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Air Pollution Control Monitoring & Delivery Rate Escalated by Efficient use of Markov Process in Manet Networks: to Measure Quality of Service Parameters

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Abstract:

In MANET (Mobile Ad hoc Network) packet transmission is performed by the gathering of intermediate devices present between the Senders with the recipient. Efficient packet transmission involves increased throughput, less delay, and guaranteed delivery is achieved by analyzing the network performance. In the AOMDV (Ad hoc On-Demand Multipath Distance Vector) protocol, various ways are set up between sources to an objective. The best path selection is done with both having the minimum transmission time and maximize throughput. Minimum transmission time is achieved by estimating and reducing the queuing delay and processing delay. A maximum throughput estimation is done by analyzing signals and noise strength. In our proposed system QOS parameter based on best path selection in channel aware routing protocol (QBP-CAAOMDV) in MANET, Queue delay is estimated by Bayesian decision rule methodology by analyzing packet arrival rate and packet processing rate. The Hidden Markov model is used to find noise affection along the various paths. The selected best path satisfies QOS parameters such as the increased delivery rate without packet loss and reducing average delay. For example, we have implemented this algorithm-based data packet transfer in real-time data analysis like Air pollution control monitoring. To carry out air pollution monitoring over an extensive area, a combination of ground measurements through inexpensive sensors and wireless (Geographical Information System) GIS will be used for this purpose. This portable device, compressing solid-state gas sensors integrated to a Personal Digital Assistant (PDA) linked through Bluetooth communication tools and Global Positioning System (GPS), will allow rapid dissemination of information on pollution levels at multiple sites simultaneously. The AQ report generated can be then published using internet GIS to provide a real-time information service for the PCD, for increased public awareness and enhanced public participation.

Keywords: *Bayesian Decision, Hidden Markova, Queue Delay, Noise Affection.*

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I.INTRODUCTION

A get-together of adaptable focus focuses that competently plot a fleeting structure is named as a without any preparation system. Structure – less system, it is an extraordinarily named structure does not rely on any settled foundation without making data transmission through a fixed base station, nodes forward data packets to another node to a destination node are attained. Usually, a packet may travel through many intermediate nodes before reaching its destination. [1]

It is a self-arranging system of dynamic moveable devices which are associated using remote connections with no entry point.

Routing in ad hoc networks is noticeably different from routing found in traditional infrastructure networks. It needs to consider various factors like topology, routing path selection, and routing overhead. It must find a path quickly and efficiently.

The available resources are generally lower than compared to the infrastructure networks so that optimal routing is needed. Routing is the process of moving packets travels multiple paths are established between sources to destination. The best path selection is done with both having the minimum transmission time and maximize throughput.

At the minimum transmission, time is achieved by estimating queuing delay and processing delay. A maximum throughput estimation is done by analyzing signals and noise strength. In our proposed system QOS parameter based on best path selection in channel aware routing protocol in Manet, Queue delay is estimated by Bayesian inference methodology and Hidden Markova model is used to find noise affection along the various paths.

The relax of the article is organized as takes after: In Section II we talk about related works. The issue, distinguishing proof of the existing framework in segment III. The proposed methodology QOS parameter based on best path selection in channel aware routing protocol in MANET this section IV. Mathematical Solvation in Queuing Delay and Signal to Noise is described in section V. Reproduction results and investigation of the subsequent execution is given in area VI. Conclusion and future improvement exhibited in Section VII.

II. BACKGROUND AND RELATED WORKS

We use the AOMDV protocol, selecting multiple paths between source and destination. In normal packet transmission involves single path selection and transmission of all data from source to destination along the same path, but it may increases delay in packet transmission and reduces the energy level of nodes in the particular path. In this system, we distribute packets along the multiple paths to reach the destination.

In [2] proposed Traffic aware load balancing in AOMDV for mobile Ad-hoc networks. A user discussed without processing the intermediate node is select then the distributed load of the data are forwarding the packets. Total queue length based on each intermediate analyzed to take decision load the data are distributed, but each node dynamic moves anywhere at any time to change buffer size and available bandwidth various in each path of the intermediate node transmitted is not considered

[3] The user not discussed the increase and decrease of buffer space depends on the speed of the forwarding node, the speed of incoming packets, and available bandwidth.

In [4] proposed Congestion Aware multipath Routing for Mobile Ad hoc Network. To find the minimum transmission time with less delay of the path is selected instead least number of the neighbor node are selected. The congestion level of a node and the average congestion level is calculated in the path depends on the route discovery and forwarding data packets a primary route. If the path is failed, then a route is selected next secondary level in its high congestion compared to the primary route. The multipath selects a route with a minimum average congestion level than start data transmission; if the current route breaks select a new route to the next higher congestion level is found. In this paper buffer space of each node incoming packet, and processing of the node. So that capacity of the channel is maintained and packet life is increased

In [5] Channel Aware fuzzy logic hops selection for wireless sensor networks. Depends upon the medium to change number forwarding data packets are transmitted. To avoid again and again broadcasting the message, it reduces the power level and output. Fuzzy logic-based to check the constraints of each channel in a next-hop node is selected using signal to noise ratio and

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the probability of the distance between the received power. It involves reliable data transmission which improves the performance.

In [6] achieving energy efficiency in MANETS by using the load balancing approach. These techniques are proposed multipath data transmission using balancing based on energy level only one constraint user check. But the user not discussed traffic analysis, intermediate buffer free space, and channel bandwidth.

In [7] increased throughput for load-based channel aware routing in MANETs with Reusable paths. The Radio wave signal passed to communicate between all neighbor nodes, the signal is fluctuating to affect the channel path. After reuse the same path recovery the fluctuation the number of users shared to be loading the data with a minimum level of resource constraints based on improving the network performance.

In [8] power-aware load balancing multipath routing protocol for MANET. A user discussed a sufficient amount of residual energy, minimum delay, and reduces the congestion based on selecting all next-hop neighbor nodes are route discovery. A load balancing technique is implemented shard by various paths are depends on the priority level to assign the data packet. The sufficient number of nodes are not available route, discover in the entire network, it is difficult to achieve the packet accept ratio.

In [9] Proposed Performance Analysis of Queue Congestion Status Routing Protocol for Ad Hoc Networks. Segregation load of the data and nodes are each path travel from initializing to the endpoint. Metric based path selection in each neighbor node, which involves a number of packets processed in a queue based arrival and processing rate. Node and path congestion status are calculated to send the packet with load sharing in each path expression on reducing packet dropped and delay.

III.PROBLEM IDENTIFICATION

- High transmission power is required
- More time delay due to traffic
- Less security
- Noisy data occurs at high rates
- More packet drops

IV. PROPOSED WORK

In this proposed system the proper best path selection based on minimum transmission time and maximum throughput. A minimum transmission time achieves by estimate queuing and processing delay are reduced. Maximum throughput achieved by analysis of signal and noise strength. With this constraint-based selecting the path, it reduces average delay without packet loss and increases the delivery rate in this formula (1),(2), and (3).

$$Best\ Path\ (BP) = Minimum\ Transmission\ Time\ (MTT) + Maximum\ Throughput\ (MT) \quad (1)$$

$$Minimum\ Transmission\ Time\ (MTT) = Queuing\ Delay\ (QD) + Processing\ Delay\ (PD) \quad (2)$$

$$Maximum\ Throughput\ (MT) = Analysis\ of\ Signal\ Strength\ (ASS) + Noise\ Strength \quad (3)$$

A. Queuing delay:

The amount of time the packet is waiting in the queue is taken up for processing is known as queuing delay [10]. Delays are varying from 0 to ∞. A node is idle, this case need not stay in the queue. The packets are immediately reaching to the node, a delay becomes 0. A node is busy, in this case, some other packets have processed the node at this time a queue is full. Whenever a new packet arrives, it is going to discard this packet or no space in the queue, a delay queue wait time becomes ∞ using Algorithm 1 and 2.

Queuing delay depends on queue size and node processing speed. When the node a packet arrival rate and a processing rate are considered the queue size as well as the processing speed. A node becomes an idle state, this case processing time taken high speed of each packet they delay becomes zero. Otherwise much amount of time taken to wait in the queue, it takes more delay in Algorithm3.

Algorithm 1Packet arrival rate in queue:

While (n (queue)! =NULL)
Begin
Packet P
If (packet_ArrivalRate(AR)<packet _Processing Rate(PR))

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P=n (queue)
p=p-1
End
End.

Algorithm 2 Packet processing rate in the queue:

While (N (queue)! =full)
Begin
I=1packet
If (packet Arrival Rate (AR)>Packet Process Rate (PR))
I=I+1
N (queue) =I
End
End.

Algorithm 3 Delay calculation in the queue:

Queue space=How much of wait in the queue (much time, more delay)
Int delay (WQS, TR)
(
Queue space (QS) ==waits in the queue size (WQS)
IF (Node (WQS)>Transmission rate of bits (TR))
Return Delay++;
Else
Return Delay--;
End
}

Amount of time packet is waiting in the queue (AWQ)
Amount of time taken from the node to process a packet (ANP)
AWQ

$$\infty \frac{1}{ANP} \quad (4)$$

This formula (4) AWQ is inverse proportionally ANP. Amount of time taken from the node to process a packet is a high speed, and then the Amount of time the packet is waiting in the queue is decreased

B.Signal and Noise Strength:

Noise is depended upon Signal to noise ratio,

$S/N=2^{C/B}-1$ (5)

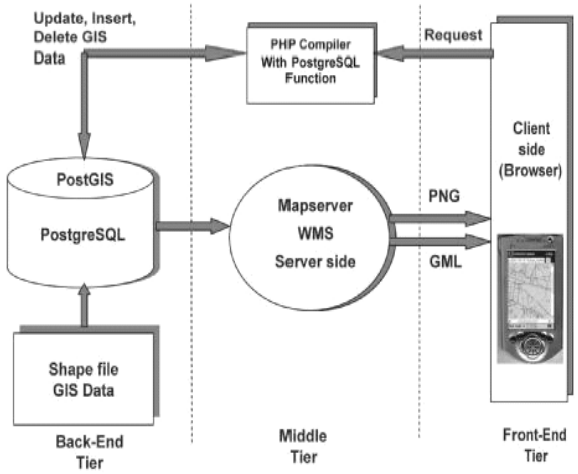
C-Channel Capacity, Bandwidth, S/N-Signal to noise ratio.

This formula (5) S/N is obtained by the above equation and it is clear that when channel capacity is very high compare to a bandwidth of the signal the SNR ratio is high.

C. Multipath Detection:

- ❖ We use the AOMDV protocol, selecting multiple paths between source and destination.
- ❖ In normal packet transmission involves single path selection and transmission of all data from source to destination along the same path, but it may increases delay in packet transmission
- ❖ In the proposed system we distribute packets along the multiple paths to reach the destination

Air pollution control monitoring system process using GIS



In this real-time application, we have taken a trial of air pollution control monitoring using the GIS system. Here we implemented the mobile Adhoc network algorithm that we have proposed in the MANET network. For the wireless Data Updating System, it is composed of three tiers, including Front-End Tier, Middle-Tier, and Back-

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End Tier which is shown in figure 1. Back-End Tier where PHP and PostgreSQL with Post GIS read the data and execute the request.

Integrating GIS

As shown in the figure, the solid-state gas sensor gives out electric signals, related to NOx concentration.

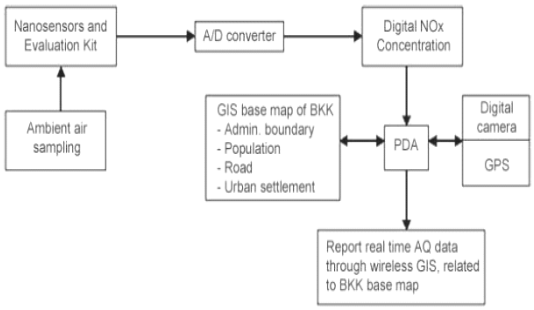

Figure. Block diagram of Air pollution sensing

The air quality levels were categorized into five classes. The five classes of air quality level reported include hazardous, very unhealthy, unhealthy, moderate, and good. Hence, the internet users can browse and query air quality interpolated maps, relating to geographic information, including districts, roads, urban settlement, historical air quality level, population. The internet-based GIS is useful real-time interaction on air quality levels and increases public awareness and participation

D. Multipath Traffic Analysis:

- ❖ Traffic analysis must be done before the transfer of data to avoid congestion in the network.
- ❖ The intermediate queue free spaces are analyzed to decide whether to involve a particular node in the transmission or not.
- ❖ The channel bandwidth capacity between nodes is determined.
- ❖ The Energy level in the node is also analyzed.

Initialize m amount of nodes within Mobile Adhoc Network. Each node communicates within the broadest casting of neighbor node Route Request (RREQ) and a Route Reply (RREP) up to reach the receiver node. It takes the high overhead. One too many sufficient on next-hop neighbor nodes are selected as an alternative of one to all in all the neighbor node algorithm 4.

An Adequate_Neighbor_Node (ANN) and In _Adequate_Neighbor_Node (NAN) is checking the constraints of Average queue capacity utilization, sufficient transmission range based on the available number of nodes is ANN otherwise NAN. This process until they performed up to an M number of Nods in MANET.

Algorithm 4 Available number of ANN and NAN:

AQC=Average Queue Capacity Utilization, Threshold Value (TV).AQC=75%
GCS=greatest communication scope.
M-convenient amount of nodes within the Mobile Ad hoc Network.
Node_list[]={n[0],n[1],n[2]……n[m-1]}
N1=Available number of ANN
N2=Available number of NAN
Declare P=0,l=0,R=0
FOR P in range (1, M)
IF ((Node_list [p] >= TV.AQC) && (Node_list[p] >GCS))
Adequate_ Neighbor _Node (ANN)[l]=Node_list[p]
l++;
Else
In_Adequate_Neighbor_Node (NAN) [R] =Node_list[p]
R++;
END IF
END FOR
END

E.QBP –CAAOMDV ROUTE DISCOVERY IN CONNECTION RATE

VI. SIMULATION RESULTS:

Ns-2[13] is utilized to recreate the QOS Parameter based on best path selection in channel aware routing protocol in Manet the multiple path transmission based on the load sharing available buffer size. In the recreation, the Packet Size is the default, and transmitting parcel rate is relies upon in light of the heap the accessible cushion space

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and allotment of data transmission in every way. The reenactment and parameters are outlined in Table1

TABLE 1: Simulation parameters

Number of nodes	100
Area Size	1500 X 1500
MAC protocol	802.11
Radio Range	250 m
Antenna	Omnidirectional antenna
Simulation Time	50 Sec
Traffic Source	CBR
Routing protocol	AOMDV, QBP-CAAOMDV
Packet Size	800 bytes
Mobility Model	Random Way Point
Rate	100 KB, 200 KB, 300 KB
Maximum number of packets in the queue	200
Speed (m/Sec)	2m/Sec

B. Performance Metrics:

In AOMDV PROTOCOL Route discovery in distributing the packet along the multiple paths to reach the destination. Traffic analysis must be done before transfer the data to avoid congestion. The QBP-CAAOMDV protocol route discovery in each intermediate node the queue spaces are analyses and also without noise effect depends on deciding whether to involve a particular node in the transmission or not. Segregation based On multiple paths is analyses of heavy and low traffic. The heavy load nodes are heavy traffic path and no packets are transmitted is In _Adequate_Neighbor_Node (NAN). When less traffic path and more packets are transmitted is Adequate_ Neighbor _Node (ANN).

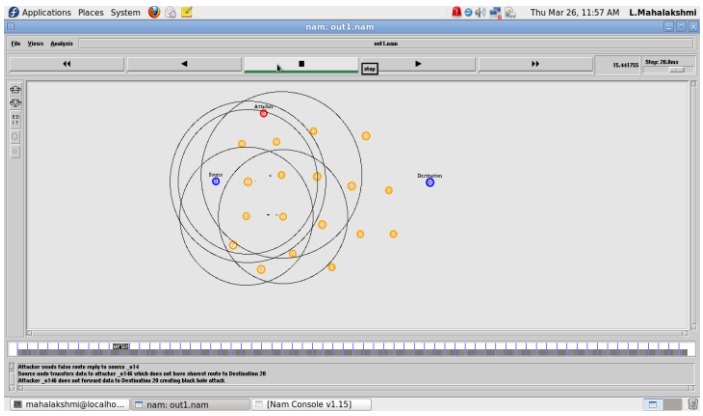

Figure 1 Route Discovery process ANN and NAN

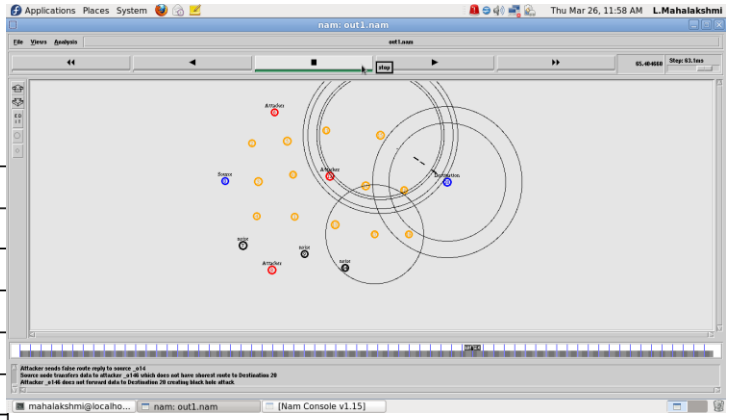

Figure 2 Traffic and Noiseless based forwarding the numbers of packets

In this Ns-2 simulator initialize node is segregated to assign the color RED is ANA and NAN is a BLACK, the SOURCE and the DESTINATION are indicate the color is BLUE in fig 1,2.

ANA=CONNECTION_RATE+MEDIUM RATE depends on travel the path in which the number of packets is assigned.

NAN=CONNECTION_RATE+MEDIUM RATE depends on travel the path in which the number of packets is assigned

$$\text{Connection\_rate (MT)} = \frac{\textit{Successful number of received signal}}{\textit{Broadcasting route request signal}} \quad (6)$$

$$\text{Connection\_rate (MTT)} = \frac{\textit{Rate and load are shared number of user}}{\textit{Remaining available resource}} \quad (7)$$

Using this formula (6), (7) describes the UN parallel parcel the aggregate number of bundles is shared in numerous ways. Fig 5 throughputs vs. delay in an Every way has the check the imperatives of transfer speed, postponement, stack, and the hop count or cost. In this imperative in light of choosing the ways in load factor on the number of bundles are transmitted. Priority-based to allocate the number of packets is transmitted in each path. When comparing to AOMDV, this proposed routing protocol reducing the congestion and increase the data rate. It will improve the performance allocation channel and packet lifetime on each node.

Case1: Minimum Transmission Time (end to end delay):[14]

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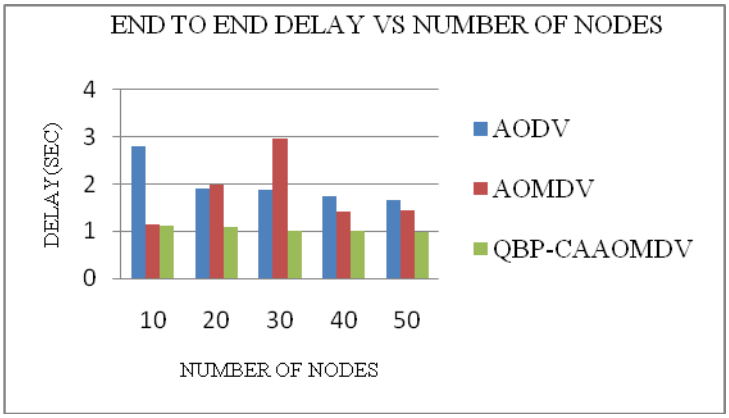

Figure 3 Delay Vs Nodes

In Fig 3 end to end delay on the entire path. In this path have analyzed the queue delay and processing delay involves in each neighbor node have traveled to reach the destination node. Rate and load are shared by the number of users depend on remaining available resources to reduce the delay. AOMDV compare to the QBP-CAAOMDV, it 0.12% decreases the end to end delay of travel entire path which transmission of data.

VI. CONCLUSION AND FUTURE UPGRADE

In this paper, we proposed a multipath transmission in light of load sharing measurements based on available queue space and without noise affect the received signal strength in each node and allocation of bandwidth to reduce the congestion with delay and high quality of connection rate in each path. This proposed algorithm focuses on minimum transmission time and maximum throughput based on select the best path with load sharing technique in multiple paths.

The simulation parameter analysis queuing delay based on the transmission rate and noise analysis depending on maximum throughput. In this selected best path satisfies QOS parameters such as the increased delivery rate without packet loss and reducing average delay. This exploration expands trust and booking based load sharing actualizes in high need and low need high light.

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Holding the position of NPTEL coordinator role for since 8 months

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Mr.Rakesh KK received his MCA degree from Anna University Coimbatore in 2010, and Mphil in Computer science from Bharathiyar University in 2014. Currently pursuing his Ph.D. degree in Computer Science, from Bharathiyar University. He has published three research papers in national and international journals/conferences. His research interest includes wireless sensor network, Mobile computing, Mobile

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