Impact of Network Size on the Performance of OLSR Routing Protocol using Random Placement model in MANETs

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Abstract

A MANET is a type of infrastructure less wireless network that can change locations and configure itself instantaneously. MANETS being mobile, they use wireless connections to connect to different networks. In this paper we analyze the impact of Network size on the performance of OLSR routing protocol using random placement model in MANETs.

Keywords: *MANET, OLSR, Network Size*

I. INTRODUCTION

Wireless communication is among technology's biggest gift to mankind. MANETs are a kind of wireless networks which do not have any pre-existing infrastructure [1]. MANETs have significant importance in research in the recent years. Routing in MANETs is considered to be a challenging area. Many researchers have proposed different routing protocols. Among the different proactive routing protocols OLSR routing protocol has less average end to end delay and has less routing overhead.

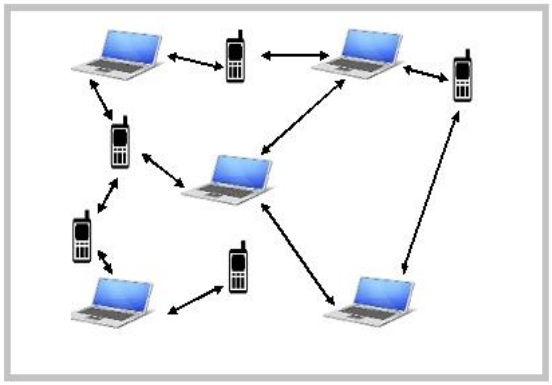

Fig 1: MANET

II. OLSR ROUTING PROTOCOL

OLSR is optimized link state routing proactive routing protocol. It uses the different functionalities like link status sensing with neighbours, multi-point relay forwarding, etc. It exchanges topology information with other routers in the network frequently. "MPR flooding", in OLSR provides an effective method for information distribution within the MANET.

Characteristics of OLSR:

- Defines three essential types of control messages like Hello, Topology control and Multiple Interface Declaration messages.
- Reduces control traffic overhead by using Multipoint Relays (MPR) [4]
- HELLO messages [3][4] are broadcasted occasionally for neighbour sensing
- Network topology information [3][4] is extracted from topology control (TC) packets.
- Shortest path algorithm is used for route calculations [3]

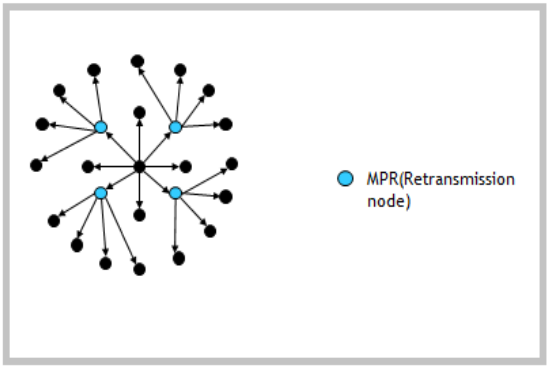

Fig 2: OLSR – Multi point Relays

III. SIMULATION ENVIRONMENT

Impact of network size on the performance of OLSR routing protocol is examined with OPNET Simulator.

Simulation Parameters:

Parameter	Value
Routing Protocol	OLSR
Simulation time	300sec
Simulation Area	1000m x 1000m
Node Type	MANET
Network Size	30, 60 and 90 nodes

Nodes Placement	Random
Mobility Model	Random Way Point
Operational mode	802.11b
Data rate	11Mbps
Address mode	IPV4

Table 1: Simulation Parameters

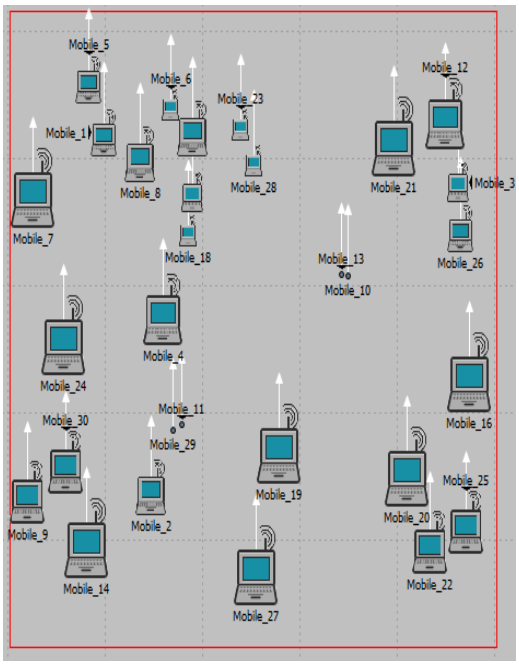

Fig 3: Simulation with 30 Nodes

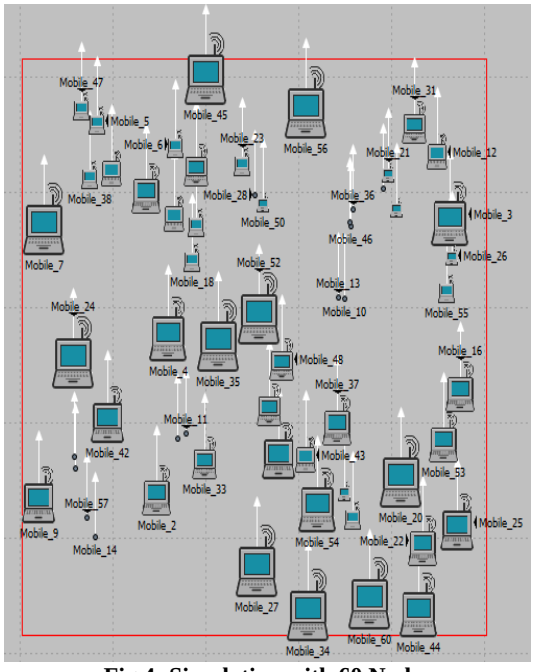

Fig 4: Simulation with 60 Nodes

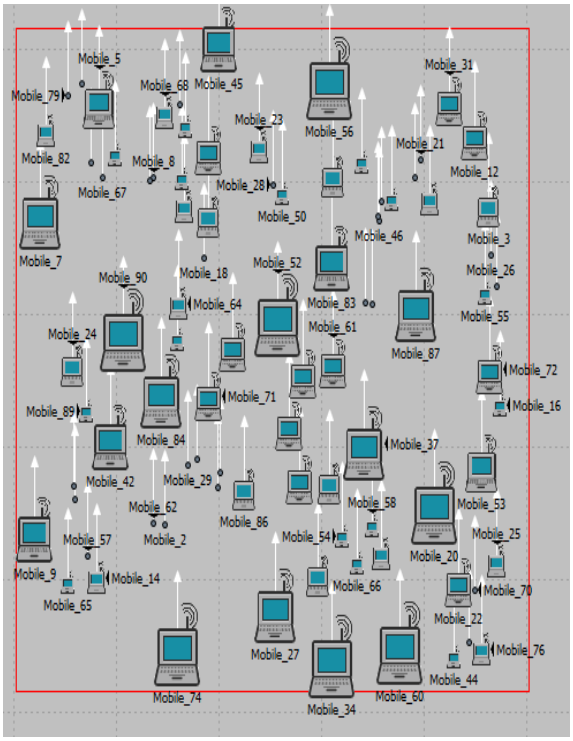

Fig 5: Simulation with 90 Nodes

IV. EXPERIMENT RESULTS

The performance of OLSR routing protocol is analysed using the following metrics.

A. Throughput:

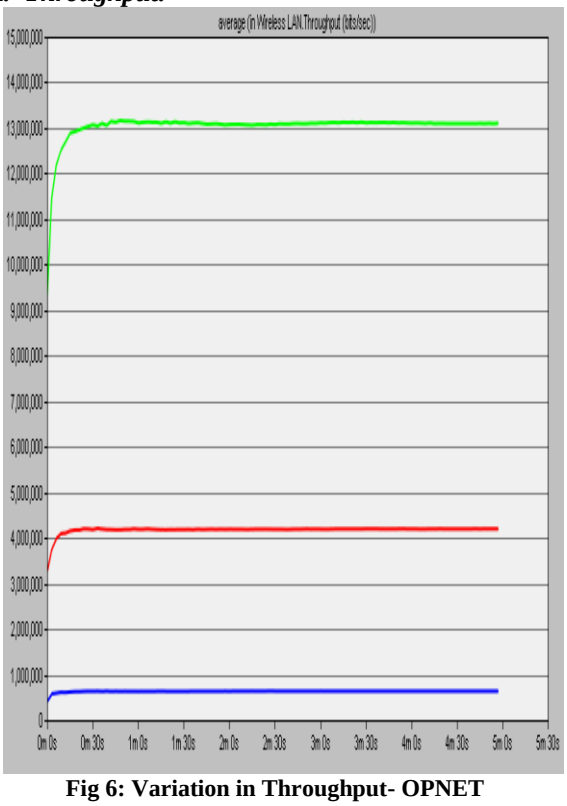

Fig 6: Variation in Throughput- OPNET

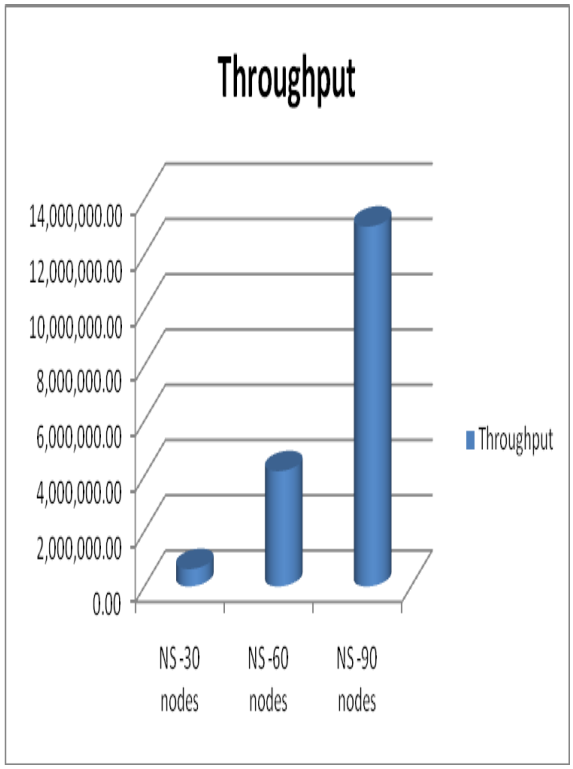

Fig 7: Variation in Throughput

B. Load:

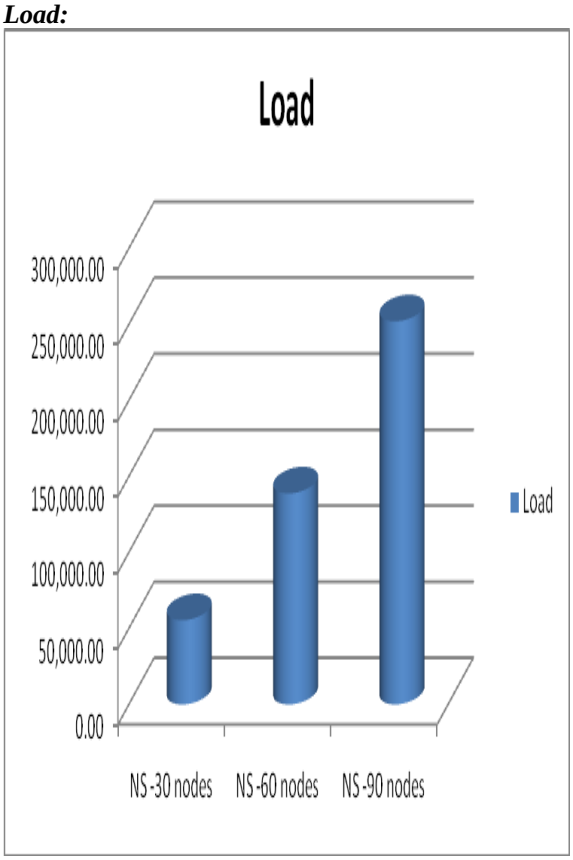

Fig 8: Variation in Load

C. Delay:

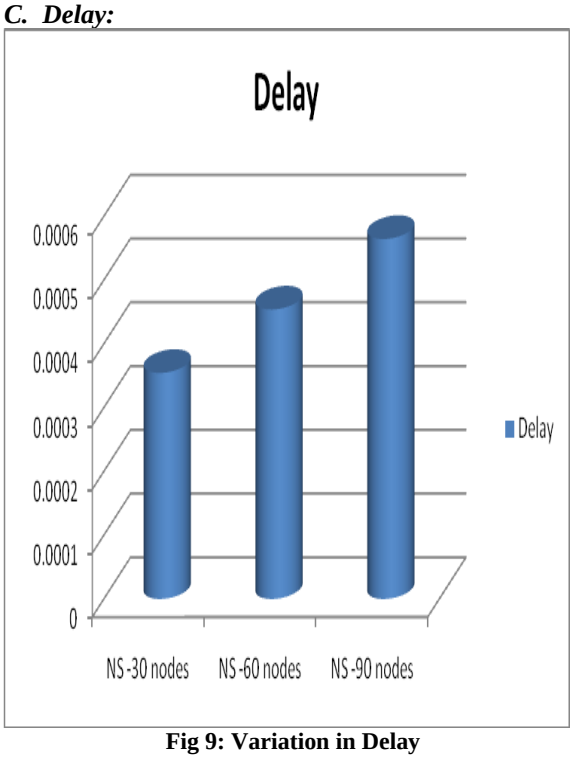

Fig 9: Variation in Delay

D. Hello Traffic Sent

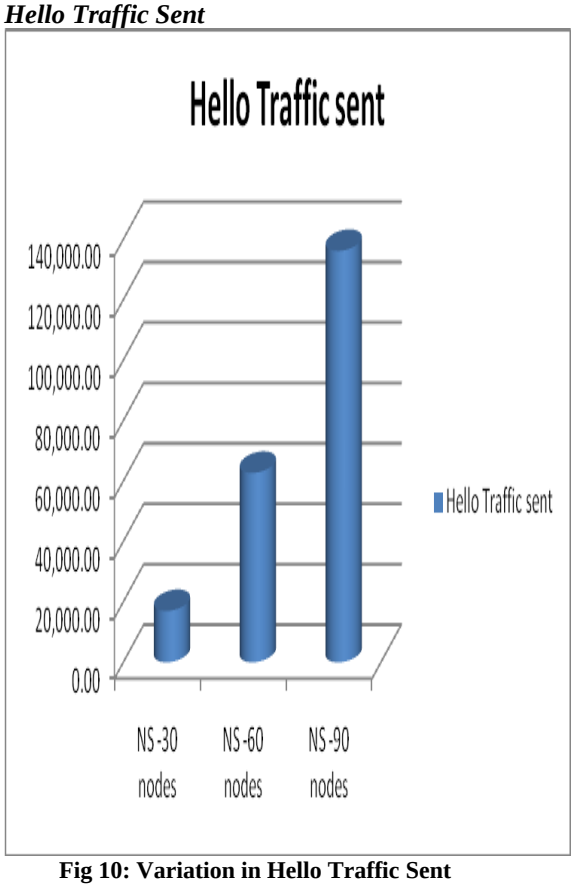

Fig 10: Variation in Hello Traffic Sent

E. Total Hello Messages Sent

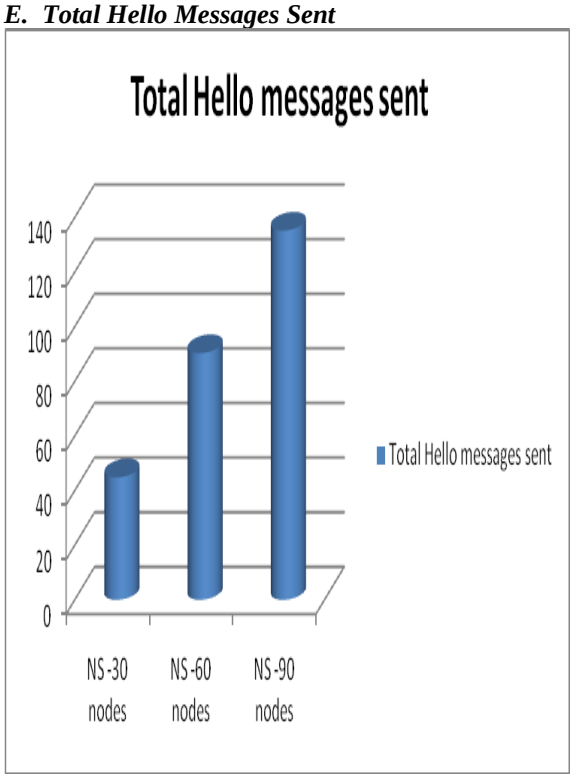

Fig 11: Variation in Total Hello Messages Sent

G. Topology Changes

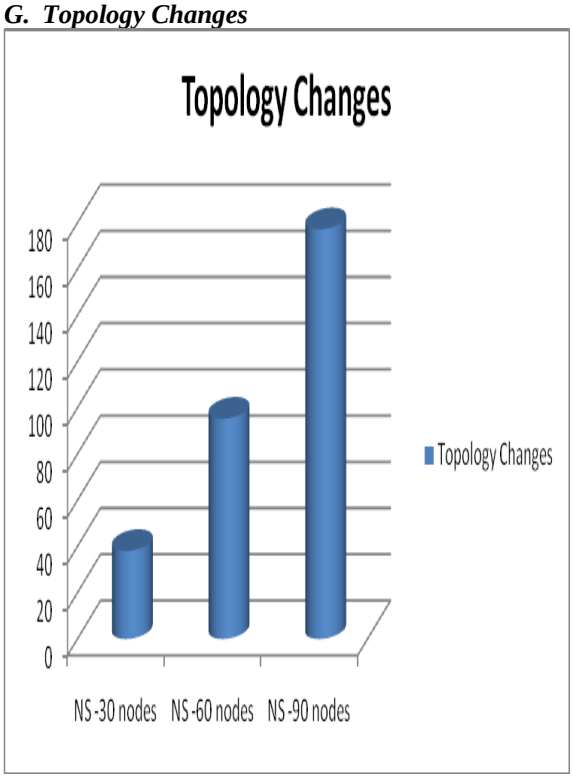

Fig 13: Variation in Topology Changes

F. MPR Calculations

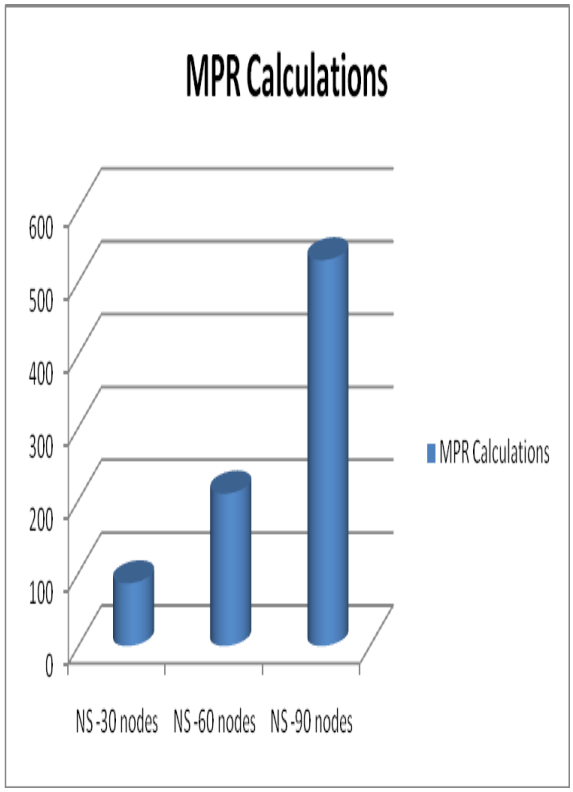

Fig 12: Variation in MPR Calculations

H. MAC Delay

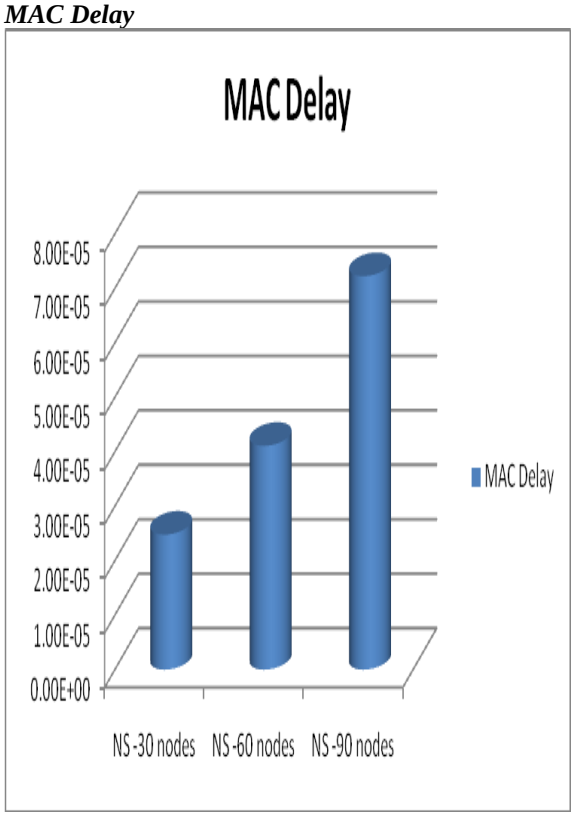

Fig 14: Variation in MAC Delay

V. CONCLUSIONS

The performance of OLSR is analysed by considering the metrics throughput, delay, load, Hello Traffic sent, Total Hello messages sent, MPR Calculations, Topology Changes and MAC Delay. We observe from the experiment results that there is a large impact of network size on the performance of OLSR routing protocol in MANETs. The values of the metrics considered are significantly increased as the network size increases.

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