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An Investigation of AODV and DSR Based Routing Protocol for Mobile ADHOC Network

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ABSTRACT

The ad hoc wireless sector of the wireless industry is becoming increasingly important. Although other network technologies like Internet Protocol (IP) and cell coverage are making headway, ad-hoc wireless networks still have the upper hand. MAN stands for "Mobile Ad Hoc Network," and it refers to a network of people who use mobile phones to communicate with one another. These users have a limited amount of battery life and a weak wireless connection. In addition to this, ad hoc routing strategies have been developed. Ad hoc routing solutions, on the other hand, have a lot of disadvantages. Here is an illustration of a cross that consists of AODV, EXT, BP, and DSR. You will learn everything there is to know about AODV and the characteristics of AODV at this convention. This convention offers information that is both more accurate and more reliable than others because it makes use of the AODV convention and the DSR protocol. In addition, by making use of the Bayesian probability hypothesis, it lowers the amount of energy that is used and improves the effectiveness of the transmission of information.

Keywords: Adhoc Wireless Network, Routing, Adhoc Routing Protocol, AODV, DSR, DSDV.

INTRODUCTION:

When working with standard monolithic materials, it may be challenging to strike an appropriate balance between a material's strength, stiffness, toughness, and density. Composites are the most promising materials that have received recent attention. This is because composites have the potential to address these deficiencies while also meeting the ever-increasing demand of modern technologies. Composites composed of metal matrix (MMC) offer better features over unreinforced alloys, such as high strength, damping capacity, and wear resistance. These composites are also known as metal matrix composites (MMC). The use of composites that include reinforcements with low densities and cheap costs is becoming more common. Fly ash is a solid waste by-product that results from the combustion of coal in thermal power plants. It is one of the most inexpensive and low-density reinforcements that are accessible in large quantities, and it is also easily available. As a direct consequence of this, composites that are strengthened with fly ash are on the verge of breaking through the price barrier for widespread application in motor vehicles and smaller engines [1].

MANET was first developed for use in the military, but it has since found applications in a wide range of fields, including those dealing with the aftermath of natural disasters, the collecting of information in specialised fields, help work, as well as intelligent courses and seminars. The key to success in impromptu steering strategies is to pay attention to the minute details. The amount of battery power that events use might be a good indicator of how successful they are. A hub consumes energy both inside an organisation and while it is controlling traffic. Convention steering is a topic that has been explored in a diverse selection of published publications.

A "specially appointed organisation" (or "specially appointed organisation") is a scattered group that does not have a strongly established basis of organisation. MANET[1] is an acronym that stands for mobile ad hoc network, and it is a free network made up of people who use mobile phones to interact with one another through a remote connection. This network has a reasonable minimum width constraint, and it uses less battery than other networks. Because of the flexibility of the organisation, the geographic location is not only undeniable but also impossible to predict throughout the course of the long term. As a consequence of hub departures and debuts, the connection between the hubs is susceptible to timing adjustments on occasion. These fluctuations may be significant. Each hub in the organisation is accountable for creating contact with the

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other hubs in the system in its capacity as a transmitter, host, and switch. Additionally, order and control are scattered throughout the several centres.

Just a few of the many aspects of directing include creating and selecting courses, making mental notes of the topography and the organisational structures of associations, communicating this information to others for the purpose of utilising it in route expansions, locating meeting endpoints, and sending traffic along the selected courses. Ad hoc networks are formed because there is a scarcity of resources within these kinds of partnerships, which compels a more efficient use of the resources that are available. In addition, the relatively recent nature of these connections produces significant impediments in the direction of exhibitions that are specifically demanded of them, while also shifting the evaluation of exhibits in order to acquire guiding credibility.

RELATED WORK

The many hubs that make up the organisation will keep on exchanging data with one another so long as the table-driven (proactive) steering conventions remain in place. Tables are often used as a means of storing the guiding data. The information included in these tables is subject to regular revisions in the event that the corporation moves its headquarters. Every steering convention has the choice to maintain a varying number of tables at their disposal. Conventions for routing networks like DSDV and Link State Routing, as well as other table-driven (proactive) steering examples (LSR). Conventions for table-driven steering will be discussed further in the following sections. sections that relate to corresponding .'s

Bellman Ford's calculation has been improved using the DSDV [2][3]. By keeping the table and succession number up to date, it should be possible to prevent the issues of steering circles and tally to boundlessness. This component gives users rapid and reliable access to classes that may help them handle any and all of their problems. Tables are rotated among neighbours on a regular basis so that everyone may stay current with the most recent insights into the organisation. The failure of a transmission is one method that neighbouring hubs employ to locate dead spots in the network when connectivity is nonexistent.

The DSDV has been superseded by the Randomized Destination Sequence Distance Vector (also known as [5]. During this procedure, a clog control device [6] that is based on a probabilistic model is employed. As a consequence of this norm, each hub has the authority to choose whether or not to advance or drop a bundle, as well as the kind of bundle that should be advanced or dropped. This method is referred to as "randomised picking of hub," which describes the procedure. The way a person feels about themselves might have an effect on their ability to make decisions. Every hub is responsible for ensuring that this value is accurate. In the event that the clog level is high when the package is presented, the parcel is not discarded regardless of the situation.

The aims of this conference include achieving successful enrolment and having board traffic [7]. The answer is "yes" if you are using distance vector steering in your manoeuvres. During this meeting, it could be feasible to divide the whole organisation into many more manageable parts. In addition, each group is led by a designated individual and has at least one central location. When compared to the distance vector convention, the use of the idea of a group results in a reduction in the amount of space occupied by the table. On the other hand, CGSR has a hard time preserving the group structure that it has established.

In contrast to proactive steering conventions, responsive (On interest) Routing Protocols are powerful directing conventions that have a nature that is receptive and are directed by the protocol. These protocols are built on top of on-demand course disclosures, which serve as their base. Because of this, they are not addressed until the source hub has a need for them.

It is necessary to use bundles in order to transmit the whole position (each jump in the course) from the source to the target in order to adhere to the DSR protocol. This practise will become less important in big organisations as a result of the growing distance between businesses, which will result in an increase in the amount of overhead that is included in the bundle. To put this another way, it's possible that the overhead will consume the bulk of the data transfer in businesses that are both distinctive and enormous in size. This convention, on the other hand, has some benefits over other directing conventions, and it functions more effectively in organisations that are on the smaller side (up to around 300 hubs). Before initiating course disclosure, a source hub that wishes to support the position wanted by DSR may examine its own course reserve to see whether or not it has a real course. If a substantial reserve is found, there is no need for course disclosure to take place. Because courses saved in the course store will be valid for a longer length of time, this may be advantageous for you if you work for a firm that has a low level of employee mobility. A further benefit of DSR is that it does not need frequent

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beaconing (or large message transactions), which enables hubs to enter rest hubs in order to better manage their capacity. This results in significant cost savings for the organisation in terms of data transfer capacity.

Calculations made using DSDV and DSR are the foundation for the AODV steering convention [9]. It makes use of the intermittent beaconing and succession numbering that are included in DSDV, in addition to the comparative course revelation method that is featured in DSR. However, it is important to keep in mind that DSR and AODV have two significant distinctions from one another. In DSR, in contrast to AODV, where each parcel only contains a single piece of directional information, every bundle sends all of its data at once, including all of its directing information. As a direct consequence of this, it is feasible that AODV has a lower steering overhead than does DSR. In addition, the course responses for DSR only offer information about the objective IP address and the grouping number for each hub in the course route, but the course answers for AODV also provide information about the location of each hub in the course. One of the benefits of AODV is that it is flexible enough to be used to many different kinds of businesses. There is a possibility of enormous delays in the development of the course, as well as connection failures, which might result in the exposure of new course information. This uses up more transfer speed as the size of the organisation grows.

The Transiently Ordered Routing Algorithm, or TORA for short. A "temporary requested directing calculation" (TORA) is the same thing as a "appropriated steering calculation" [10]. The calculations for connection inversion are the ones that go back to the very beginning of the family of computations. The objective of the TORA project is to lessen the disruption caused by topological alterations. The fundamental assumption behind this discussion is that control messages are often confined to a very limited number of hub configurations. It is common practise to supply a source/objective combination that has many courses in order to ensure that none of the courses are included inside a circle. Encapsulating the additional hidden capabilities requires the usage of IMEP, which stands for Internet MANET Encapsulation Protocol.

PROPOSED METHODOLOGY

Both the AODV and the DSR protocols are in need of further development. The benefits gained from using the AODV protocol [11] and the DSR protocol [12] are combined. The updated [12] AODV protocol includes a new packet called RREQ for the purpose of transferring packets. The number of nodes that come in between the source and the destination may be determined by the use of Bayesian Probability. All nodes that are located between a source and a destination are considered part of the AODV standard. A Bayesian likelihood-based RREQ will always have the same predetermined number of hubs. Because of this, there will be no have to retransmit any bundles at any point in time. In addition to this, it contributes to the overall decrease in the volume of traffic in the workplace. In addition to this, it helps cut down on the quantity of energy that is used. As a direct consequence of this, the expenses of routing are reduced to an absolute minimum. When compared to the conventional RREQ system, the power usage was decreased by 3.3% [12].

The DSR approach has a number of advantages, some of which are listed below: A route is only maintained while travelling between two nodes at a time. This approach is not only going to save you money and time, but it will also be more effective overall. There is also the possibility of saving the route so that it may be found again at a later time. It is possible to build many routes from a single route detection by using the route cache information that is provided by intermediate nodes.

For instance, it is conceivable to publish courses on demand, and objective arrangement numbers (OANs) may be used to ascertain which courses are the most appropriate. The quantity has become less throughout the course of the last several months. The HELLO messages that enable for course retention have had the scope of their use restricted so as to minimise the amount of unneeded system overhead.

The following are the stages of the hybrid AODV EXT BP DSR protocol:

Step 1: Create your MANET by broadcasting an RREQ message on your local network [12] and assigning mobile nodes using the AODV EXTBP protocol [11].

Step 2: As with AODV [12], a Bayesian probability is utilized to determine how many hubs are saved in the RREQ-header on MANET and if a backlink is established. The RREQ will be predicated on a Bayesian probability of one if there are only five hubs in a network. If the probability is 0.50, only n/2 hubs will get messages.

The joint probability of two events, A and B, can be expressed as

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$$P(AB) = P(A/B) * P(B) \text{or} P(B/A) * P(A)$$

In normal AODV route message forwarding, if a node is forwarding a packet then all the n neighbours will try to forward the message again. If Prx is the power consumed by a node when receiving a route control message and Ptx is the power consumed when a node forwards a
route control message, then all n nodes will spend

$$P_s = (P_{rx} + P_{tx}) * n$$

If Pi is the sum of total initial power of the n neighbouring nodes, then the total remaining power
of the neighbouring node remaining is

$$P_{\text{total}} = (P_i - P_s)$$

If probabilistic route message forwarding scheme is used, for example, assume that only 50% of the nodes are allowed to forward the message at any instance based on probability of 0.5, this means that only n/2 nodes will receive and forward the message. This means that the network residual power will be

$$P_{\text{total}} = \left(P_i - \frac{P_s}{2}\right)$$

It saves energy. It has been shown in result section in detail

According to study, when the probability is between 0.3 and 0.4, power consumption is optimal [12]. This is particularly true for businesses with fewer than 30 hubs and probability values of 0.3 or 0.08. Parceling is most likely to happen in companies with 70 to 100 hubs, with a probability of 0.5. You may see a list of the hubs you've gathered in the RREQ when you arrive at the target.

Step 3: In RREP postings, node lists are added. To unicast RREP postings, reverse links and node-list are utilized, while forward links are supplied as in AODV. Even for an intermediate node, the node-list for the remaining route to the destination may be generated using nodes discovered in the RREQ obtained, as well as nodes found in its routing-table for the remaining route to the destination, as long as its routing table has been updated.

Step 4: When the root node delivers data to a destination, it includes Node-list in the packet-header, which sends the packet to all forward connections and the node-list.

RESULT ANALYSIS

MATLAB is used as a network simulator for the performance analysis of DSR, AODV, and Hybrid Routing Protocols. The purpose of this set of experiments is to evaluate and compare the performance of AODV, DSR, and Hybrid Routing Protocols in Mobile Ad hoc Networks

Figures 1 and 2 provide a graph showing the relationship between throughput and the number of nodes. The throughput of the hybrid protocol is greater and stays constant as the number of nodes density increases. It is due to the use of optimal route finding and local repair in the event of a connection failure.

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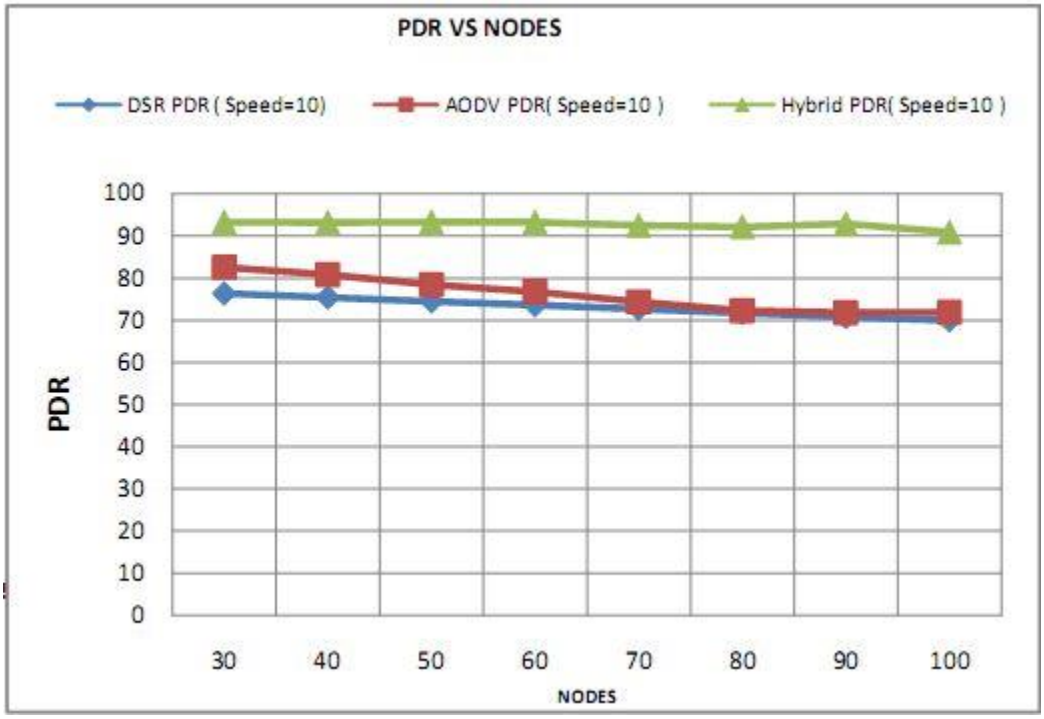

Figure 1 Throughput vs. nodes for node speed 10 m/s

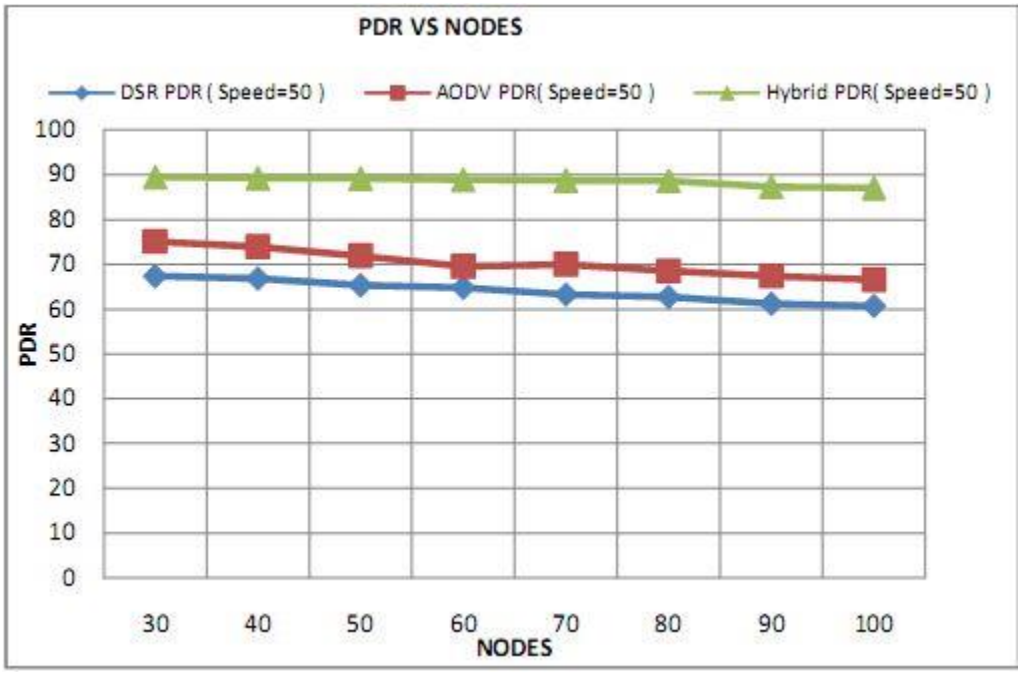

Figure 2:- packet Delivery ratio vs. nodes for node speed 50 m/s

There is a decrease in throughput as the number of nodes on a network increases. Routing takes longer to transmit packets to the destination because of the retransmission attempts because packets sent to the destination are lost during transmission.

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The hybrid protocol's throughput decreases somewhat as the node's speed rises. The throughput of the Hybrid Routing Protocol improved at node speeds of 10 m/sec and 50 m/sec, respectively, as compared to DSR and AODV Routing protocols. According to DSR, the lowest and maximum improvements in comparison to AODV Routing Protocol are 17.4 percent and 28.1 percent, respectively.

For both AODV and DSR, energy consumption increases as the number of nodes grows, but the hybrid protocol's energy consumption is exceptionally low at both low and high speeds. This is shown in Figures 3 and 4. When comparing low and high node speeds for the Hybrid Protocol, there is no difference in energy consumption.

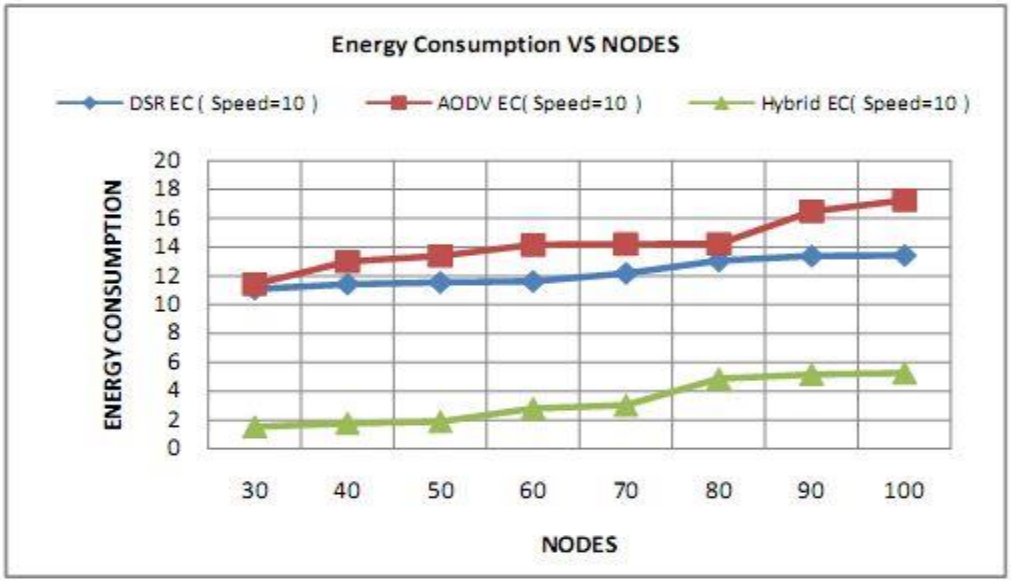

Figure 3:- Energy consumption vs. no. of nodes 10m/s

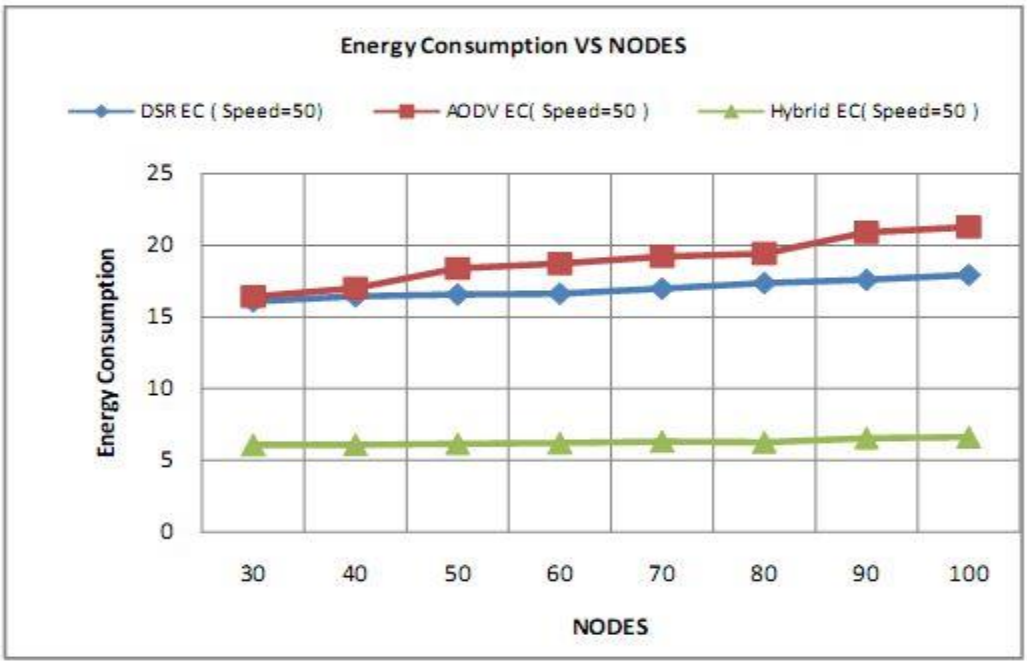

Figure 4:- Energy consumption vs. no. of nodes for 50m/s

Nodes traveling at 10 m/sec and 50 m/sec were found to use less energy using the Hybrid Routing Protocol than with the DSR and the AODV protocols. Both DSR and AODV show gains of 86.36 and 63.12 percent when compared to DSR and AODV, respectively.

CONCLUSION

As its name indicates, a MANET is a network of people who utilise mobile phones to communicate with one another despite the extremely restricted wireless connection and low battery life of their devices (Mobile Ad Hoc Network). Additionally, the development of ad-hoc routing protocols occurred during this time period. On the other hand, ad hoc routing approaches come with their own set of drawbacks. This picture depicts a cross between an AODV, EXT, BP, and DSR. The AODV convention, which offers more information, and the DSR protocol, which is known for its reliability, are both included in this convention. As a result, you get the best of both worlds. It's possible that both the amount of energy used and the amount of efficiently sent information may be cut down by using the Bayesian probability hypothesis.

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