Impact of Node Deployment Models on QoS by Using OPNET Simulator 14.5

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Abstract **- Mobile ad hoc networks (MANETs) are decentralized highly adoptable network consists of autonomous number of mobile devices. Mobile devices in these networks will act as routers that generate user's traffic and carry out network control and routing tasks. The mobility of devices in MANET dynamically changes the network topology, which makes routing between devices more complicated. When devices move, the impact could be very significant in terms of connectivity and Quality of Service (QoS). In this paper, we intend to conduct a comparative analysis of a few popular mobility models and diverse traffic patterns. We have developed simulation models that incorporate various mobility models and traffic sources to measure applications' performance in terms of end-to-end throughput (bit rate), delay, and convergence.**

Index Terms **- Quality of Service, Convergence, Throughput, Delay.**

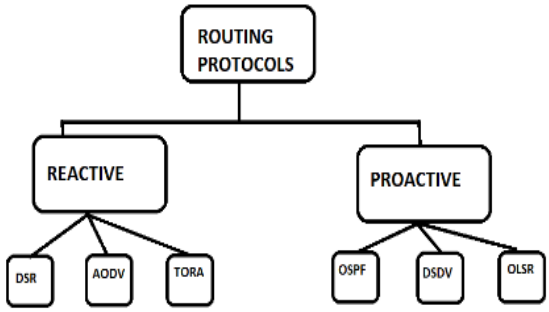
I.INTRODUCTION

MANETS are Self Handled, easily deployable, extremely adaptable, Dynamic network having autonomous no of mobile nodes each mobile node acts as both transmitter and receiver. In this process any mobile node can join, and any node can discharge unexpectedly. If the mobiles node is connected to the network, they can communicate with each other if it is in the straight signal range. Suppose if the signal is not in the specified range then communication occurs in a mechanism called multihop. Due to dynamic topology routing is the main issue there will be having delay and the throughput (QoS). In MANETS all the mobile nodes share the equal resources. Another issue in MANETS is optimal utilization of resources as we know that the range of wireless communication is limited, long distance communication between both the nodes depends upon the forwarding of intermediate mobile nodes.

II. LITERATURE REVIEW

Several researchers [1],[4],[12],[15],[16],[19] have done the performance analysis and classification of routing protocols qualitatively and quantitatively at totally {different completely different} performance metrics and different quality models. The effort of researchers is to spot the simplest appropriate routing protocol which supplies the required end in some seconds. Dr.S.P. Setty et. al. [19] given the performance analysis of the AODV [17] indiscriminately waypoint quality with varied surroundings like Grid, random, and Uniform and cleared that AODV works all right in Grid surroundings. to visualize the QoS of the AODV, they investigated AODV on the average disturbance, Average finish to-end delay, Packet delivery magnitude relation, and output with a varied variety of nodes and speed of the nodes in several environments. S. Kumar et. al. [12] showed an important impact of the quality on the routing protocols. It given the cluster and random waypoint quality models and all over that reactive routing protocols worked higher than table-driven routing protocols. It used Average End-to-End delay, Normalized Routing Load, output, and Packet delivery magnitude relation to research the performance at completely different quality models with a varied variety of nodes, speed, and pause time. S. Ali et. al. [1] compared the three routing protocols specifically AODV, DSR [11], and OLSR [10]. In [1], tables are given that OLSR outperformed alternative 2 routing protocols altogether given eventualities. This performance analysis was done against 3 performances metric specifically delay, network load and output with varied network size. twit Broch et. al [4] compared four routing protocols at packet level simulation with mobile nodes. They used packet delivery magnitude relation, routing overhead, and

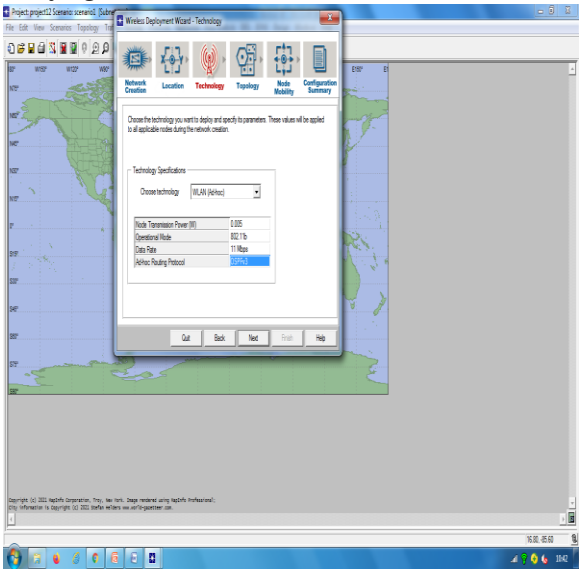
path length with varied pause time, CMBR sources, and speed of the nodes. They give that they all given protocols worked all right for fewer speed of the nodes however the performance of the protocols varies because the speed of the nodes increased. Its main concern was a modification in the ns-network machine through this analysis. Peiyan et.al.[16] given that the DSR is best than TORA and AODV with an increasing variety of nodes. Moreover, Parma in [15] compared the reactive, table-driven, and hybrid routing victimization of the protocols named AODV, FSR and ZRP severally. This paper shows AODV worked higher than ZRP and gave a uniform performance with FSR at completely different performance metrics. Comparison among DSDV [18], DSR, and AODV with varied no. of nodes victimization NCTUns network machine was given in [13]. Santoso et. al. [21] given the comparison among OLSR, AODV, and DSDV in VANETs considering the human safety on road victimization NS3. This paper showed that DSDV provides a higher end in VANETs eventualities than alternative 2 specifically AODV and OLSR. Hamma et. al. [20] gave a comparative study of the reactive and table-driven routing protocols. It uses delay and disturbance as a performance matrix to check the performance of routing protocols (like OLSR, DSR, and AODV) by varied network density and showed that network density has no result on the OLSR whereas AODV and DSR area unit affected. It additionally showed that reactive routing is best than proactive. [3] given comparison among AODV, PAODV, CBRP DSR, and DSDV routing protocols victimization finish finishing delay, normalized routing overhead and output with varied no. of nodes, and employment. Samir R. Das et. al. [7] used DSR and AODV to point out the performance of the reactive routing protocols in circumstantial networks. each routing protocol was investigated in 2 configurations of a random waypoint quality model. Average end-to-end delay, PDR, Normalized routing load, and Normalized raincoat load were used with varied pause time and no. of sources. result of the quality was shown by victimization completely different speed of nodes. They showed that the performance of the AODV and DSR varied with no. of nodes. for fewer no. of nodes, DSR had higher preference than AODV and for larger no of nodes; researchers area unit tributary during this space so that economical good and efficient routing will get existence. the most motive behind this paper is to produce the result of the quality model similarly on offer careful comparative study of the adaptative routing protocols. Anuj K. Gupta, Harsh, and Anil K. Verma [2013] have created a shot to check completely different quality models and supply an outline of their current analysis standing. the most focus is on Random quality Models and cluster quality Models. Firstly, they gift a survey of the characteristics, drawbacks, and analysis challenges of quality modeling. At the last, they gift simulation results that illustrate the importance of selecting a quality model within the simulation of a commercial Adhoc network protocol. Also, they illustrate however the performance results of a commercial hoc network protocol drastically amendment as a result of dynamical the quality model simulated.



III. OSPF

OSPF (Open Shortest Path First) protocol development started in 1987 by the IETF (Internet Engineering Task Force) as a replacement to the RIP protocol. throughout that amount, the net was evolving and broadened, leading to a lot of and {bigger} networks leading to bigger routing tables. The RIP updates within the new network surroundings were conjointly wasting plenty of information measure. The OSPF social unit of IETF managed to form a replacement hierarchal, democratic link state protocol that achieved higher convergence to adapt to the network changes quicker, used a a lot of descriptive metric than hop-count, and supported security and kind of Service. the primary version of OSPF, named OSPFv1 was revealed in 1989, within the RFC 1131. issues relating to the deletion of knowledge within the routing tables, the performance of the network being destroyed by endless routing update loops, and therefore the motivation to reinforce the protocol

interval times and routing search method, cause the publication of the OSPFv2 in 1991, within the RFC 1247. (Moy, 1998) Finally, OSPFv2 was changed to support the new IPv6. The new edition named OSPFv3 was revealed in 2008, in RFC 5340. [23] we tend to use OPNET machine for OSPFv3 in wireless network. readying is shown below:



IV. METHODOLOGY

Use There are many ways in which to validate a replacement framework or protocol during a networked atmosphere such as mathematical modeling, simulation, hybrid (which is a combination of simulation and mathematical modeling), and test-bed emulation [22]. Mathematical modeling is that the quickest technique, however, once a sophisticated model with numerous factors is to be sculpturesque, it's not correct and it becomes irrelevant. In Simulation models, the interaction between modeling devices creates a careful packet-by packet model for network activities. to compromise the many quantities of machine power and therefore the long nature of simulation, typically mathematical modeling combined with simulation are wont to model behaviors of a network. This technique is termed hybrid modeling. Test-bed emulation is implementing a replacement framework or protocol on a tiny scale on real devices. This technique is costlier and nearly always involves surprising engineering issues.

V. OPNET SIMULATOR & PROCESS

"OPNET (Optimized Network Engineering Tools) is that the leading industrial distinct event machine [24], that is very employed in trade and world. OPNET follows object-oriented principles. A hierarchy of models is employed in a very network model to simulate network behavior. In OPNET, the network model contains node models, and node models include processes, transmitters, and receivers. A method model simulates behaviors of a node employing a state transition diagram, during which transitions area unit conditions/events that occur in a very network's life. The OPNET library contains several predefined network devices and protocols such as routers, switches, mounted and mobile wireless workstations, etc. OPNET combines C language with state transition diagram, and offers a brand-new language referred to as Porto-C that is being employed for planning and implementing method models." "Also, C++ is often wont to extend OPNET antecedent models. OPNET offers debugging facilities through the OPNET computer program (ODB), during which you will be able to follow the packets flow and movements of a mobile node in a very simulated setting. The performance metrics area unit delay and turnout."

"Delay: Represents the end-to-end delay of all the packets received by the wireless LAN MACs of all WIFI nodes within the network and forwarded to the upper layer. This delay includes medium access delay at the supply Macintosh, reception of all the fragments severally, and transfers of the frames via Access Point if access purpose practicality is enabled."

"Throughput: Represents the whole variety of bits (in bits/sec) forwarded from wireless LAN layers to higher layers altogether WIFI nodes of the network. This simulation study aims to gauge the performance of existing wireless routing protocol OSPF in varied node placement models like Grid, Random and Circular i.e., the nodes area unit placed in varied arrangements and move every which way. The simulations are performed victimization OPNET version fourteen.5, a code that gives climbable simulations of Wireless Networks. For this, the simulation is administered among a 500m X 500m space by variable the number of nodes (one supply and one destination) and keeping the speed and pause time constant. The Nodes placement in 3 models for twenty nodes, forty for little and medium network purpose is as shown following figures three,4,5".

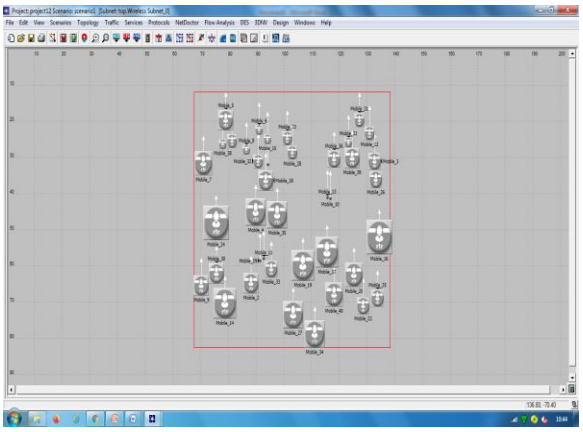


FIG:3 RANDOM

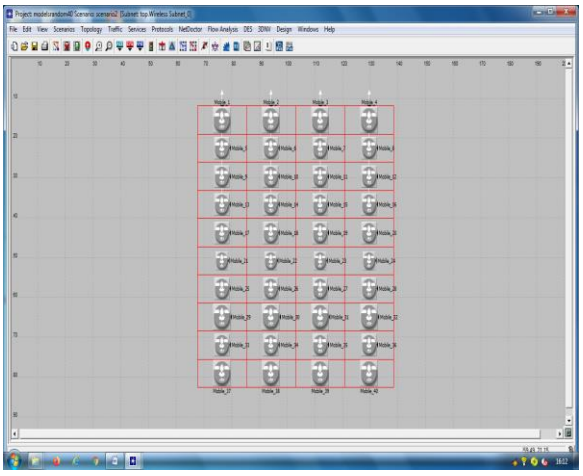


FIG:4 GRID

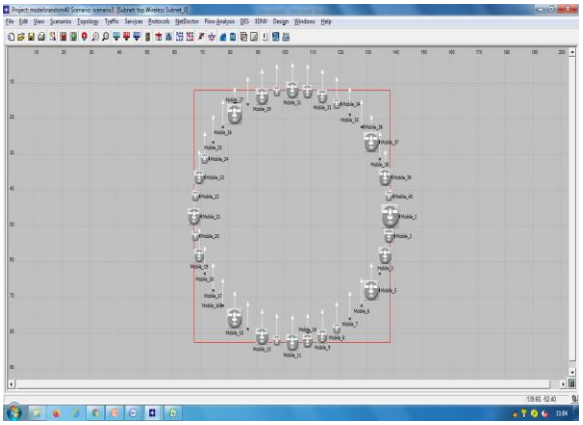


FIG:5 CIRCULAR

VI. SIMULATION ENVIRONMENT

Table-1 Simulation Parameters

Parameter	value
Area	500m X 500m
Nodes	40
Nodes Placement	Random, Grid, Circular
Mobility Model	Random Way Point
Node Transmission Power	0.005
Operational Mode	802.11b
Data Rate	11Mbps
Simulation Time	1000 (Sec)
Defacto Values Set	MANET
Scenarios	3

VII. RESULT & DISCUSSION

To evaluate the discussion, we use the simulator called OPNET in this we choose the mechanism called Deploy Wireless Network. Open the OPNET Simulator click on new project and create new scenario. And deploy the scenario 1 which is named as random we will be entering to the Simulation Environment now click on deploy wireless network. choose technology as WLAN(Adhoc) and operational mode as IEEE802.11b, with data rate 11Mbps by choosing the Adhoc routing protocol as OSPFv3(Version 3), choose Random Fashion and the last and final procedure is to click on finish under Configuration Summary. then there is a deployment of random mobile nodes. Now select all the nodes and right click on the mobile nodes and click on the edit attributes click on Applications IF0 change to OSPFV3 and in the IF1 also the same procedure is to be followed. Now click on the apply to the selected mobile nodes. Now run the simulation at 1000 seconds. select the attributes of the selected deployment process those are OSPF Network Convergence Activity, Wireless Lan Delay (Sec), Wireless Lan Throughput(bits/sec). under random there will be having no impact on OSPF Network Convergence Activity, Wireless Lan Delay.

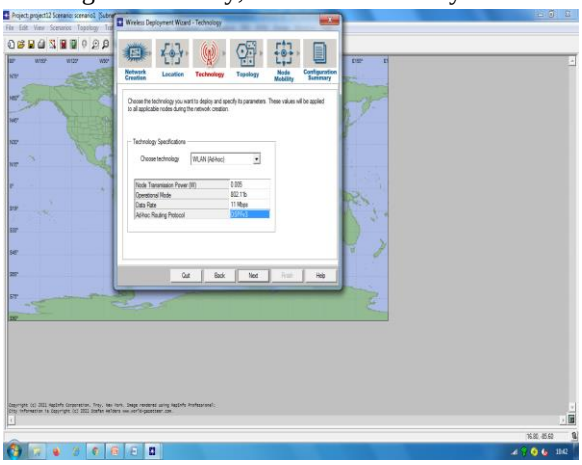


Fig: Wireless Deployment Wizard for random

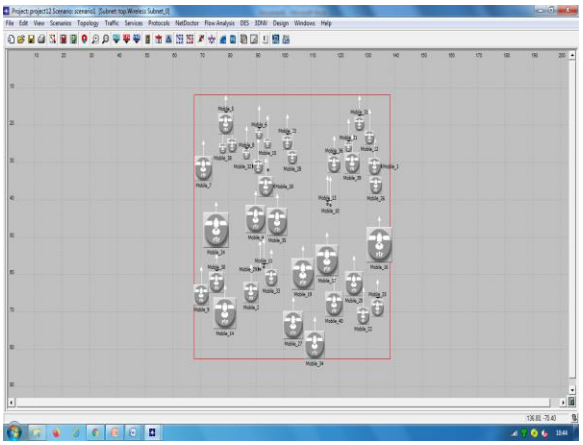


Fig: Random Deployment of Nodes

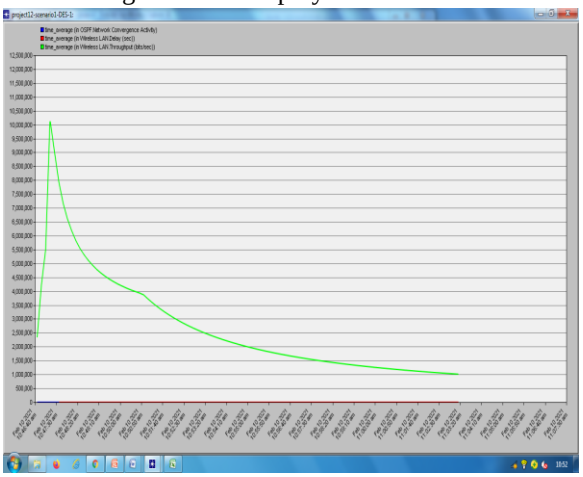


Fig: Graphical Representation of Random nodes (Convergence, Delay, Throughput)

To evaluate the discussion, we tend to use the machine referred to as OPNET during this we elect the mechanism referred to as Deploy Wireless Network. Open the OPNET machine click on a new project and make the new state of affairs. And deploy the state of affairs one that is known as random we are going to be getting into the Simulation surroundings currently click on deploy wireless network. opt for technology as WLAN(Adhoc) and operational mode as IEEE802.11b, with rate 11Mbps by selecting the Adhoc routing protocol as OSPFv3 (Version 3), opt for Random Fashion and therefore the last and final procedure is to click on end underneath Configuration outline. then there is a reading of random mobile nodes. currently, choose all the nodes and right-click on the mobile nodes, and click on on the edit attributes click on Applications IF0 amendment to OSPFV3, and within the IF1 conjointly identical procedure is to be followed. currently click on the application to the chosen mobile nodes. currently, simulate at one thousand seconds. choose the attributes of the chosen readying method that area unit OSPF Network Convergence Activity, Wireless LAN Delay (Sec), Wireless LAN Throughput(bits/sec). underneath random, there will be having no impact on OSPF Network Convergence Activity, Wireless LAN Delay.

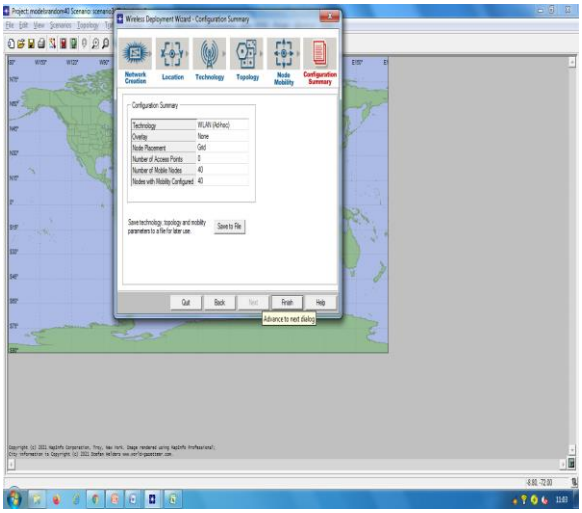


Fig: Wireless Deployment Wizard for Grid

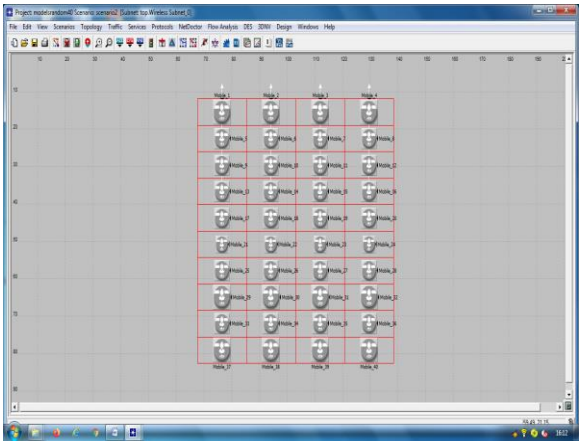


Fig: Grid View of Deployment of Nodes

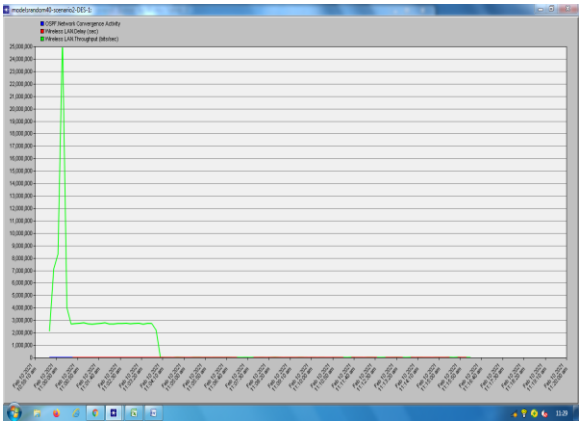


Fig: Graphical Representation of Grid View of nodes (Convergence, Delay, Throughput)

Open the OPNET machine click on a new project and make a new state of affairs. And deploy the scenario3 that is known as Grid we will be coming into to the Simulation surroundings currently click on deploy wireless network. opt for technology as WLAN(Adhoc) and operational mode as IEEE802.11b, with rate 11Mbps by selecting the Adhoc routing protocol as OSPFv3 (Version 3), opt for Circular Fashion and therefore the last and final procedure is to click on end underneath Configuration outline. then there is a preparation of the Circular read of mobile nodes. currently, choose all the nodes and right-click on the mobile nodes and click on on the edit attributes click on Applications IF0 modification to OSPFV3 and within the IF1 additionally, an equivalent procedure is to be followed. currently click on the application to the chosen mobile nodes. currently, simulate at a thousand seconds. choose the attributes of the chosen preparation method that area unit OSPF Network Convergence Activity, Wireless computer network Delay (Sec), Wireless computer network Throughput(bits/sec). underneath Circular there will be having no impact on OSPF Network Convergence Activity, Wireless computer network Delay.

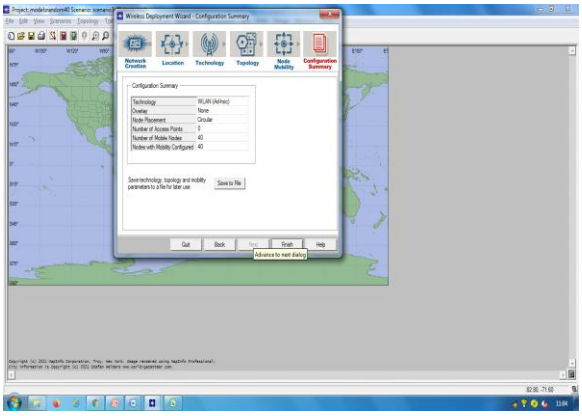


Fig: Wireless Deployment Wizard for Circular

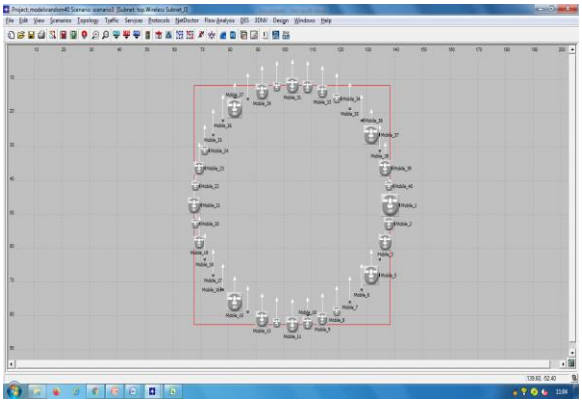


Fig: Circular View of Deployment of Nodes

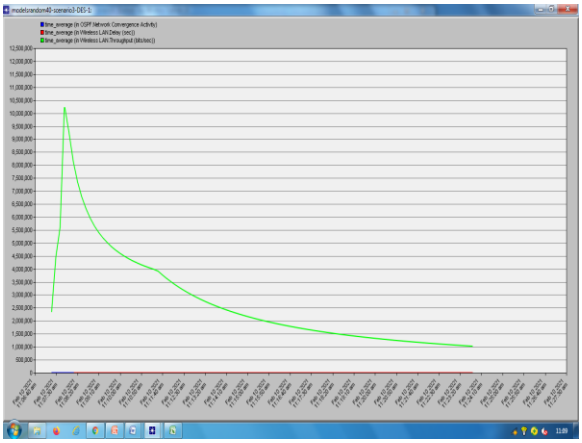
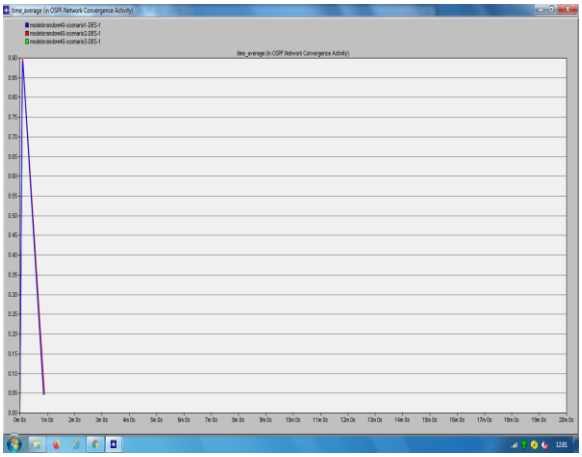
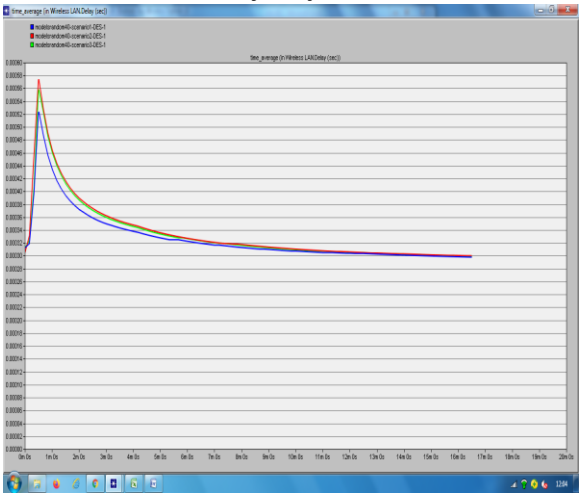


Fig: Graphical Representation of Circular View of nodes (Convergence, Delay, Throughput).

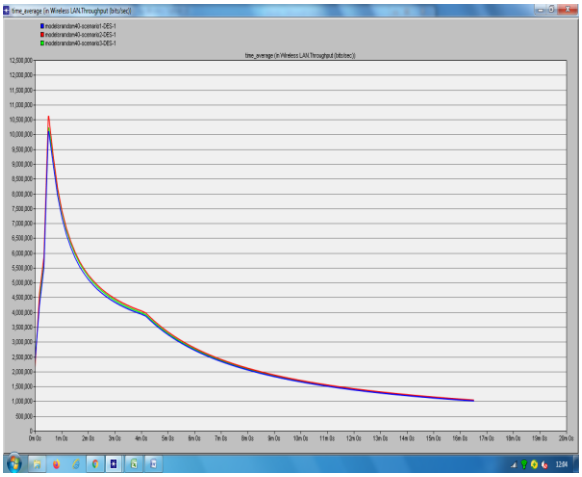
When we consider Network Convergence Activity for all the three Scenarios called Random, Grid, Circular by using all the three scenarios, we justify that



When we consider Wireless Lan Delay for all the three Scenarios called Random, Grid, Circular by using all the three scenarios, we justify that



When we consider Wireless Lan Throughput for all the three Scenarios called Random, Grid, Circular by using all the three scenarios, we justify that



VIII. CONCLUSION & FUTURE SCOPE

From the above Simulated Investigation, we conclude that random way of deployment of nodes are particularly suitable by observing the combination of metrics such as Convergence Activity, Delay, Throughput when compared to Circular, Grid Deployment models. There is no future scope for this investigation. only the random way of deployment is suitable rather than other way of deployment of nodes.

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