problems were found, causing several dropped packets. The post-processing perl script worked well for discovering and diagnosing problems. A perl script was much easier to implement and modify than trying to implement the checking in behavioral verilog.

OPTIMIZATION (Area & Timing)

Using the optimization techniques, the design is able to achieve a worst-case timing path of 1800ps and an area of 4774730 um^2. This timing translates to a maximum overall operating frequency of 540 MHz and approximately 5 mm^2 of die space (or 1/20th of a 10mm x 10mm die).

The largest portions of the timing path and area come from the input_block module due to the large Virtual Output Queues and their linked-list overhead. The area of the three main design blocks is shown in following Table

Block	Area/instance (um^2)	Total Area (um^2)
input_block	561836	4494688
scheduler	75879	75879
output_block	25155	201240
Total		**4771807**

V CONCLUSION

This paper presented an 8x8 on chip input buffered crossbar switch utilizing the iSLIP scheduling algorithm. The design was implemented in Verilog RTL and synthesized using Synopsys Design Vision and a 0.20 micron synthesis library to achieve a maximum frequency of 540 MHz and area of 4771807 μm^2. The design was tested using unit-level and system level test benches utilizing random stimulus and strategically-placed assertions. Several microarchitectural optimizations were used to reduce area and critical timing paths including Virtual Output Queues, a thermometer programmable priority encoder, and multi-phase packet and data transfers.

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An Approach to Local Route Repair for MANET Routing Protocol

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Abstract : **Mobile Ad Hoc Network (MANET) do not have fixed infrastructure. MANET is dynamic network in which nodes depend upon other nodes of the network for their communication. In MANET, nodes can play the role of both host as well as router. Due to dynamic network topology, one of the major challenges is to construct the efficient routing protocols. In the ad hoc network, the nodes are free to move anywhere and in any direction. Due to the mobile nature of nodes, frequent breakdown of the paths takes place. The paper presents efficient technique that repairs the path locally which helps in reducing the overhead in the network and also prevents the packet loss. The paper also presents the working of AODV and AOMDV routing protocol and their comparison results. NS-2 is used for simulation.**

Keywords: MANET; Routing Protocols; AODV; AOMDV; AOMDVL

I. INTRODUCTION

INFRASTRUCTURE based network and ad hoc network are the two types of wireless networks [1,2]. Mobile nodes communicate with each other with the help of base station in infrastructure based network. An infrastructure based network is shown in figure 1. In an ad hoc network, mobile nodes communicate with each other without any fixed base station. In an ad hoc network, nodes depend upon other nodes for their communication. Nodes act as hosts and also perform the functionality of router [1]. The ad hoc network is shown in figure 2.

The Mobile Ad Hoc Network (MANET) has dynamic topology due to mobile nature of nodes [7]. In such networks, for transferring data, efficient and effective routing protocols are required.

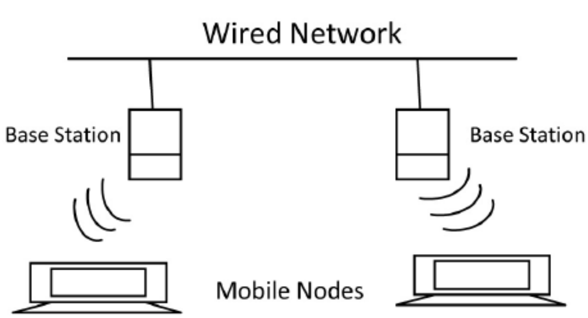


Figure 1. Infrastructure based network.

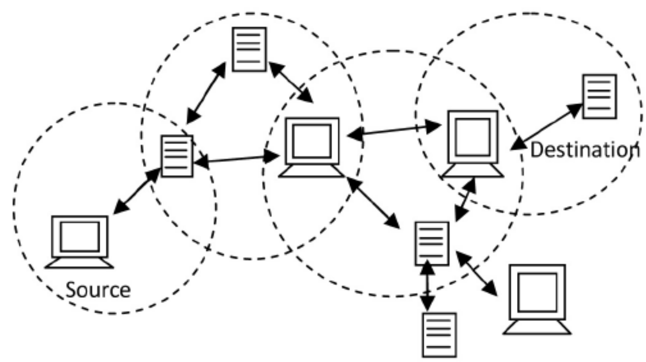


Figure 2. The Mobile Ad Hoc Network.

In MANET, nodes can dynamically leave as well as enter the network which results in breakdown of the path.

II. ROUTING PROTOCOLS

In MANET, the routing protocols are divided into three types: proactive, reactive and hybrid [3]. The proactive routing protocols are table-driven which store the network topology information in the routing table. Up-to-date information is maintained by each node. Whenever the change in network occurs, the periodic update messages are exchanged among the nodes. When the route to any destination is required, it is immediately obtained from the node routing table [6].

The reactive protocols are on-demand protocols which do not store the network topology information in the routing table and no up-to-date information is maintained. When the route is required to any destination then source node starts the route discovery process. The hybrid routing protocol combines the best features of proactive and reactive routing protocols [5].

The proactive and reactive routing protocols are classified into unipath and multipath routing protocols. The unipath routing protocol discovers the single path between the single source and single destination. The most widely used unipath routing protocols are AODV and DSR [9, 10]. The unipath routing protocol has two stages, one is route discovery in which the source node discovers the path to destination whenever required and after discovery the path is used for transferring the data packets and second is route maintenance in which the node re-discovers the path when the link between the source and destination breaks and path is still required for sending the data. The stages are shown in figure 3.

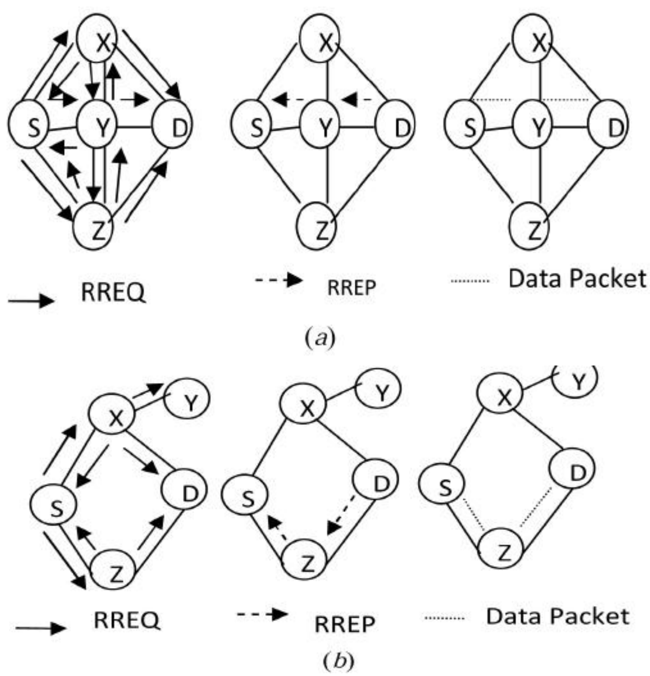


Figure 3. Stages of unipath routing protocol: (*a*) Route Discovery (*b*) Route Maintenance.

The multipath routing protocol discovers multiple paths between a single source and the single destination. The most widely used multipath routing protocols are AOMDV and AODV-BR [8]. The multipath routing protocols try to find the node-disjoint, link-disjoint or non-disjoint paths. Node-disjoint paths are the paths in which no node or link is common. Link-disjoint paths are the paths in which no link is common but node can be common. Non-disjoint paths are the paths which has node and link in common [4]. These types of paths are shown in figure 4.

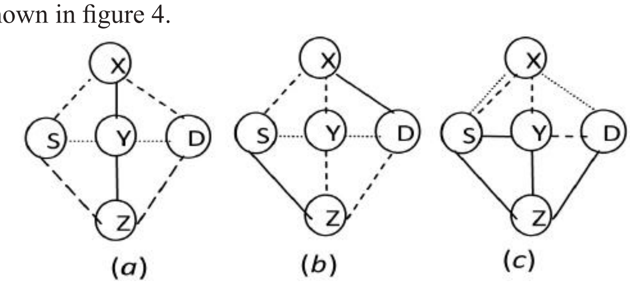


Figure 4. The paths SXD, SYD and SZD in (*a*) are node-disjoint. Paths SYD and SXYZD in (*b*) are link-disjoint. Paths SXD and SXYD in (*c*) are non-disjoint.

III. RELATED WORK

AODV: Ad hoc on-demand distance vector routing protocol is similar to DSR but AODV maintains the routing table at each node instead of route cache. AODV routing protocol works in two parts one is Route discovery and other is Route maintenance. In route discovery phase, when the source node wants to send the data packet to destination node and does not have the valid route then source node generates the route request (RREQ) message and broadcast to its neighbour nodes.

When nodes receive the RREQ message, create a reverse entry to source in its routing table and forward the RREQ message. When RREQ message arrives at destination or the intermediate node containing the valid route, they generate the route reply (RREP) message and unicast it to source. When the source node receives the RREP message, it starts sending the data along that path.

In route maintenance, a periodic hello message is advertised by the node to show its presence.

In figure 5, the source node S sends the RREQ packet to its neighbors. The intermediate node receives the RREQ and forwards it to neighbors. When the RREQ packet reaches the destination, it generates the RREP and sends it back to source. The source node may receive more than one reply; in this case source chooses the path with minimum hop count.

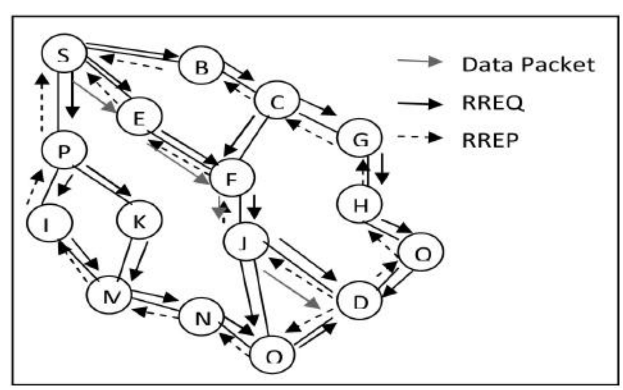


Figure 5. AODV routing protocol.

AOMDV: Ad hoc on-demand multipath distance vector is the most widely used multipath routing protocol [1]. AOMDV is the extension of AODV routing protocol. In AOMDV, the loop-free and disjoint multiple paths are formed. When source node wants to send data packet to the destination node, then the route discovery process is initiated by the source node by sending the RREQ packet.

The process of transferring multiple paths from the source to destination forms the multiple reverse paths. In AOMDV the duplicate RREQ message is not immediately discarded by the nodes like in AODV in order to form the multiple paths.

The routing table in AOMDV maintains multiple entries. One path is chosen as primary path and other as alternate paths. When the primary paths fail, the alternate path is used to transmit the date to destination [8, 14, 15]. In Figure 6, node S sends the RREQ to find path to destination. The duplicate RREQ message is received at node H but H does not ignore this duplicate request like AODV but uses this for making another path.

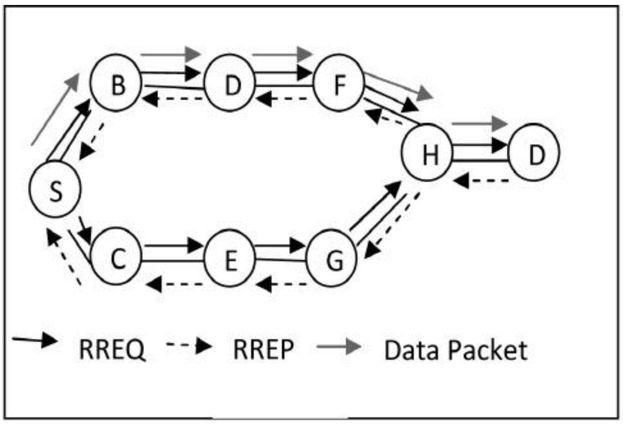


Figure 6. AOMDV Routing Protocol.

IV. PROPOSED WORK

In this paper, a local route repair technique is proposed based on AOMDV by using tabu search technique. The proposed protocol works same as AOMDV except route maintenance. In proposed protocol when a primary path fails, then firstly alternate path is chosen based on the number of hops and if the alternate paths have same number of hops then on the basis of signal strength, the best alternate path is chosen. When no alternate path is available then a failure sensed node sends the REPAIR packet which contains the tabu list.

The tabu list is maintained in the routing table of nodes during the route discovery process. When the node receives the REPAIR packet, it checks the following condition: (*a*) the TTL reached (*b*) node already received REPAIR packet or (*c*) node ID already present in tabu list. If any of the condition is true then node drops the REPAIR packet otherwise add its own ID in the tabu list and broadcast the packet. When the destination or the intermediate node having path to destination receives the REPAIR packet then it generate the RREP which are sent back to the originator node. When the originator node receives the RREP packet, the data packet is sent through the discovered path.

V. PERFORMANCE EVALUATION

This paper investigates the performance of AODV and AOMDV routing protocol. To simulate the performance, the simulator NS-2.35 is used. The mobile nodes are simulated over the size of 500m X 500m rectangular area. For the simulation LINUX environment is used. Table 1 shows the simulation parameters.

TABLE 1 -- SIMULATION PARAMETERS FOR AODV AND AOMDV

S No.	Parameters	Values
1	Area	500m x 500m
2	Number of Nodes	25-100
3	Radio Propagation Model	Two ray ground
4	Simulation time	200s
6	No. of experiments	4
8	Traffic Type	CBR or FTP

A. Packet Delivery Ratio (PDR): PDR is obtained by dividing numbers of packets received by the number of packets sent by the source nodes.

$$PDR = \frac{\sum_{p=1}^{n} R_p}{\sum_{p=1}^{n} S_p}$$

where R_p is the number of packets received at the destination and S_p is the number of packets sent by the source.

B Throughput: It is defined as the total number of packets received per unit time.

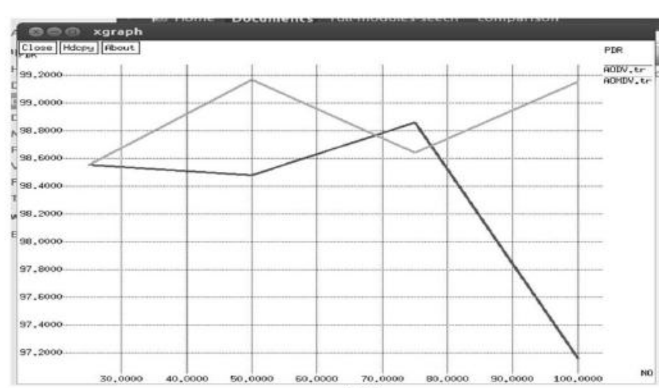
$$\text{Throughput} = \frac{\sum_{p=1}^{n} R_p}{Total\ Time}$$

C Packet Loss Ratio (PLR): PLR is defined as the difference between the number of packets sent by the source and the number of packets received at the destination.

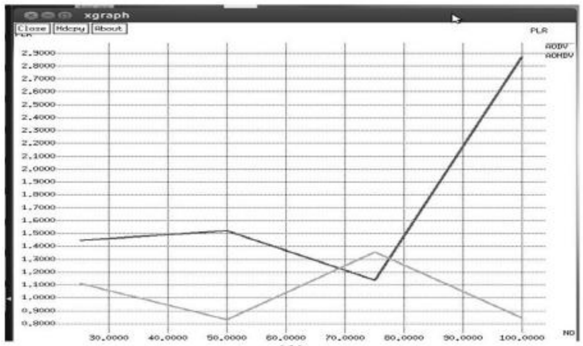
$$PLR = \frac{\sum_{p=1}^{n} S_p - \sum_{p=1}^{n} R_p}{\sum_{p=1}^{n} S_p} * 100$$

VI. RESULTS

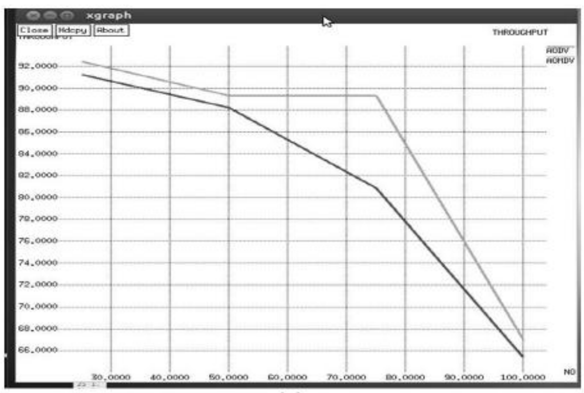
In simulation, AODV and AOMDV routing protocol performance is evaluated. The number of nodes varies from 25 to 100 and simulation is performed for 200 seconds. The scenario contains six UDP/CBR connections between source and destination. Figure 7 shows comparison result of AODV and AOMDV routing protocols. Figure 7(*a*), shows AOMDV has higher packet delivery ratio as compare to AODV. Figure 7(*b*), shows that AODV has less throughput in comparison to AOMDV. Figure 7(*c*), shows the more packet loss for AODV in comparison to AOMDV.



(*a*)



(*b*)



(*c*)

Figure 7. (*a*) Packet Delivery Ratio (*b*) Throughput (*c*) Packet Loss Ratio.

VII. CONCLUSION

This paper presents the working of unipath AODV and multipath AOMDV routing protocols. The paper contains the proposed algorithm which performs better route recovery by using the concept of tabu search. The paper also contains simulation results of AODV and AOMDV routing protocols. AOMDV performs better in comparison to AODV routing protocol.

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Facial Expression Recognition Using Biogeography-Based Optimization with Support Vector Machine

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Abstract: **Facial expression recognition is an attractive and difficult issue and affects vital applications in numerous zones, for example, human–computer connection and information driven movement. Removing the ideal components from pictures is continuously needed in face acknowledgment calculation to accomplish high precision. In this paper, author displays a proficient facial representation and face acknowledgment calculation in view of Biogeography Based optimization (BBO). To start with, the elements utilizing the Principal Component Analysis (PCA) in the wake of applying Gabor channels are separated and afterward we apply BBO to get the most alluring highlights. The Execution investigation is performed utilizing Cohn Kanade face database. Execution results demonstrate that biogeography based optimization with SVM using LBP produces preferable results over the SVM using LBP.**

Keywords: BBO, GABOR Filter, LBP, PCA, SVM

I. INTRODUCTION

THERE is a great deal of exploration parkways in the field of face acknowledgment because of difficulties present in the field. The objective of face acknowledgment is to match a given picture against an expansive database of pictures to check its vicinity. Outward appearance is a standout amongst the most intense, normal and prompt means for people to impart their feelings and intentions. Facial expression recognition is an attractive and difficult issue, and affects essential applications in numerous territories, for example, human–computer connection and information driven movement. The face acknowledgment has been connected to two generally vital applications *i.e* check (coordinated coordinating) and recognizable proof (one to numerous coordinating). Scientists have displayed a range of methods for face acknowledgment. These systems can be ordered as all-encompassing coordinating strategy *e.g.* Principal Component Analysis (PCA) and neighborhood highlight coordinating technique.

Determining a successful facial representation from unique face pictures is a key technique for fruitful outward appearance acknowledgment. There are two basic ways to deal with concentrate facial elements: geometric highlight based techniques and appearance-based routines. Geometric components display the shape and area facial segments, which are removed to shape a component vector that speaks to the face geometry. As of late, it is shown that geometric component based systems give comparable or preferred execution over appearance-based methodologies in real life Unit acknowledgment. On the other hand, the geometric component based strategies more often than not require exact and solid facial element identification which is hard to suit in many situations.

With appearance-based routines, picture channels, for example, Gabor wavelets are connected to either the entire face or particular face-areas to concentrate the appearance changes of the face. Because of their unrivaled execution, the real chips away at appearance- construct techniques that concentrated in light of utilizing Gabor-wavelet representations. On the other hand, it is both time and memory escalated to convolve face pictures with a bank of Gabor channels to concentrate multi-scale and multi-orientational coefficient.

Figure1. Representative set of Cohn Kanade face database.

In this paper, we concentrate on PCA. One of the greatest difficulties in PCA is that we can't utilize it on crude pictures specifically. They have to be appropriately adjusted and consistently enlightened. This test can be comprehended utilizing Gabor channels which take a crude picture, create Gabor channel reaction and convert the crude picture into appropriately adjusted. We have investigated the exploration that demonstrated that Gabor PCA based strategy for face acknowledgment beats PCA based Eigen face strategy.