that are going to be traced during simulation must be selected before the simulation. The trace file then can be scanned and analyzed for various parameters that we want to measure.

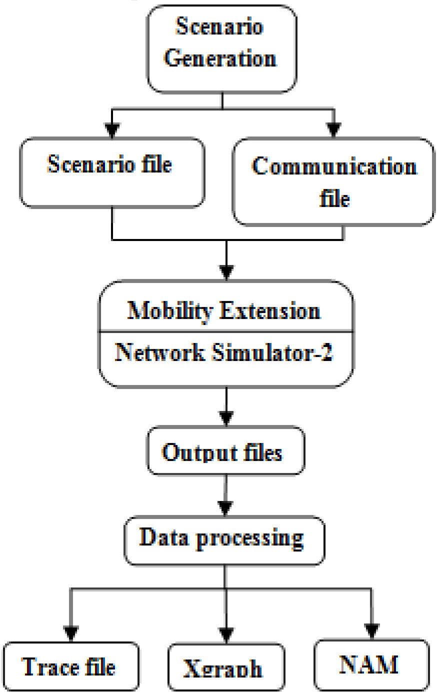

Figure 1: Simulation analysisusing NS-2

We have studied the performance analysis of AODV, DSDV and DSR for different number of nodes – 10, 20, 40 and 100.

4.1 Performance Parameters

Sending Throughput: - Throughput in this simulation is defined as the total number of bits generated per second throughout the network. It is denoted by bps (generated bits per second). It signifies the capacity of the network to utilize available bandwidth.

Received Throughput: - It is defined as the total number of bits received per unit of time. It signifies the useful utilization of available bandwidth.

Packet Loss: - It signifies the reliability of the network. We calculate it as:-

Packet Loss = Total Packets sent – Total Packets Received

Simulation Time: - The time for which simulations will be run that is time between the starting of simulation and when it ends.

Network size: - It determines the number of nodes and size of area that nodes are moving within. Network size basically determines the connectivity. Less number nodes in the same area mean fewer nodes to communicate to, but also smaller probability of collision.

Number of nodes: - This is constant during the simulation. We used 10, 20, 40 and 100 nodes for simulations.

Environment Size: - It determines the size of the environment. We have used a size of 500X400.

4.2 Simulation Environment

Initially we have chosen the simulation of 10 nodes in 500X400 square meter area, in other words we have chosen two dimensional area (2D) rectangles. The position of each mobile node is represented in 2D grid; the X-axis value is chosen from the range of (0,500) and Y-axis value is chosen from the range of (0,400). In random waypoint model, a mobile node is assigned a destination. The mobile node then moves to the destination at given speed. Once the destination is reached, the mobile node stops for a given pause time. The mobile node then chooses another random destination for mobile node's next movement. We have used CBR sources that started at different times because we want to get a general view of how routing protocol behaves, rather than TCP sources which use flow control and retransmission feature. We have assumed bidirectional links during our simulations i.e. links work well in both directions. Because bidirectional links are necessary if 802.11 acknowledgements are supposed to be used. Traffic load is taken very low. The traffic consists of 8 connections. The source destination pairs are chosen at random. Table 2 summarizes our parameters.

Table 2: Simulation Parameters

Parameter	*Value*
Number of nodes	10, 20, 40 and 100
Simulation time	200 sec
Node speed	10 m/s
Pause Time	0 sec
Environment Size	500x400
Packet size	512 bytes
Traffic Type	Constant Bit Rate
Packet Rate	4 packet/sec

Here three MANET routing protocols are taken AODV [3, 4], DSR [5], DSDV [7, 9]. The relationship between simulation time and throughput is calculated, and comparison of throughput is performed between these protocols.

4.3 Simulation Result

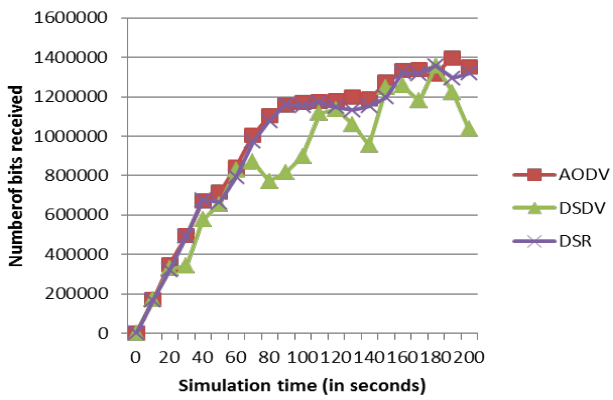

Figure 2: Received Throughput (bps) for 10 nodes

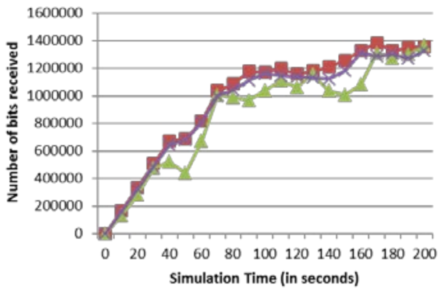

Figure 3: Received Throughput (bps) for 20 nodes

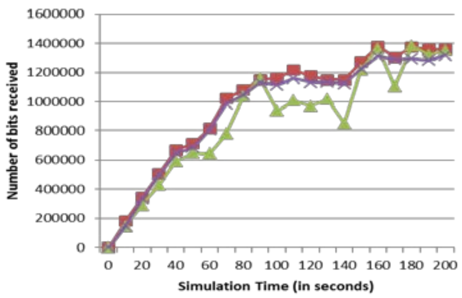

Figure 4: Received Throughput(bps) for 40 nodes

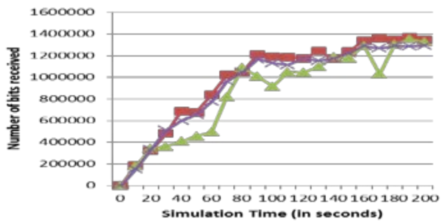

Figure 5: Received Throughput (bps) for 100 nodes

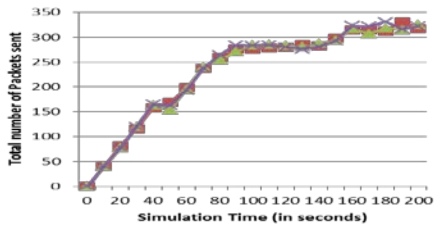

Figure 6: Throughput (Packets Generated per second) for 10 nodes

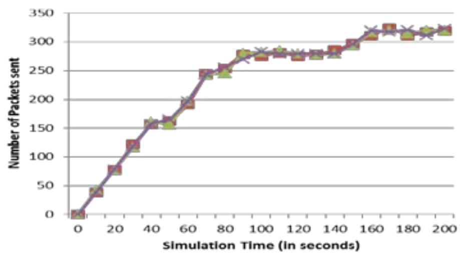

Figure 7: Throughput (Packets Generated per second) for 20 nodes

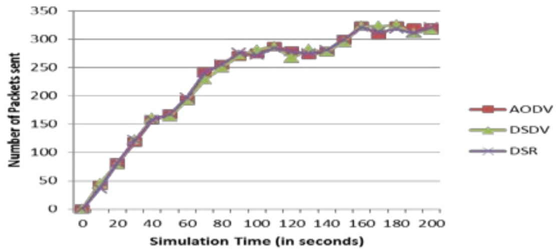

Figure 8: Throughput (Packets Generated per second) for 40 nodes

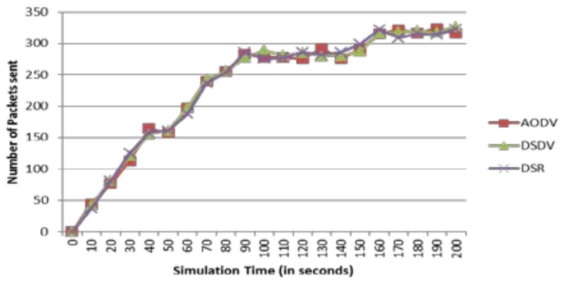

Figure 9: Throughput (Packets generated per second) for 100 nodes

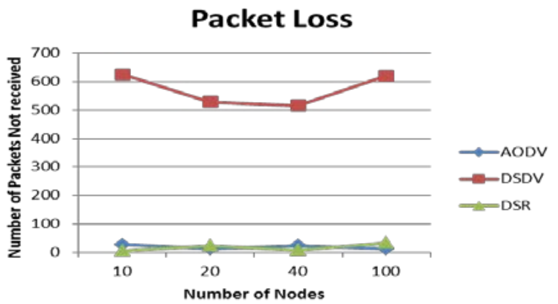

Figure 10: Packet Loss vs Number of nodes

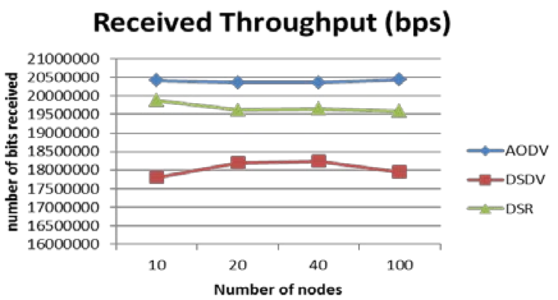

Figure 11: Received Throughput vs Number of nodes

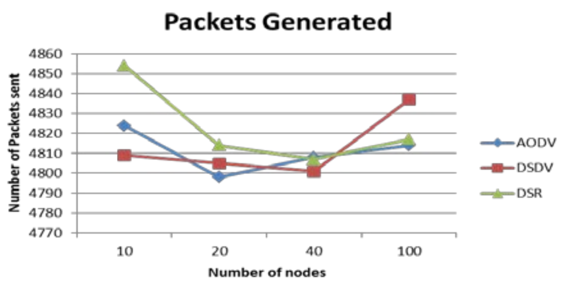

Figure 12: Sending Throughput vs Number of nodes

5. Conclusion

In this paper the analysis of adhoc routing protocol is done in the above mentioned mobility and traffic pattern on different number of nodes and simulation duration. AODV and DSR show much better Received Throughput than DSDV for entire duration of simulation window. DSR performance matches with AODV when number of nodes is less but AODV shows clearly better performance when number of nodes are 100.

DSDV Sending throughput performance fluctuates for lesser number of nodes but as number of nodes is increased upto 40, DSDV performance improves and matches with those of AODV and DSR.

DSR and AODV packet loss performance is much better than DSDV. DSR gives slightly better performance when number of nodes is less but as it reaches to 100, AODV wins in this performance metric as well. Overall, we conclude that AODV shows better performance than DSR and DSDV.

6. Future Scope of the Work

Our analysis is limited to three commonly used protocols in adhoc network which falls under category of topology based proactive and reactive protocols. Further study can be done on topology based hybrid routing protocols like ZRP. One can also do the performance analysis of position based routing protocols like DREAM or LAR.

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