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Enhancement of Routing Discovery and Data Sending Efficiency using Hybrid Based Approach

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ABSTRACT

Ad Hoc on demand distance vector (AODV) routing protocol is important in the direction of wireless sensor networks. AODV protocol has improved the Quality of service issues of wireless networks, as wireless networks suffers from the starting time when the researches being studied this network. Many protocols like TCP, UDP fails to provide the quality of service to end wireless devices. We proposed an enhanced version of hybrid algorithm that make from ACO-PSO algorithm which include AODV protocol features. This hybrid approach has been complete the same requirement that does biological ants. The biological ant searches the food on the basis of pheromone and we utilized the same idea in our algorithm. In our hybrid approach, the hello packet searches the link breakdown status and then intimate the node to send the data before it makes clear all the route direction means other possibilities. Now, Route request packet has propagate to the network for discover the route in the inter-zone network. The Route Reply packet holds the information like hop count, status of current route and number of nodes present on the network. This status provided by all the nodes. We also proposed the PSO algorithm (include in Hybrid approach) that specify the location/movement of every node. The simulation results show that our hybrid approach outperforms the AODV and ACO-PSO based routing algorithms.

Keywords-- biological, provided, frequency

I. INTRODUCTION

In recent years, the boom of wireless devices in any region like Asia-Pacific, Europe and other well noted regions because they cannot provide any infrastructure. The requirement of wireless infrastructure is very less as it required wireless node and Access point. The wireless should be any mobile or cellular device, laptop, PDA and any wireless equipment transmit/received the data. Unfortunately, there are some of disadvantages like energy consumption, delay, interference and noise related problems. We were solved these problem via proposed hybrid approach that has discussed in section 3.

The reactive protocols were very prevalent in the case of networking terminology, as these protocols capable to find the best route and if any failure occurred or route distraction then it is the concern of the protocol to detect the subsequent direct path on the parameters like weight, time, hop based selection and many more [14]. In this paper, we were select the best protocol out of performing reactive and proactive protocol in the reference of [16], i.e. AODV protocol. The AODV protocol stored the routing information on every course of transmission and necessary changes required by the node, provided information to the central or cluster Head node.

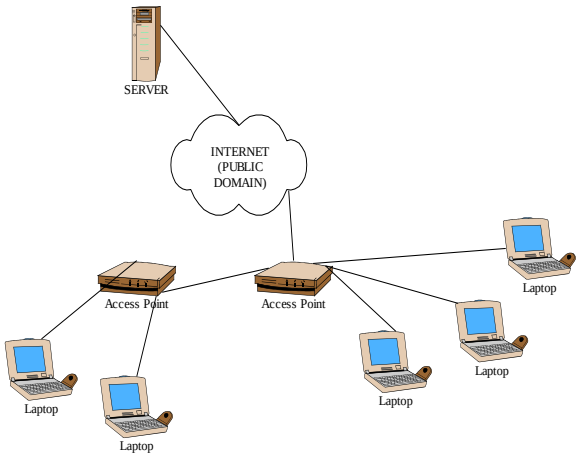

Figure 1:Wireless Network Environment [14]

The contribution of this paper has summarized:
1. We modified the PSO-ACO based algorithm to improve the routing functionality, session establishment and detect the path breakage.
2. We evaluate the routing method to choose the best route to ensure the delivery of data.
3. We enhanced the previous method and to improve the wireless link from uncertainty transmission loss.
4. We analyzed the parameters like channel impulse response and noise.

5. We have to compare the existing and proposed approach.

II. LITERATURE SURVEY

Numbers of protocols were developed to ease the routing capability in wireless networks. These protocols were categorized as Proactive, Reactive and Hybrid protocols [15]. These routing protocols had maintained the routing table and guaranteed to give the reliable path to every node in the network. The proactive protocols remove the unused path from routing table space so that node looks only the consistent path. This proactive path has worked on real time application because it has low end to end delay. Another protocol was Reactive protocol that behaved like on demand routing, when node wants to communicate then first of all reliable route was finalized before any transmission goes. This protocol has own advantages like low routing overhead, improve delay parameters. Last protocol was hybrid protocol [17] that contains the mixed functionalities of Reactive and Proactive protocols. In the hybrid protocol, the total network load distributed in all of the nodes and suitable for inter-zone routing for proactive and inter-zone routing for reactive protocol. These protocol has used in sensor devices where we found the energy consumption related parameters. Now a days, the number of application has been completed which is based on ACO and routing protocols. In one of application ACO-AODV [18] has used by the researcher's and conduct experiments in few application data and conclude that discovery of finding the route was higher in this hybrid technique . The few papers that we analysed to compare the paper with existing approaches are [1,2,3].

III. PROPOSED METHOD

We defined the approach in two ways: ACO (Ant Colony Optimization) and PSO (Particle Swarm Optimization). Firstly, the working of ACO based scheme in depend ANT based approach which find the optimal path, for instance, the ant searches the food on the basis of exchange information and this information collect from ant to ant, the chemical factor called pheromone. This pheromone is the information that transfer the data to every ant so that it easily searches the food. Now in the modified ANT based approach (in our case), the number of wireless node which are dynamic in nature, and these nodes choose the path followed by modified approach but it used following messages to transmit the data.

1. RREQ Packet: This is the Route Request packet that sends the packet from source node to the destination node. The source node floods the packet to existing node in the network.
2. RREP: This is Routing Reply packet when the destination node Receive the packet it send it acknowledgement.

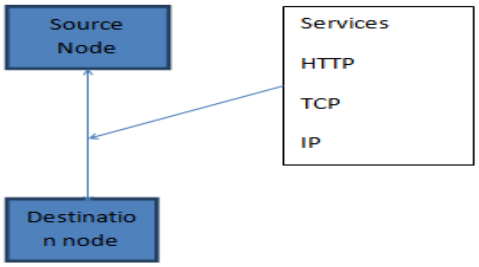

Figure 2: RREQ and RREP Process

The RREP packet stores the communication information at the time of sends the data by the source and reply back by the destination, the information stored on the routing table. Fig.2. shows the communication between the two nodes i.e. source node and destination node, the distance between the two node used the maximum distance is 15 Km and used the unlicensed band 2.4 Ghz. The throughput capacity in the wireless link is usually 1 or 2 Mbps but some environment condition the value reduces than 1 Mbps (< 1 Mbps). In the proposed standard, we are trying to used reactive protocol (AODV) that stores the information and find the shortest and compatible route whichever technique fails sometimes.

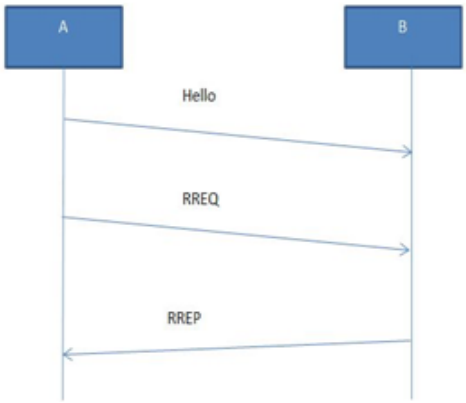

Figure 3: Communication between end devices

With the combination of AODV, PSO and ANT based algorithm we are sending the Hello packet message to establish the route between source machine and receipt machine (Fig.3). Now, there are two nodes A and B that run the same process to support the application data. Hello packet get the information for route breakage, connection establishment and time to time information deliver for the route (whether it is sustainable or not). RREQ, the packet hand-me-down to the desired destination node. RREP only give the reply back when Request packet was received. Later on the RRER (route error) activated when the destination node unreachable. Secondly, we have used an PSO based approach that searches the best position of the node. We know in the wireless nodes are dynamic in nature and we trouble to find the coordinators even we were used the best approaches like ANT in our case. The position could never be finding because the nodes were dynamic

behaviour. Reference to the [2], each particle has some position and velocity that determine the walk or movement of the node. There if the value W assumed to be weight and D is dimension of the solution space (but in our hybrid approach d is the distance of the node). Each particle searches the exact position (even current position) according to the rules that followed by the PSO based approach. At the last, we are using hybrid approach that contains the functionality of ACO based algorithm, PSO based Algorithm and then import the functionality of AODV protocol. In the hybrid approach, the ACO search the best path after identification by AODV protocol, now AODV pause the work for next shortage route. ACO used Hello packet message to every 1 second to identify the route breakage. The PSO has been starting their work to discovery the current location of destination node, hop and gateway. The approach work like the given below hybrid architecture (fig.4).

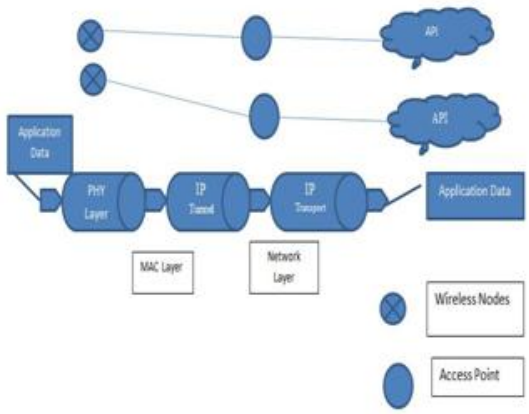

Figure 4:Proposed Hybrid Architecture

All the access point (AP) placed on the network area beyond wireless transmission range. The wireless range and coverage determined in the frequency of wireless environment (i.e. 2.4 Ghz). Now, the wireless transmission sends the data to other wireless nodes (receiver side). Each AP communicated with other AP to transmit the application data. Now the API process the application data that determine the requirement of wireless frequency, radio management and MAC decays. The other functionality of each layer that responding for communication was given below:

***PHY Layer*:** determine the frequency, bit transmission.
MAC Layer: Frequency match, frame sending/receiving.
Network Layer: MAC decaps, security, radio management, message Scheduling.

In short, Network layer select the best route that judges by the AODV protocol and ANT-PSO algorithm has worked on the MAC Layer whereas frequency pattern understand by the Physical Layer. IP tunnel (as worked on Network Layer) clubbed with IP transport layer (understand by Transport Layer). Real time transfer protocol has worked on transport layer and we have used Transmission control protocol, TCP and AODV were different processing and we cleared in this paper, AODV help to manage the data, record the data and route management functionality. TCP sends the transmission of data which was actually send the data and provide reliability on end to end node.

IV. EXPERIMENTAL TESTBED

Figure 5 and figure 6, represented the simulation model where the hybrid approach has implemented. In this model, all nodes are communicated under IEEE 802.11 standard. When the node is in the transmission range then it would be transmit the data.

The AODV protocol implemented on the TCL (Tool Command Language) script and hence the shortest route chosen accordingly.

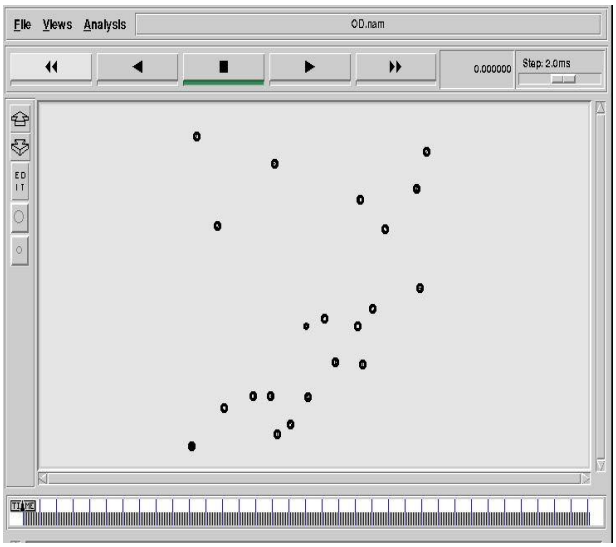

Figure 5:Proposed Hybrid Scenario

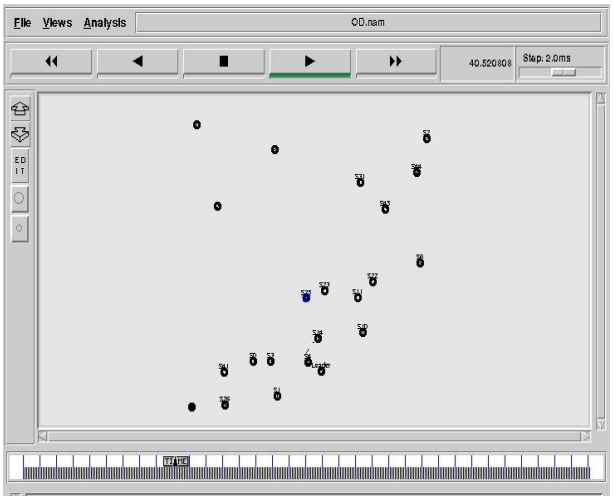

Figure 6:Proposed Hybrid communication/data transfer

V. EXPERIMENTAL RESULTS AND DISCUSSIONS

We are randomly placed twelve channels corresponding to 25 nodes that select the path randomly. We were saying one complete path follows one channels. Now, to reduce the congestion towards the node, we selected the channel. Through channels we measured the response time individually, as the experiment results it takes mean of the combination of two channels and we see that the response time of proposed approach was less comparing to previous approach.

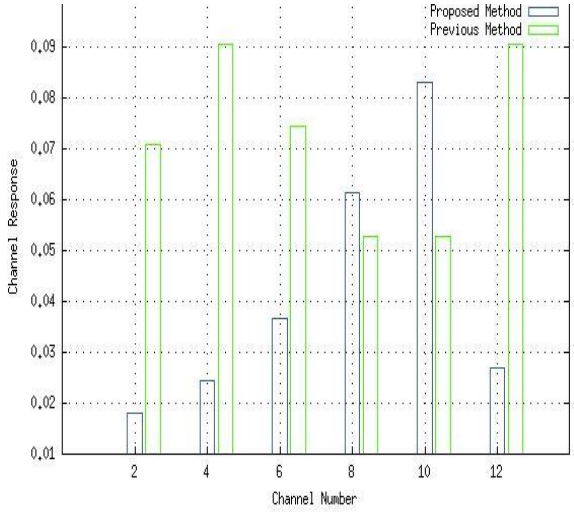

Figure 7:Channel Impulse Response

In the figure 8, we measured the noise in the channel when we send the packet and therefore, we said if the noise ratio is more towards the packet then it assume the sending time is more or packet may be discarded in some situations.

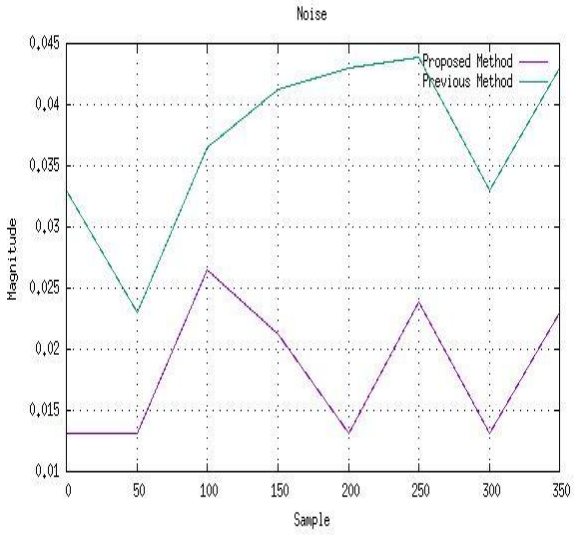

Figure 8:Noise

VI. CONCLUSION

In this paper, we have implemented a hybrid approach which reassembles of ACO and PSO based techniques. We have focused on efficiency of network and reduce the channel response time on individual channels that we assigned to the network nodes. We evaluated the AODV protocol in our hybrid based approach, in the quest of routing paths determination and data transfer. In the eve of data sending/route determination in AODV protocol was not sufficient so we deploy the hybrid approach to improve the network performance and taken care of complexity issues. The evaluated results like noise and channel response time give better results than existing approaches.

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