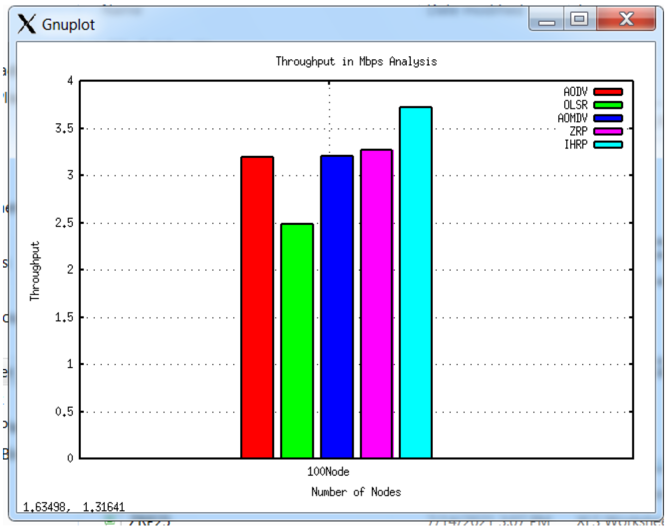

Figure 6: "Throughput" Analysis for IHRP, ZRP, AOMDV, AODV and OLSR

Figure 6 depicts the IHRP, ZRP, AOMDV, AODV, and OLSR throughput analyses. We can see that IHRP performs better in terms of throughput than ZRP, with a score of 3.53.

6.1.6 Normal Routing Load

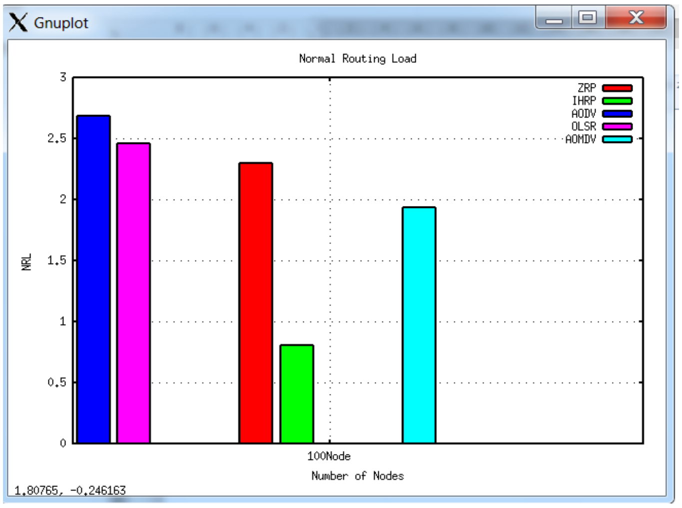

Figure 7: "Normal Routing Load" Analysis for AOMDV, ZRP, AODV, OLSR and IHRP

AOMDV, AODV, and OLSR Normal Routing Load analysis is shown in *figure 7*. According to the graph above, the performance of IHRP in terms of Normal Routing Load is 0.81, compared to 2.04 for ZRP, 1.94 for AOMDV, 2.69 for AODV, and 2.46 for OLSR.

6.1.7 Average End-to-End Delay (ms) Analysis

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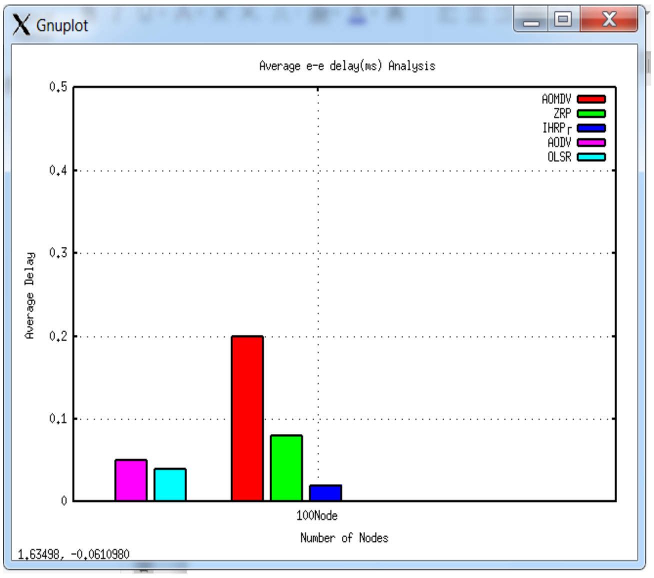

Figure 8: "Average End to End Delay" Analysis for IHRP, ZRP, AOMDV, AODV and OLSR

In *figure 8* the **E-to-E Delay (Average) is** 0.02 **by IHRP is very little as compared to** ZRP, AOMDV, AODV, and OLSR. In the above scenario, IHRP outperforms ZRP, AOMDV, AODV, and OLSR.

Table 2: Overall Summery of Performance of 100 NODES Matric

S.No	Parameter	IHRP	ZRP	AOMDV	AODV	OLSR
1	Data Send	11513	10240	10225	10558	9184
2	Data Receive	11151	9807	9636	9586	7470
3	Packet Drop	362	433	589	972	1714
4	Pdr	96.86	95.77	94.85	90.79	81.34
5	Through-put	3.72	3.27	3.21	3.2	2.49
6	Nrl	0.81	2.04	1.94	2.69	2.46
7	Delay	0.02	0.08	0.2	0.05	0.04

6.2 Simulation Results for 50 Nodes

6.2.1 Data Send Analysis

Figure 9 represents the data send analysis for IHRP, ZRP, AOMDV, AODV, and OLSR routing protocols. The performance of IHRP, ZRP, AOMDV, AODV, and OLSR for data send is 9791, 9395, 9047, 7837, and 7574, respectively. Here we clearly show that the **IHRP is sent 9791** maximum packets. Thus, IHRP has a faster data transfer rate than ZRP, AOMDV, AODV, and OLSR routing protocols.

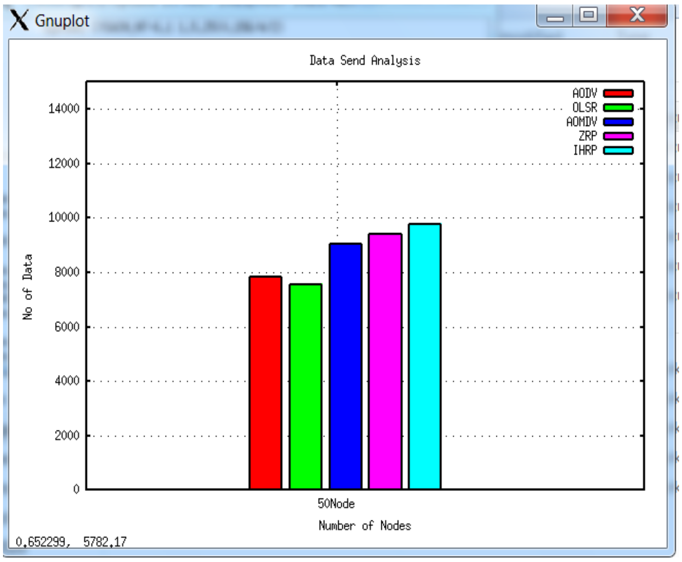

Figure 9: "Data Send Analysis" Analysis for IHRP, ZRP, AOMDV, AODV and OLSR

6.2.2 Data Receive Analysis

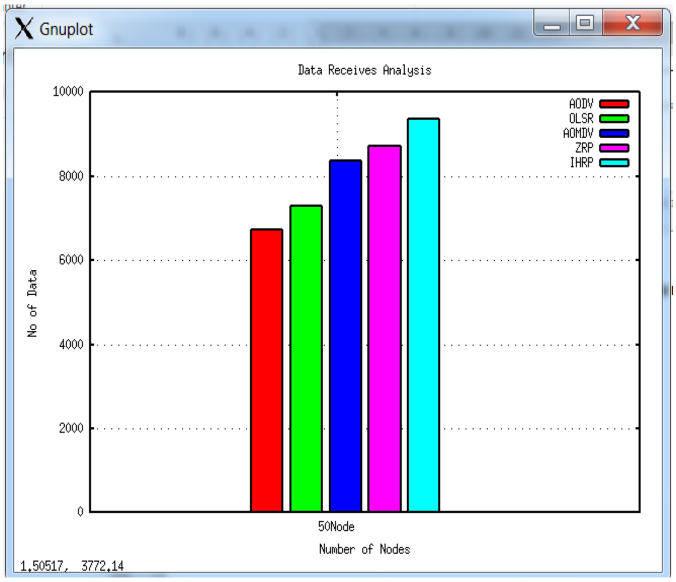

Figure 10: "Data Receive" Analysis for IHRP, ZRP, AOMDV, AODV and OLSR

Figure 10 represents the **data received** for IHRP, ZRP, AOMDV, AODV, and OLSR. The Performance of IHRP, ZRP, AOMDV, AODV and OLSR for **data receive** are 9367, 8714, 8370, 6730 and 7298 respectively. The maximum number of data packet received is 9367 **by IHRP**. So IHRP receives data faster than ZRP, AOMDV, AODV, and OLSR.

6.2.3 Packet Drop Analysis

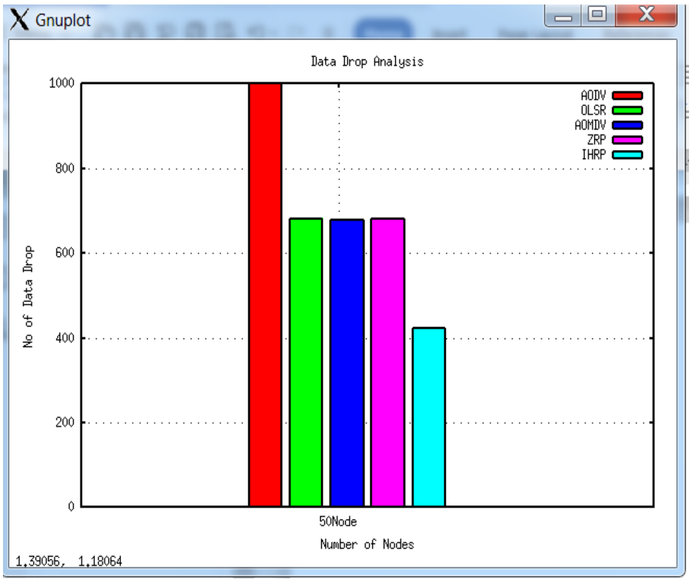

Figure 11: "Packet Drop" Analysis for IHRP, ZRP, AOMDV, AODV and OLSR

In *figure 11*, the minimum number of **data packet drops** is 424 **by IHRP**. The Improved Hybrid Routing Protocol outperforms ZRP, AOMDV, AODV, and OLSR. In the case of data dropping, the performance of ZRP, AOMDV, AODV, and OLSR Routing Protocols is 681, 677, 1107, and 682, respectively.

6.2.4 Packet Delivery Ratio Analysis (PDR)

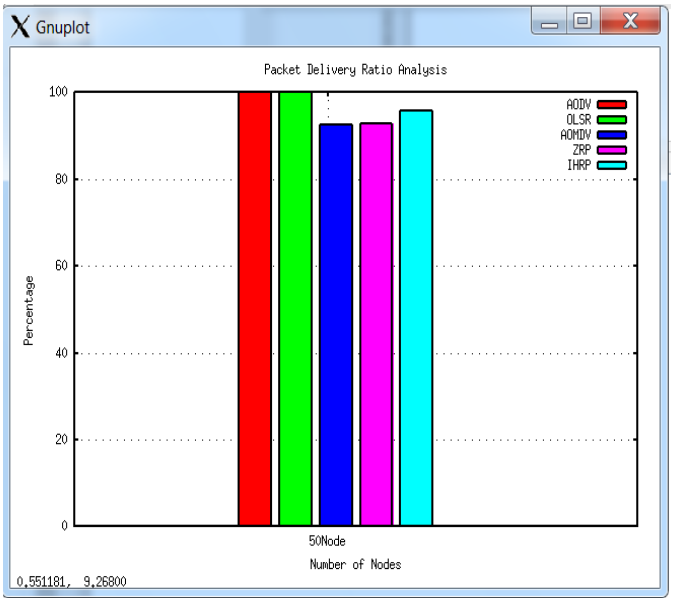

Figure 12: "Packet Delivery Ratio" Analysis for AOMDV, AODV, IHRP, OLSR and ZRP

In *figure 12* the **PDR is** 95.67% **by IHRP**, ZRP is 92.75%, AOMDV is 92.52%, AODV is 85.87% and 91.45% by OLSR, and thus, the IHRP has a greater PDR than the other routing methods.

6.2.5 Throughput Analysis

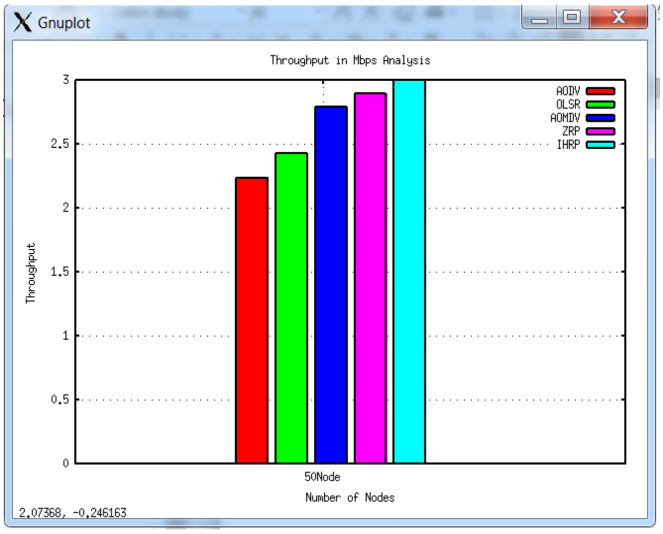

Figure 13: "Throughput" Analysis for IHRP, ZRP, AOMDV, AODV and OLSR

The **Throughput** analysis for IHRP, ZRP, AOMDV, AODV, and OLSR is shown in **Figure 13.** 3.12, 2.9, 2.79, 2.24 and 2.43 respectively. Here we clearly show that **the performance of IHRP** in terms of throughput is higher, i.e., 3.12, So, in terms of Throughput, IHRP outperforms ZRP, AOMDV, AODV, and OLSR.

6.2.6 Normal Routing Load (NRL)

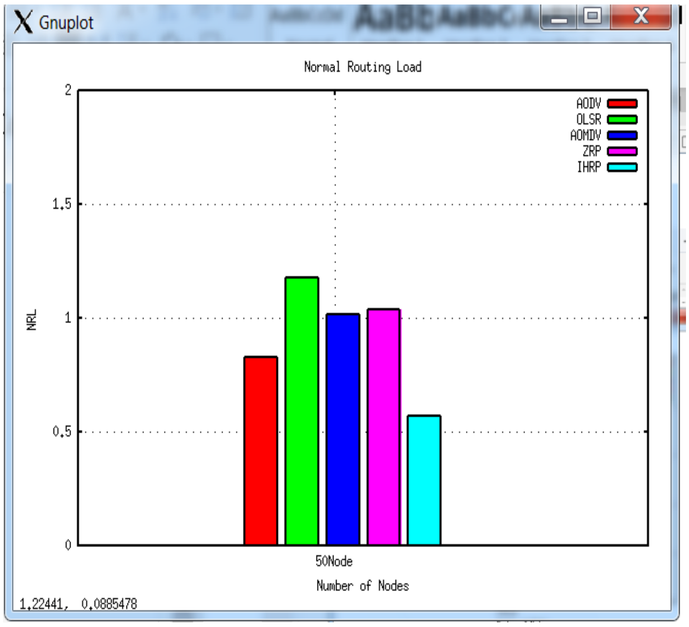

Figure 14: "Normal Routing Load" Analysis for IHRP, AOMDV, ZRP, AODV OLSR and ZRP

In the above *figure 14*, Normal Routing Load is 0.57 for IHRP, 1.04 for ZRP, 1.02 for AOMDV, 0.83 for AODV, 1.18 for OLSR, and 4.72 for ZRP.

6.2.7 End-to-End "Delay Average" (ms) Analysis

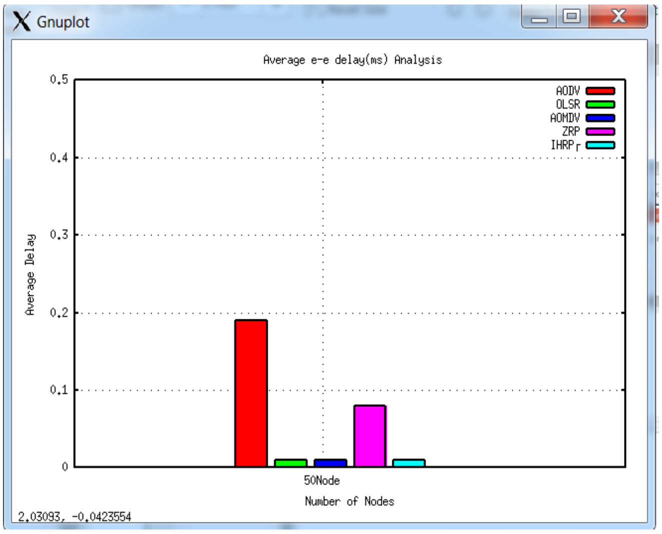

Figure 15: "E-to E Delay (Average)" Analysis of IHRP, ZRP, AOMDV, AODV and OLSR

In the *figure 15* IHRP has an E-to-E delay (Average) of 0.01 collated to AOMDV, ZRP, OLSR and AODV. So, in the above scenario, the execution of **IHRP** is preferential than AOMDV, AODV, ZRP and OLSR Routing Protocol

Table 3: Overall Summery of Performance of 50 NODES Metric

S.No	Parameter	IHRP	ZRP	AOMDV	AODV	OLSR
1	Data Send	9791	9395	9047	7837	7574
2	Data Receive	9367	8714	8370	6730	7298
3	Packet Drop	424	681	677	1107	682
4	Pdr	95.67	92.75	92.52	85.87	91.45
5	Through-put	3.12	2.9	2.79	2.24	2.43
6	Nrl	0.57	1.04	1.02	0.83	1.18
7	Delay	0.01	0.08	0.01	0.19	0.01

7. CONCLUSION AND FUTURE WORKS

An ad-hoc wireless network that works without a fixed base station. The most critical MANET problem is abrupt link failure. Due to this difficulty, we must restore the connection by sending RREQ and RREP. As a result, network performance suffers. We utilized scenario routing to merge the DMR, AOMDV OLSR, and AODV routing protocols to build the IHRP routing protocol. The simulation was run on Network Simulator 2.31. In Improved Hybrid Routing Protocol (IHRP), reactive procedures include AOMDV, AODV, and DMR, whereas proactive treatments include OLSR. Routing costs are lowered, packet loss is minimized, and data packet responsiveness is improved. To reduce network overhead, all MANET nodes keep track of other nodes' movements and positions. The nodes deliver data packets instead of routing packets. PDR is improved due to better network packets. Routing speed improves and reduces unnecessary waste in multipath routing. Mobility and position undoubtedly helped routing. It also enabled low-cost destination discovery. The Improved Hybrid Routing Protocol (IHRP) outperforms ZRP, AOMDV, AODV, and OLSR routing protocols (data send, data receive, data drop, PDR, throughput, E-E latency, and NRL). Mobility and location can also be used to find rogue or hostile network nodes. If a security system identifies the attacking node, it can determine the attacker's location and mobility (s). In a MANET, mobility and location routing help defend and detect attacker nodes.

REFERENCES

[1] Gaurav Soni , Kamlesh Chandravanshi , Deepak Tomar , Mahendra Kumar Jhariya "A Multipath Location based Hybrid DMR Protocol in MANET",3rd International Conference on Emerging Technologies in Computer Engineering: Machine Learning and Internet of Things (ICETCE-2020), (IEEE Conference Record # 48199), 07-08 February 2020.

[2] Anindya Kumar Biswas, Mou Dasgupta, "A Secure Hybrid Routing Protocol for Mobile Ad-Hoc Networks (MANETs)", 11th ICCCNT, IIT – Kharagpur, IEEE – 2020.

[3] Omar Barki, Zouhair Guennoun, Adnane Addaim, "Improving the selection of mprs in OLSR protocol: a survey of methods and techniques", International Journal of Electrical and Computer Engineering (IJECE), Vol. 10, No. 1, ISSN: 2088-8708, pp. 288~295, February 2020.

[4] Ankur Goyal, Vivek Kumar Sharma, Sandeep Kumar and Ramesh Chandra Poonia, "hybrid aodv: an efficient routing protocol for manet using mfr and firefly optimization technique", journal of interconnection networks,vol. 21, no. 01, 2150004, 2021.

[5] Abdul Majid Soomro, Mohd Farhan Bin Fudzee, Muzamil Hussain and Hafiz Muhammad Saim, "A Hybrid Routing Approach Comparison with AODV Protocol Regarding Speed for Disaster Management in MANET", Journal of Computer Science 18 (3): 204.213 DOI: 10.3844/jcssp.2022.204.213, 2022.

[6] Ahmed Adnan Had, Seyed Vahab AL-Din Makki, "mproved MANET Routing Protocols Performance by Using Hybrid Cat and Particle Swarm Optimization (CPSO)", Webology, Volume 19, DOI: 10.14704/WEB/V19I1/WEB19148, Number 1, January, 2022.

[7] Mostafa E. A. Ibrahim, Alaa E. S. Ahmed, "Energy-aware intelligent hybrid routing protocol for wireless sensor networks", https://doi.org/10.1002/cpe.6601, 12 September 2021.

[8] S.R. Biradar, Hiren Kumar Deva Sarma, Subir KUlrar Sarkar, Puttamadappa C, "Hybrid (Day Night) Routing Protocol for Mobile Ad-Hoc Networks", IEEE -Proceedings of International Conference on Microwave – 08, 978-1-4244-2690-4444/08/$25.00, 2008.

[9] Anupam Kumar Sharma, Munesh Chandra Trivedi, "Performance Comparison of AODV, ZRP and AODVDR Routing Protocols in MANET", IEEE, Second International Conference on Computational Intelligence & Communication Technology, 201

[10] Ranjana R Nair, S Indira Gandhi, "Performance Analysis Of Threshold Based Hybrid Routing Protocol For Manet", IEEE-3rd International Conference on Signal Processing, Communication and Networking (ICSCN), 2015.

[11] Bhabani Sankar Gouda, Debasis Patro, Rabindra Kumar Shial, "Scenario-Based Performance Evaluation of Proactive, Reactive and Hybrid Routing Protocols in MANET using Random Waypoint Model", IEEE-13th International Conference on Information Technology 978-1-4799-8084-0/14 $31.00, 2014

[12] Priyanka Sarkar and Hrituparna Paul, "Comparative Performance Analysis of GZRP, AOMDV and DSR in MANETS", IEEE Xplore, March 08, 2014.

International Journal of
Electrical and Electronics Research (IJEER)
Research Article | Volume 11, Issue 1 | Pages 15-24 | e-ISSN: 2347-470X

[13] Dong-Won Kum+, Won-Kyeong Seo, Jae-In Choi, and You-Ze Cho, “Mobility Adaptive Hybrid Routing for Mobile Ad hoc Networks”, IEEE-978-1-4673-0089-6/12/$26.00, 2012

[14] Avni Khatkar, Yudhvir Singh, “Performance Evaluation of Hybrid Routing Protocols in Mobile Adhoc Networks”, IEEE-Second International Conference on Advanced Computing & Communication Technologies, 978-0-7695-4640-7/12 $26.00, DOI 10.1109/ACCT.2012.86, 2012.

[15] Savita Gandhi, Nirbhay Chaubey, Naren Tada, Srushti Trivedi, “Scenario-based Performance Comparison of Reactive, Proactive & Hybrid Protocols in MANET”, IEEE- International Conference on Computer Communication and Informatics (ICCCI -2012), Coimbatore, INDIA, 978-1-4577-1583-9/ 12 , Jan. 10 – 12, 2012.

[16] Dr. M. V. Rajesh, P V V S Srinivas, and A. Lakshmanarao (2022), Intensive Analysis of Routing Algorithm Detection over Mobile Ad hoc Network Using Machine Learning. IJEER 10(4), 963-968. DOI: 10.37391/IJEER.100435.

[17] Sree Ranga Raju, Jitendranath Mungara, “A Unified Approach to Enhance the Performance of ZRP for MANETs on an Urban Terrain”, IEEE -978-1-4244-6789-1110, 2010.

[18] Annapurna P Patil, Harish.R, “Comparing the Performance of reactive and Hybrid protocols in MANETs using Convergence Time”, IEEE -978-1-4244-7202-4/10, 2010.

[19] G. Vinoda Reddy, Kavitha Thandapani, N. C. Sendhilkumar, C. Senthilkumar, S. V. Hemanth, S. Manthandi Periannasamy and D. Hemanand (2022), Optimizing QoS-Based Clustering Using a Multi-Hop with Single Cluster Communication for Efficient Packet Routing. IJEER 10(2), 69-73. DOI: 10.37391/IJEER.100203.