EFFECT OF DIFFERENT DATA RATE ON THE PERFORMANCE INVESTIGATION OF NEW BROADCASTING TECHNIQUES IN WIRELESS MOBILE Ad Hoc NETWORKS

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Abstract
Mobile Ad hoc Network is collection of autonomous nodes and these nodes could move freely and at anytime and anywhere. They can send and receive information each other. Mobile nodes having the limited bandwidth, dynamic topologies and limited energy in nature and manet routing protocol specifies the routes between the nodes and disseminating information between them to discover routes and maintenance. The motivation of this performance analysis is to assess the impact of variable data bits in the three new routing approaches are probability-based broadcast, neighbor knowledge and neighbor aware techniques in through the NS-2 simulation. The performance indices chosen for analysis is throughput, delay, packet delivery ratio and routing over load.

Keywords-- Ad hoc conventional routing protocol, Broadcasting Techniques, Probability based, Neighbour aware.

INTRODUCTION
Wireless mobile ad hoc networks are emerged from the technology world and does not require a specific network infrastructure and they are applicable to transmit and receive data packets through a wireless link [1][3] without aid of any fixed infrastructure and without any base-station or a router. Due to random mobility of individual nodes the link between respective source destination pair linked with aid of intermediate nodes the packet transmission [2] will be a challenging issue and its should be taken care of an efficient routing protocol.

In MANET, the prediction of mobile node is not always feasible due to random mobility of individual nodes because of mobility speed. Under this situation the route discovery process using fixed probabilistic route discovery degrades the network performance and each mobile node is fixed regardless of topological information due to mobility of individual nodes and the forwarding probability [11] should be fixed ad higher if a node surrounded by in large number of nodes compared with less density of nodes.

REVIEW OF THE LITERATURE


BROADCASTING METHODS
Probabilistic Broadcast Ad Hoc On-Demand Distance Vector (PRAODV)
In On-demand routing protocols, there is no need of periodic updates regarding topological changes due to mobility of individual nodes and routing overhead is minimized as much compared with table driven routing protocols[4][7]. The required route between corresponding source destination pairs is discovered by route discovery and route maintenance phase.

The source node is initiated the route discovery phase by sending route request packet to its one hop neighbor. Then neighbor nodes start sending rebroadcast to its other one hop neighbor till the route is available or reaches to destination. The entire network performance is based on efficient route discovery [9] and maintenance process.

The forwarding probability at a node is fixed based on gathered local topological and neighborhood information and the neighborhood information is obtained by “hello” packet at regular intervals and to construct a list of one-hop neighbors.

In the conventional Ad hoc on demand distance vector routing protocol, the date dissimilation is based blind broadcasting [14] to immediate one hop neighbor and all the other nodes rebroadcast to other nodes in the entire network leads to the problem of broadcast storm and its reduce the network resources and affect the entire network performance. In this new broadcast approach is based on predefined probability “P” and this probability is defined based on neighbor information.

In this Probability based ad hoc on demand distance vector approach, the discovery phase is initiated by source node and rebroadcast probability by intermediate nodes and all the route request packet received first time by source node once the intermediate node knows the valid route between the route.
corresponding source destination pair. The total number of
mobile nodes said to be \(N_r\) and the total number of maximum
 rebroadcasts for individual nodes \(N_r-1\).

A source node broadcast its route request route packet to its one
hop neighbors with broadcast probability of \(P_b\) is unity
\((P_{b}=1)\). When one hop neighbor node receives first, the value of
probability of broadcast \(P_b\) is less than unity \((P_{b} < 1)\) Since the
rebroadcasting decision of each and every except source and
destination pair is independent, the possible number of entire
rebroadcasts is \(P_b \times (N_r-1)\) in the network.

**Broadcast Neighbor Discovery Scheme (BNDS)**

Broadcast Neighbor Discovery Scheme (BNDS) is a new
broadcasting approach to minimize the effect of flooding [12] by
reducing the redundant broadcast and thus the routing overhead
is also reduced. In BNDS, each node maintains a list of subsets of
its neighbor nodes to take forwarding decision to other mobile
nodes in the network. The list of subsets of neighbor contains
largest number of one hop neighbors with source node.

The main focus of this BNDS routing approach is to minimize the
unneeded redundant rebroadcast that leads to flooding. The
source node selects a group of its one hop neighbor to broadcast
the route request packet contains source and destination address
and subset of neighbor receives this forwarded packet and start
reply to source node otherwise it simply drops the received
packet.

When a route request packet reaches its appropriate destination
node, the destination starts reply to the source of the request,
and it does not forward further. The subsets of neighbor node are
assumed as degree of neighbor “D” where the degree of node \(N\)
fixed \(D(N)\) and it is the number of one-hop neighbors available
with source node and updated frequently in specified intervals.

If a sender \(S\) wants to send its data to destination node \(D\), it starts
initiated the route discovery phase by sending route request
packet to its nearest [15] one hop neighbors and need to select
first three or four forwarding nodes based on the degree of node
which is largest set and need to select its further forwarding
nodes (F) to reach destination node [16].

**Neighbor Aware Ad hoc on Demand Distance Vector
(NAAODV)**

The NAAODV scheme is based on AODV [2]. In this modified
approach, the routing decision is depending of its neighbor node
remaining energy available and neighbors check their table
whether it has the route. If it doesn’t have the route, it will
forward the packets to its neighbors [10].

The duplication of route request packets is avoided using the
sequence numbers of received packet and it is checked with the
existing one for the same packet.

Using this sequence number, the freshness of route is obtained
and it will be replaced. Otherwise the existing entry will be
maintained. Here, the transmission of route request packets
happens after getting the information about remaining energy of
the node.

**SIMULATION METHODOLOGY**

Network Simulator-2 is extensively utilized in the research
community to carry out network simulation and it is one of the
most popular simulators developed by VINT project and a
discrete event driven, object-oriented network simulating tool,
very much applicable for researchers, professors and students.

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packet rate from minimum of
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The traffic model for this variable packet rate from minimum of
4, 6, 8 and 10 of maximum using the packet size of 512 bytes. It
generates Traffic during ON period[13]. The table 1 gives the
details of parameters fixed for entire simulation and analysis of
the three different approaches. The following four performance
indices those substantially affect the performance of routing
protocol are throughput, delay, packet delivery ratio extracted
for analysis from simulation outcome.

| **Table 1. Simulation Parameters** |
|--------------------------|-----------|
| **Parameter**            | **Value** |
| Simulator                | NS2 (Version-2.35) |
| Simulation area          | 500 x 500 meters |
| Transmission range       | 250m |
| Mobility speed           | 10 m/s |
| Number of nodes          | 50 |
| Traffic type             | VBR |
| Mobility model           | Random way point |
| Packet rate              | 4, 6, 8 and 10 packets/sec |
| Packet size              | 512 bytes |
| Protocols                | PBAODV, BNDS, NAAODV |

**RESULT AND DISCUSSION**

**Throughput**

Fig. 1 depicts the variation of throughput of NAAODV, BNDS and
PBAODV for different data rates from 16 to 40 kbps. It is evident
that all three approaches BNDS, NDLV and NAAODV show closer
performance and provide better throughput from 16 to 24 kbps.

The performance of PBAODV is degraded overall than other two
techniques. NAAODV is showing better throughput for all the
data rate variation from 16 to 24 kbps. It is evident
other two techniques.

**Delay**

Fig. 2 Shows the variation of delay of NAAODV, BNDS and
PBAODV for variable different data rates. The results have
revealed PBAODV exhibit superior performance than all the two
techniques. It is evident that the two approaches BNDS, and
NAAODV consumes maximum delay from data rate 32 up to 40
kbps. The performance of NAAODV is degraded overall than
other two techniques.
The bar chart shown in Fig.3 shows the variation of packet delivery ratio for varying in data rate. It is seen that the delivery ratio for all the approaches is greater than 72 % for all the data rate variation. The BNDS and PBAODV have in general higher PDR than NAAODV and delivers the average of PDR 75 %.

### Routing Overhead

Fig.4 shows the variation of routing overhead (in packets) of NAAODV, BNDS and PBAODV for variable data rate. For the maximum data rate 40 kbps all the three approaches have increased routing overhead. It is seen that NAAODV has larger routing overhead other than the three approaches. It is clear that PBAODV has improved performance of overhead except for the initial data rate of 16 kbps.

### CONCLUSION

This paper investigates the issues concerning the variation data rate on the performance of three broadcasting techniques. The simulation study has been conducted using network simulator 2 for the performance comparison of PBAODV, BNDS and NAAODV protocols in different data traffic. It is clear that the having the possibility to use different data rate is an advantage than constant bit rate traffic. NAAODV exhibits encourage performance regarding throughput and PDR compared with other two techniques. It is observed in the analysis that PBAODV outperforms BNDS and NAAODV in general for all the data rates and it is suitable for both data traffic.

### REFERENCES


