RWP Mobility Model based Performance Evaluation of IARP, IERP and Ospfv2 in MANET

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ABSTRACT
We have analyzed performance of IARP, IERP and OSPFv2 routing protocols. The performace simulations on QualNet 5.0.2 simulator and performance of IARP, IERT and OSPFv2 routing protocols have been evaluated for varying node density (20, 40, 60, and 80) with varying speed (10, 20). The performance of these routing protocols has been analysed on the basis of performance metrics such as average end-to-end delay, average jitter and average throughput. It has been observed that IERP routing protocol outperform IARP and OSPFv2 in case of 20 nodes density in case of throughput. However, the IARP routing protocol clearly outperforma IERP and OSPFv2 routing protocols as the IARP routing protocol has shown the quite satisfactory results for average-end-to-end delay and average jitter in comparison of IERP and OSPFv2 routing protocols. Overall, the performance of all routing protocols simulated in this paper was highly affected with increasing node density and speed.

Keywords
MANET, Routing Protocols, Performance Metrics

1. INTRODUCTION
A dynamic network formed by mobile nodes in an arbitrary manner is known as Mobile Ad-hoc Network (MANET)[1]. Minimal configuration, quick deployment and unavailability of a central control make Ad-hoc networks appropriate for various situations like natural disasters, emergency medical situations, conferences etc. In MANET the availability of a node is an important issue [2]. The link between nodes in a MANET gets failed due to mobility of nodes. Hence, identification of a quick and an optimal path between nodes (source to sink node) is crucial. The mobility is main cause of availability of paths at a particular moment which may vary in an Ad-hoc network time to time[3]. Routing in MANETs is tricky task as topology changes very frequently. That is why routing in the MANETs has earned a big amount of focus from researchers and scholars. Mobility can be defined as movement of a mobile node from one place to another place. When a node moves from one place to another place it affects topology simultaneously and as a result the link gets broken. The mobility behavior of a node reflects the performance of routing protocols. Under the mobility modeling, the behavior or activity of a node movement can be described using mobility models. In this paper the authors are trying to analyze the performance of IARP, IERP AND OSPFv2 under Random Waypoint mobility model in MANET.

Many researchers have studied and analyzed various ad-hoc routing protocols through dissimilar simulators by using various performance matrices. Y. Navaneeth Krishnan, Dr Shobha [4] have explored two protocols namely Open Shortest Path First (OSPF) and Enhanced Interior Gateway Routing Protocol (EIGRP). They have evaluated the performance on the basis of End-to-End delays, Throughput performance metrics using the simulation. The evaluation results indicated that EIGRP routing protocol outperform OSPF routing protocol.

Jagdeep Singh, Dr. Rajiv Mahajan [5] have conducted a simulation based study for RIP, EIGRP and OSPF using the OPNET simulator. They have found that EIGRP performs poor in comparison to other routing protocols. The performance evaluation of a routing protocols in a specific MANETs is not an easy task as the performance of a routing protocol may get affected by the various parameters such as mobility, energy, node, channel etc [6]. Several past studies have been conducted on the performance comparison of Ad hoc routing protocols by using various network performance parameters and with the different network simulators. In the studies different traffic pattern have also been considered. A big amount of literature is available in different source related to the MANETs which actually directs the future of ad-hoc network [7, 8, 9, 10]. The present trend as it has been mentioned in various studies of the MANETs indicated that the researchers are focusing to study the role of MANETs for the futuristic wireless technologies [11, 12].

The entire paper has been organized in three sections; Section I discusses the introduction with the detail of previous work in this area. Section II provides some guidelines about simulation environment and, Section III represents simulation results and analysis including some concluding remarks. At last in section IV and V the conclusion and animation view of the study has been presented.

2. SIMULATION ENVIRONMENT
The performance evaluation of IARP, OSPFV2 and IERP has been conducted using the simulation. To conduct the simulation various parameters such as node, mobility and random waypoint mobility model have been used. We have performed simulations study using QualNet 5.0.2 simulator [13] and performance of IARP, IERP and ZRP routing protocols are evaluated for varying nodes 20, 40, 60 abd 80 in 1500 m X 1500 m terrain area with Random Waypoint mobility. Performance of routing protocols is compared on the basis performance metrics namely average delay, jitter and throughput[14]. Simulation was conducted for the 120 seconds by transferring 5000 packets using packet size of 1024.

3. SIMULATION RESULTS AND ANALYSIS

The performance comparison of IARP, IERP and OSPFV2 routing protocols using random waypoint mobility model for varying nodes scenario under varying speed 10-20 has been presented. The simulation results for IARP, IERP and OSPFV2 routing protocols are presented as under:

i. *Average End-to-End Delay(s):*

The average end-to-end delay of IARP routing protocol is least in comparison of IERP and OSPFV2 routing protocols. However, the average end-to-end delay is higher for IERP routing protocol in comparison of OSPF and IARP routing protocols. The simulation results for average end-to-end delay are shown in Figure-1.

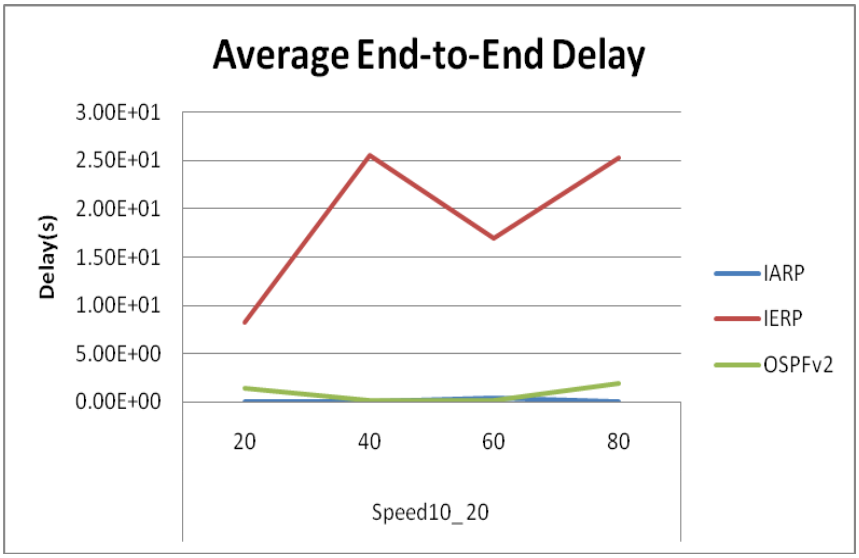

Figure 1: Average End-to-End Delay of IARP, IERP and OSPFV2 routing protocols.

ii. *Average Jitter(s):*

The average jitter is least for IARP routing protocol than that of IERP and OSPFV2. The IERP routing protocol indicated the higher jitter than that of IARP and ZRP. The simulation results for average jitter are shown in Figure-2.

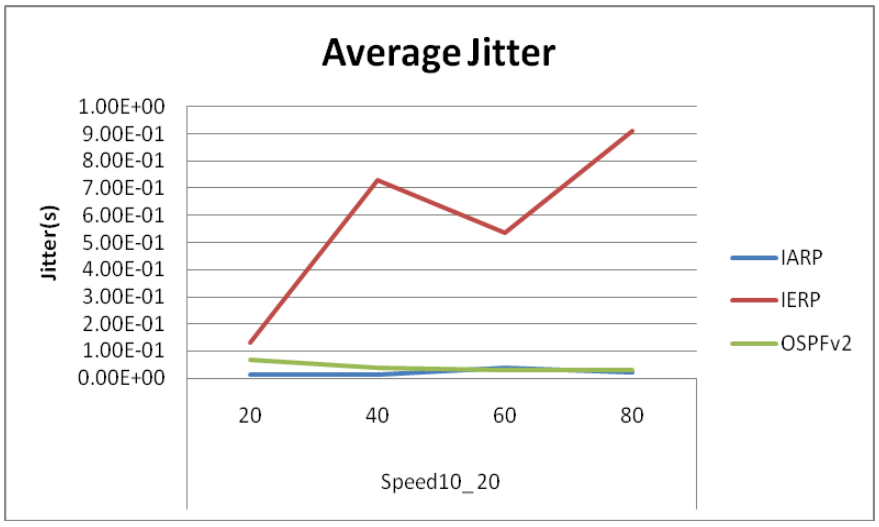

Figure 2: Average Jitter of of IARP, IERP and OSPFV2 routing protocols.

iii. *Throughput Analysis:*

The simulation results are clearly indicating that the overall performance of IARP routing protocol is better in comparison of IERP and OSPFv2 routing protocols in all cases. On otherhand the performance of IERP is quite satisfactory than than of OSPFV2 in high speed. The comparative results of IARP, IERP and OSPFV2 is graphically represented in Figure-3.

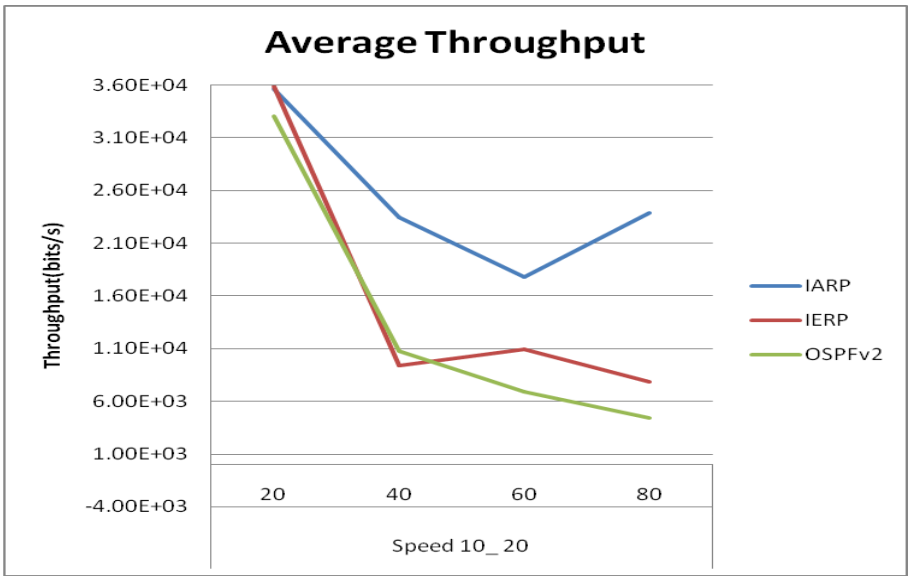

Figure 3: Average Throughput of IARP, IERP and OSPFV2

4. CONCLUSION

The performance evaluation of IARP, IERP and OSPFV2 routing protocols have been conducted using QualNet simulation. Performance of routing protocols is compared on the basis performance metrics namely average delay, jitter and throughput. It has been observed that IERP routing protocol outperform IARP and OSPFv2 in case of 20 nodes density in case of throughput. However, the IARP routing protocol clearly outperforma IERP and OSPFv2 routing protocols as the IARP routing protocol has shown the quite satisfactory results for average-end-to-end delay and average jitter in comparison of IERP and OSPFv2 routing protocols. Overall, the performance of all routing protocols simulated in this paper was highly affected with increasing node density and speed. In general, it can be state that any MANET is need to be formed or setup for any terrain size, then a proper indepth analysis is required [15].

5. ANIMATION VIEW

Animation view of simulation scenario for the performance comparison of IARP, IERP and OSPFV2 is given in the Figure-4.

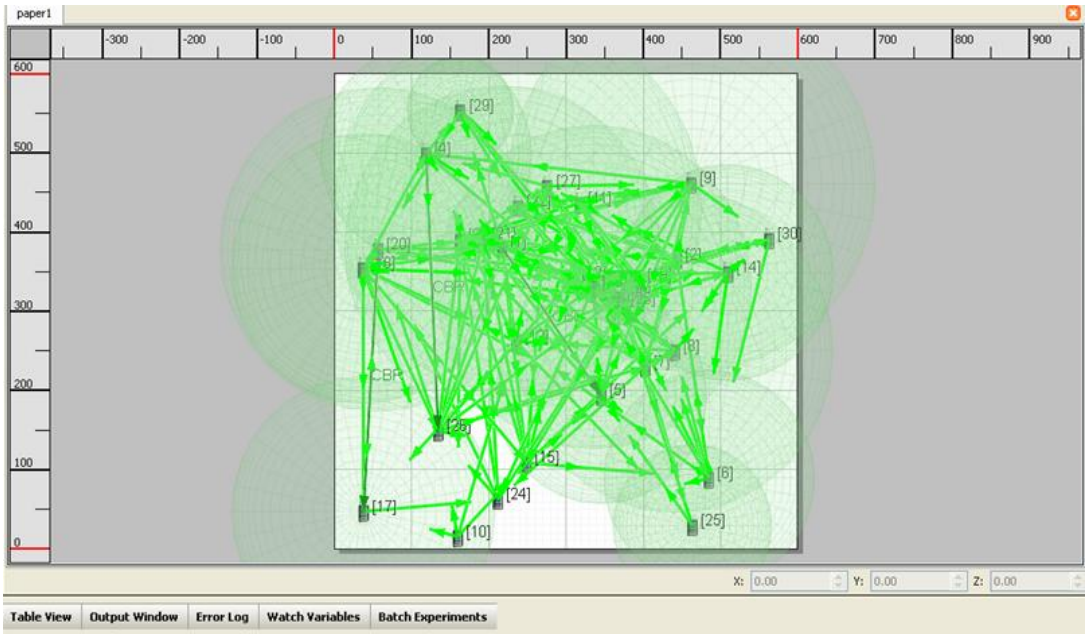

Figure-4: Animation view of simulation scenario of IARP, IERP and OSPFV2 routing protocols.

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