

Exhaustive Study on the Infulence of Hello Packets in OLSR Routing Protocol

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Abstract

OLSR routing protocol is one of the foremost used proactive routing protocol used in MANETS. The MANETS is an autonomous network, consisting of many sensor nodes, which are mobile in nature. The routing is the most key issue in MANETS, as the nodes are mobile in nature, so there is no fixed topology. In this paper our interest is focused on the OLSR routing protocol, which uses hello and topology control (TC) messages to discover and then disseminate link state information throughout the mobile ad hoc network. In this paper we discuss the impact of Hello messages on the performance of OLSR in term of load, delay and throughput using OPNET.

Keywords: HELLO, OPNET, OLSR, Routing, Delay, Load, Throughput.

1. Introduction

MANET network is group of mobile nodes, where each node act as router. The OLSR is one of the most popular proactive routing protocol used in MANET. .Proactive routing is based upon table driven approach which find routes before they need it[9]. OLSR is a type of classical link-state routing protocol, which relies in employing an efficient periodic flooding of control information using special nodes that act as multipoint relays (MPRs). The use of MPRs daemons periodically exchange different messages in order to maintain the topology reduces the number of required transmissions, OLSR information of the entire network in the presence of mobility and failures. The core functionality is performed mainly by using three different types of

messages: HELLO, TC (topology control), and MID (multiple interface declaration) messages [5].

Discussion three types of OLSR control messages:-

HELLO: This attribute in OPNET specify the time interval in seconds between Hello packets. HELLO messages are transmitted to all the neighbours. These messages are used for finding the information about the link status and the host's neighbours and MPR calculation.

TC: Topology Control messages are the link state signalling done by OLSR. These messages are broadcast throughout the network. These messages are used for broadcast information about own advertised neighbour which include at least the MPR selector list. The TC messages are propagate periodically and only the MPR hosts can forward the TC messages

MID: Multiple Interface Declaration messages are transmitted by nodes running OLSR on more than one interface. These messages list all AP addresses used by a node. The MID messages are broadcasted throughout the entire network only by multipoint relays [6].

The organization of the paper is as follows. Discussion of related work in section II, related works are discussed section III explains the simulation and performance, section IV shows the result and section V explains the conclusion of the paper.

2. Related Work

Tuning OLSR done by Yang Cheng Huang, Saleem Bhatti and Daryl Parker [8]. They conclude that OLSR routing performance largely depends on the value of the HELLO interval timer. That is, the protocol throughput is improved by setting up useable routes quickly and this is related to how quickly neighbouring nodes are detected. Performance Evaluation of AODV, DSR and OLSR Mobile Ad hoc Network Routing Protocols using OPNET Simulator is done by S. Meenakshi Sundaram, Dr.S.Palani and Dr. A. Ramesh Babu [1]. They conclude that OLSR perform well with large network sizes and high mobility. A New OLSR Routing Protocol in Cognitive Wireless Mesh Networks by Venkaiahnaidu.A1, B.Ramesh Babu, Sk.Mansoor Rahaman and K.Rajasekhara Rao [3]. They conclude that OLSR compare will able to increase the overall throughput in the cognitive mesh networks.

Improvement over the OLSR Routing Protocol in Mobile Ad Hoc Networks by Eliminating the Unnecessary Loops by Shahram Behzad, Reza Fotohi [4]. They conclude that we improve the OLSR routing protocol by eliminating the unnecessary loops. and the throughput is improved. Comparative Study on Routing Protocols GSR, OLSR and CAR in VANETs done by Nitin Kumar Verma and Swati Arya [5]. They conclude that OLSR is a proactive link-State routing protocol which has been designed for mobile ad hoc networks (MANETs and VANETs). It uses multi point Relay that reduces the number of required transmissions. Optimize OLSR with Cognitive in Wireless Mesh Network done by Manpreet Kaur and Kunwerpal [6]. They conclude that when OLSR will implemented, framework is needed for routing the packets, here

we use OLSR proactive routing protocol. The overall study shown that the performance of OLSR in term of throughput is better than many protocols like GRP, AODV, TORA AND ABR. OLSR mainly suited for large networks. Tuning OLSR shows better throughput than simple OLSR.

3. Simulation and Performance

| SIMULATION PARAMETERS | VALUES |
|-----------------------|------------------|
| MAX SIMULATION SIZE | 1800 SEC |
| ENVIRONMENT SIZE | 100 * 100 |
| NUMBER OF NODES | 75 |
| ROUTING PROTOCOL | OLSR |
| TRAFFIC TYPE | FTP |
| NETWORK TYPE | ADHOC (MANET) |
| HELLO INTERVAL | 0.5, 2, 4 SECOND |
| SIMULTOR | OPNET 14.5 |

- *Performance-* In this paper an attempt is made to discuss the impact of “ Hello packets” on the load, delay and throughput. An attempt is made to overall improve the performance of algorithm by varying time intervalof “ Hello” packets and discussing the variation shown by the results. Normally or default value of OLSR is set at 2.0 Hello interval. We have taken three different values for Hello packet interval
 - a) Value of Hello interval = 0.5 second . Various results are represented by Green colour in all graphs for this interval.
 - b) Value of Hello interval = 2.0 second . Various results are represented by Blue colour in all graphs for this interval.
 - c) Value of Hello interval = 4.0 second . Various results are represented by Red colour in all graphs for this interval.

4. Result and Discussion

1. **Hello Packet interval Impact on Number of hello packets sent**–OLSRsends periodic HELLO messages locally to detect neighbour changes, and exchanges topology information among all the nodes of the network. More the value of exchange better is the performance. When the value is set to the smallest i.e. 0.5 , it sent most hello packets. As shown by fig.1,when the value of Hello interval increase, the Hello Messages sent decrease. Overall conclusion is that when the value of Hello interval increased, the value of Hello packets sent decreased.

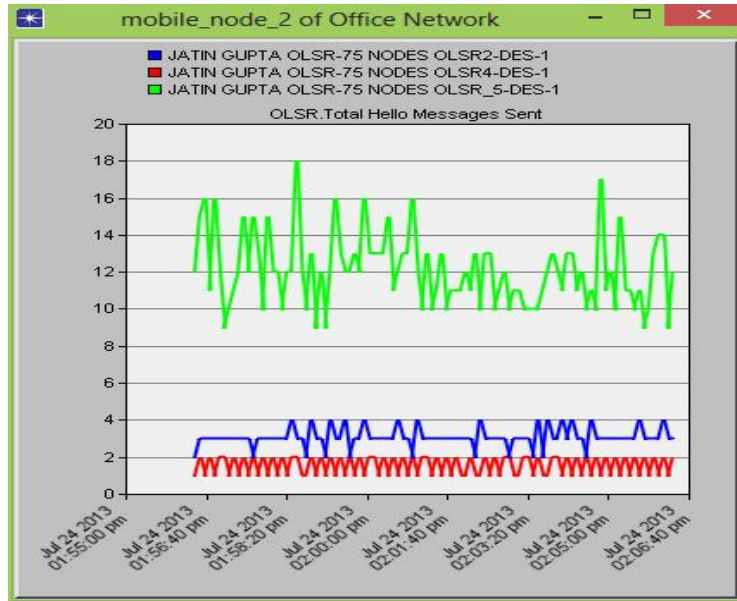


Figure 1: Hello Packets sent (75 nodes).

2. **Hello interval Impact on LOAD** – The load increase with the small value of hello interval. In fig.2, red line showing the least delay has value 4.0 for hello interval. Increasing the value of hello interval decrease the load. The value of Load always effect the value of throughput. More is the load , greater is the Throughput. We conclude that the as the value of hello interval decreases the performance in term of load starts to cut down.

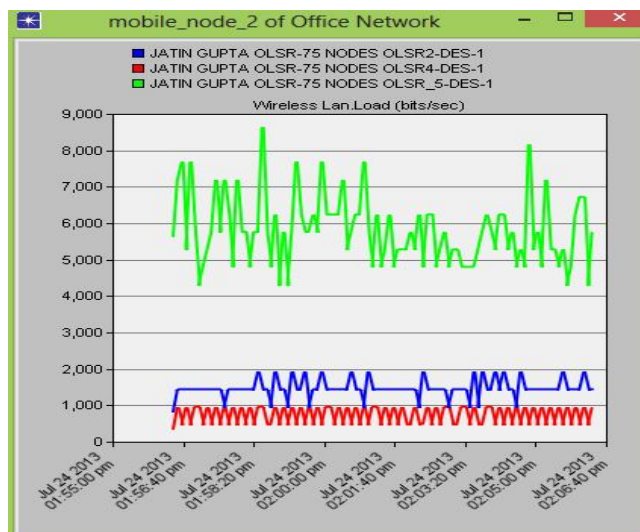


Figure 2: Load (75 nodes).

- 3. Hello Interval's Impact on DELAY-** The delay shown by Fig.3, the simulation result has shown that the delay is nearly same for 2.0 sec and 4.0 sec hello interval value. The delay starts to marginally increase with detracton of hello interval value.

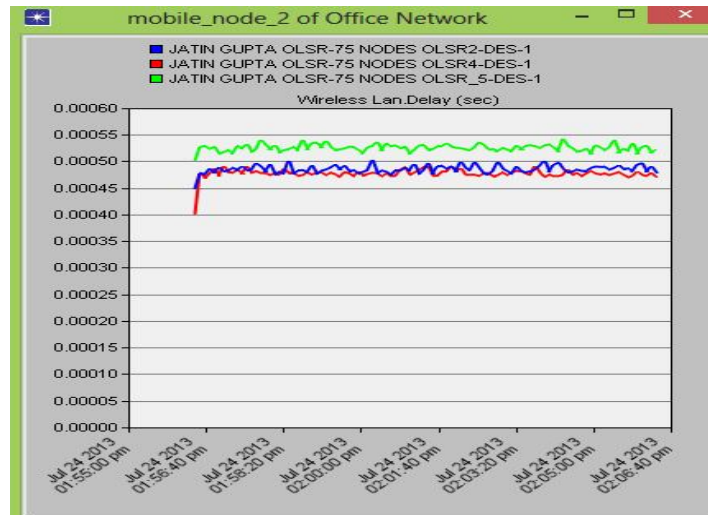


Figure 3: Delay (75 nodes).

- 4. Hello Interval's Impact on THROUGHPUT-**The throughput is the most important performance parameter considered for any routing protocol. Our basic aim is to achieve the maximum throughput. As we discussed above the value of throughput increase with increase in load value. The throughput of normal OLSR is at 2.0 hello interval. Our attempt to increase throughput is successful when we set the value of hello interval to 0.5. The throughput shows the enormous increase , when the value of hello interval is 0.5 , as shown in fig.4.

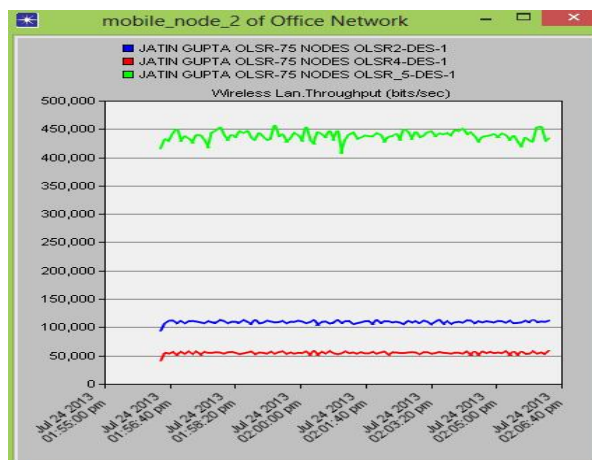


Figure 4: Throughput (75 nodes).

5. Conclusion

The simulation study has shown that the Hello interval in OLSR has great impact on the performance of various factors i.e. Hello packets sent, load, delay and throughput. The smallest value of hello interval (0.5 second) in simulation shown the most splendid results. Best performance shown by OLSR ,when the value of hello interval set to be 0.5 second. The throughput decrease as the value of hello interval increases. The hello interval plays a vital role in OLSR tuning. The throughput is the best measure to check the performance. When the value of hello interval is set to (0.5 second) there is simulation shows corpulent increase in throughput. The simulation study is done for 75 mobile nodes. Simulation study has shown that the performance of OLSR routing protocol improves, when the exchange of hello interval packets in network is greater. The performance of OLSR vitiates with the increase in value of hello interval, as shown by simulation study the value (4.0 seconds), shows the worst performance. In future our target is to further tune the performance of OLSR with using best compatible hello interval value.

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