JAYPEE INSTITUTE OF INFORMATION TECHNOLOGY

Computer Networks Project Report

V Semester

Performance Analysis of AODV and DSR Routing Protocol

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Description:

Mobile Ad-hoc Networks are a collection of two or more devices equipped with wireless communications and multi-hop networking capability. We compare the performance of two prominent on demand routing protocols for mobile ad hoc networks—Dynamic Source Routing (DSR) and Ad Hoc On-Demand Distance Vector Routing (AODV). We exhibit that though DSR and AODV share an inherent on-demand behavior, the nuances in their protocol mechanics lead to performance differentials . The simulation is carried out in NS2 where we employ the new trace format to base our comparisons.

Simulation Environment:

The network simulations have been done using network simulator NS-2 The network simulator **NS-2** is discrete event simulation software for network simulations which means it simulates events such as sending, receiving, forwarding and dropping packets. The latest version, ns-allinone-2.34, supports simulation for routing protocols for ad hoc wireless networks such as AODV and DSR. We chose a Linux platform i.e. **UBUNTU** , as Linux offers a number of programming development tools that can be used with the simulation process.

AODV Routing Protocol:

Ad hoc On Demand Distance Vector (AODV) is a reactive routing protocol which initiates a route discovery process only when it has data packets to transmit and it does not have any route path towards the destination node, that is, route discovery in AODV is called as on-demand. AODV uses sequence numbers maintained at each destination to determine freshness of routing information and to avoid the routing loops that may occur during the routing calculation process. All routing packets carry these sequence numbers.

DSR Routing Protocol:

The Dynamic Source Routing (DSR) protocol is a reactive routing protocol based on source routing. In the source routing, a source determines the perfect sequence of nodes with which it propagate a packet towards the destination. The list of intermediate nodes for routing is explicitly stored in the packet's header. In DSR, every mobile node needs to maintain a route cache where it caches source routes.

When a source node wants to send a packet to some other intermediate node, it first checks its route cache for a source route to the destination for successful delivery of data packets. In this case if a route is found, the source node uses this route to propagate the data packet otherwise it initiates the route discovery process. Route discovery and route maintenance are the two main features of the DSR protocol.

Loss Monitor Agent:

Loss Monitor is attached with receiver node in TCL script. Loss Monitor objects trace out the lost packets, and received packets and stores the corresponding details. Packet Loss is measured by accessing the loss monitor object. Received bytes are obtained using inbuilt variable bytes.

Performance Metrics:

While analyzed the AODV and DSR protocols, we focused on four performance metrics for evaluation which are **Packet Delivery Fraction (PDF), Average End-to-End Delay, Normalized Routing Load (NRL) and Throughput.**

Packet delivery fraction (PDF) is the fraction of all the received data packets successfully at the destinations over the number of data packets sent by the CBR sources.

Average End to End Delay is the average time from the transmission of a data packet at a source node until packet delivery to a destination which includes all possible delays caused by buffering.

Normalized Routing Load (NRL) is as the ratio of all routing control packets sent by all nodes to the number of received data packets at the destination nodes.

Throughput is the average number of messages successfully delivered per unit time number of bits delivered per second.

Data Analysis:

The results we got after performing the AODV and DSR algorithm over 20 mobile nodes are-

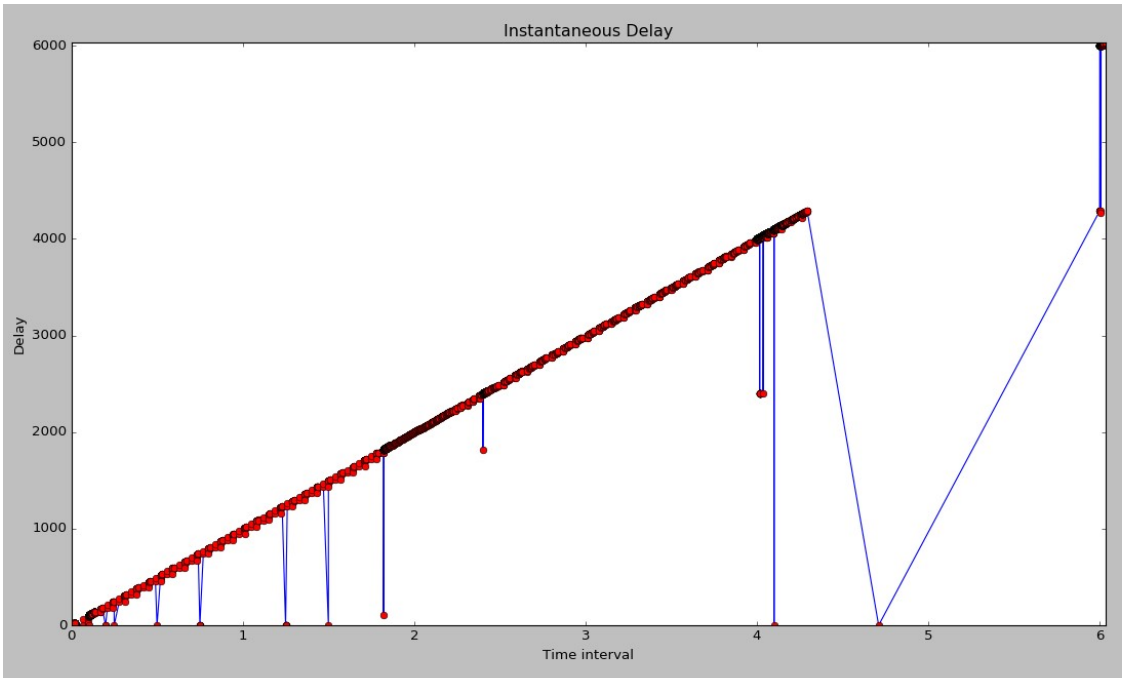
Performance Metric	DSR	AODV
Avg end-to-end delay	4689.15 ms	6027.57 ms
Avg throughput	473.98 kbps	101.83 kbps
Routing overhead	1.205	1.873
Packet Delivery Ratio	48.0892	99.3377

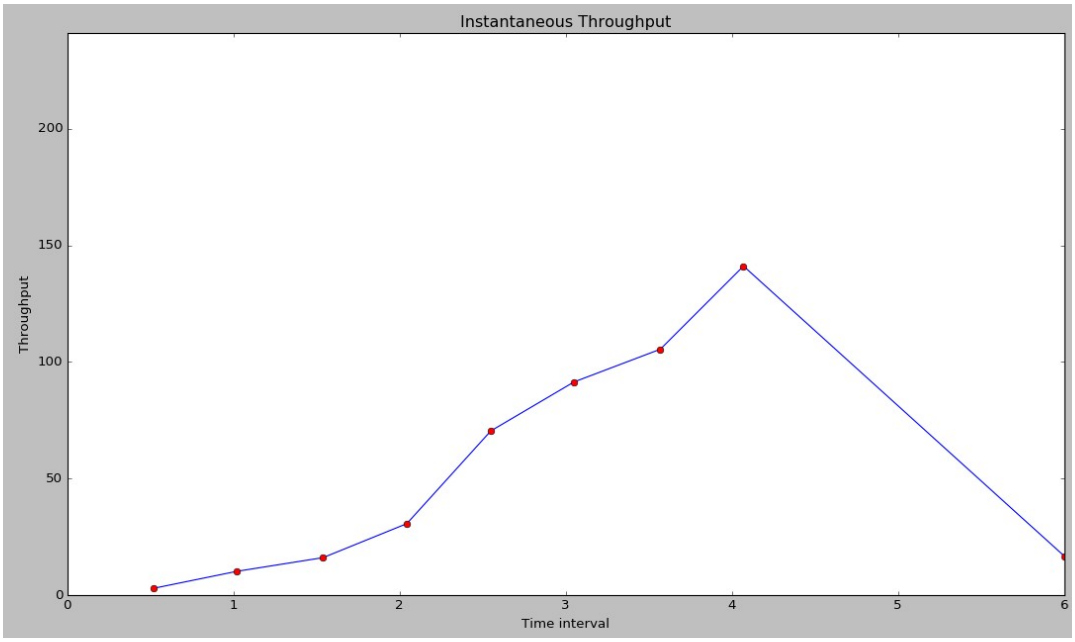
CONCLUSION:

In this our simulation work, the routing protocols: AODV and DSR are evaluated for the application oriented performance metrics like packet delivery fraction, average end-to-end delay, throughput and normalized routing load. As a result of our studies, we concluded that AODV exhibits a better performance in terms of packet delivery fraction and throughput with increasing number of mobile nodes due to its on demand characteristics to determine the freshness of the routes. It is proved that the AODV has slightly higher average end-to-end delay than DSR. Our result also indicates that as the number of nodes in the network increases AODV and DSR gives nearly constant throughput. Considering the overall performance, AODV performs well with varying network size.

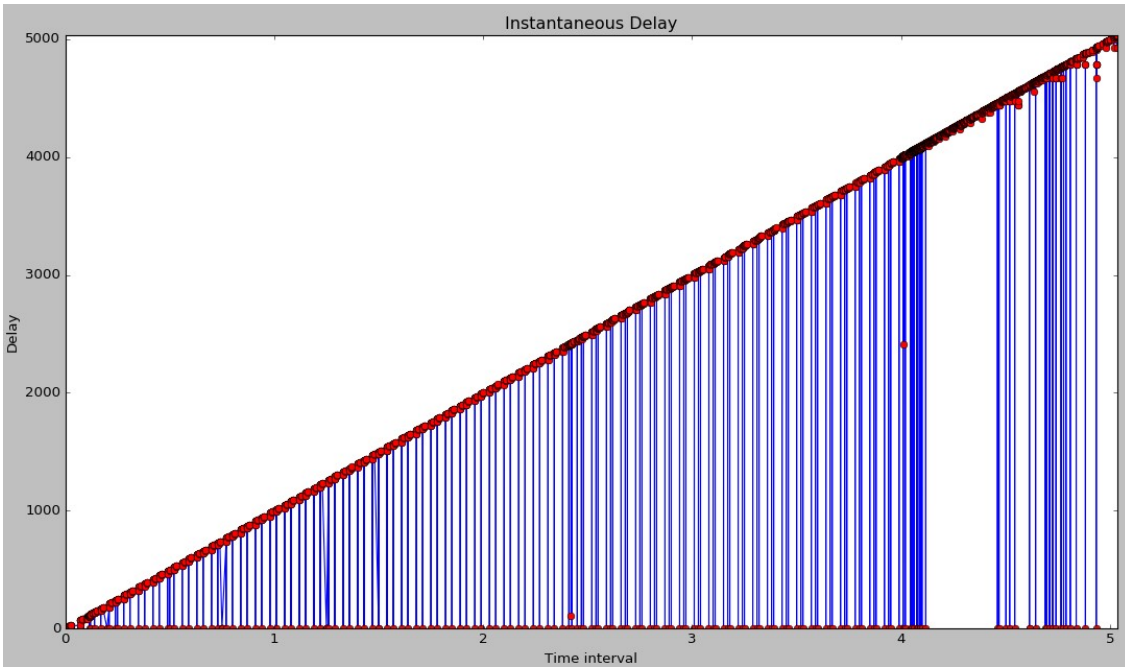
Visualization Of Data:

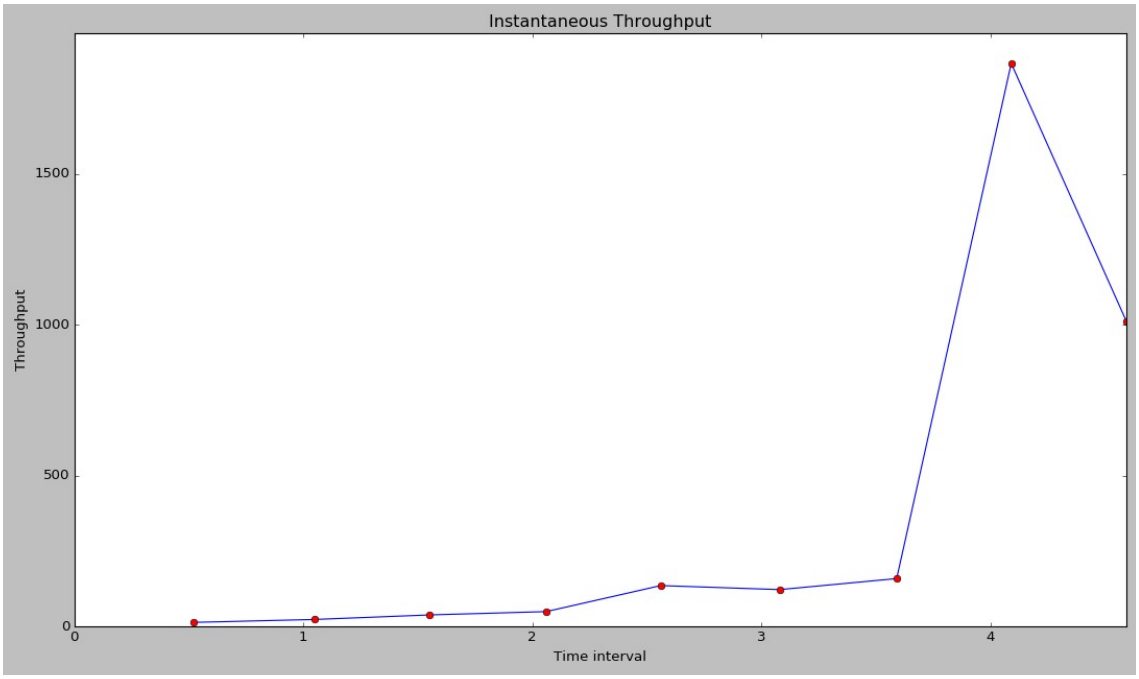
AODV-





DSR-


Instantaneous Delay
Delay
Time interval
0
1000
2000
3000
4000
5000
0
1
2
3
4
5


Instantaneous Throughput
Throughput
Time interval
0
500
1000
1500
0
1
2
3
4