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ENHANCING THE EFFICACY OF AN IP BASED CONNECTIVITY TO DEVELOP AN EFFICIENT MOBILE AD HOC NETWORK (MANET)

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ABSTRACT

The increasing demand for enabling MANET nodes to connect to IP based fixed infrastructure wired networks and use their services and applications requires the cooperation of MANET routing protocols and IP mobility protocol. The integration of MANETs to the fixed infrastructure IP access networks is useful in many scenarios. MANET users can access the wired network and the Internet and access a range of services and applications. In this paper, we have proposed a framework which provides Connectivity to MANET node to the wired network using Mobile IP enabled gateway nodes. We implement Mobile IP with DSDV protocol to provide Connectivity between hybrid MANETs. The proposed framework is simulated in the ns2 simulator, and the performance of the proposed framework is evaluated on the basis of packet delivery ratio, average end to end delay and throughput under different scenarios.

INTRODUCTION

MANET is a wireless community architecture which consists of mobile nodes that could communicate with every other, without the want of network infrastructure or centralized management. MANETs have a few boundaries which incorporate dynamic topology, the limited battery power of cell nodes, constrained bandwidth, confined wireless coverage & restrained variety of services and applications. The lack of Connectivity to the stressed infrastructure permits easy control and deployment of MANETs. However, it limits the applicability of MANETs to a situation that calls for Connectivity to the outside community. Nodes in the MANET may be linked to different networks inclusive of the net resulting in Hybrid MANETs. Hybrid MANETs allow the cell node to get admission to internet offerings and are finished through Gateway, which acts as a bridge between MANET and the net. The Hybrid MANETs structure encompasses MANETs related to the stressed community with the assist of gateways. The gateway node act as a bridge among the MANET and the outdoor international. All communication to the out of doors international passes even though the portal i.e., cell node can get facts from the correspondent node CN via the gateway node and vice versa. The rest of the paper is prepared as follows. Phase I offers to evaluate of MANET routing protocols and cell IP. Phase II speaks the proposed framework. Phase III simulates the proposed structure, and performance assessment is executed below particular scenarios. Phase IV gives the conclusion of the paper.

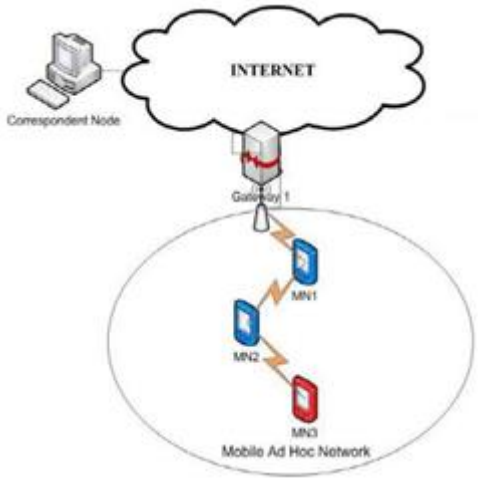


Fig.1. Hybrid MANET architecture

LITERATURE REVIEW

RELATED WORK

In the literature, many answers have been proposed for integrating MANET with the Internet using IP Mobility protocols. In line with the gateway discovery system, these integrated routing protocols may be labeled as proactive solutions, reactive answers, and hybrid answers. In, MEWLANA, cellular IP Enriched wi-fi neighborhood location network, MEWLANA-TD, and MEWLANA-RD are proposed. Three styles of domains are taken into consideration, particularly, net domain, the FA domain, and the ad hoc area. MEWLANA-TD uses DSDV routing protocol to course packets among the FA and cell advert ad-hoc nodes. In MEWLANA-RD, desk primarily based bidirectional routing (TBBR) is used to course packets between the ad hoc cell nodes to the FA. In, EDSDV is proposed to solve the link break problem due to high mobility. It also suggests bidirectional Connectivity for ad hoc networks.

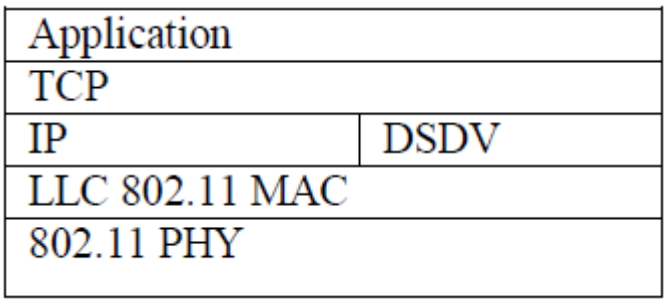
In, an ad hoc networking mechanism is designed and carried out, which allows cell computer systems to communicate with every different and get entry to the Internet. The suggestion makes FA serve a cell node that is out of communique variety. A modified RIP (Routing records Protocol) I sued to address the routing in the ad hoc network. In, MIPMANET – cellular IP for cell advert Hoc Networks, uses FA as getting admission to factor to the net. AODV routing protocol is used to course packets between the FA and ad-hoc nodes. While a node wants to gain access to the Internet, it registers with FA the usage of its domestic deal with. The cellular node in the ad hoc network tunnel the packet s to the FA to be able to send them to the Internet.

PROPOSED FRAMEWORK

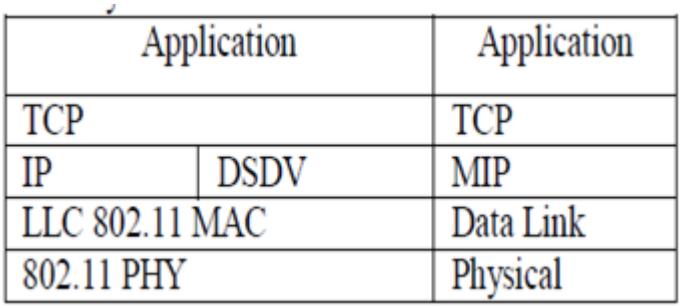
Our proposed framework consists of multiple MANETs attached to the backbone Internet through gateway nodes. A Gateway is a host that connects MANET to the Internet. Each Gateway is connected with the Internet through a wired link and with MANET through wireless connections. Gateway forward data packets from the mobile node to the Correspondent node and vice versa. Gateway nodes work as a home agent for local nodes and foreign agents for the visitor nodes. DSDV protocol is used for routing for the communication of the nodes which want to communicate with each other inside the MANET. To communicate with the wired domain, the mobile node sends the packet to the gateway node, which in turn forwards the packet to the correspondent node. Similarly, packets from the correspondent node reached to the mobile node through the gateway node.

PROPOSED PROTOCOL STACK

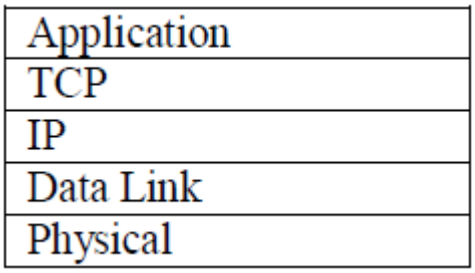
MANET Node



Gateway Node



Internet Host



PROPOSED NETWORK MODEL

In the proposed network model, there is one correspondent node CN which is connected with router R, which in turn is connected to two gateway nodes G1 and G2, which are providing Connectivity to two different Manets. Also, G2 is assigned the responsibility of Foreign Agent which servers the mobile nodes which comes to its being

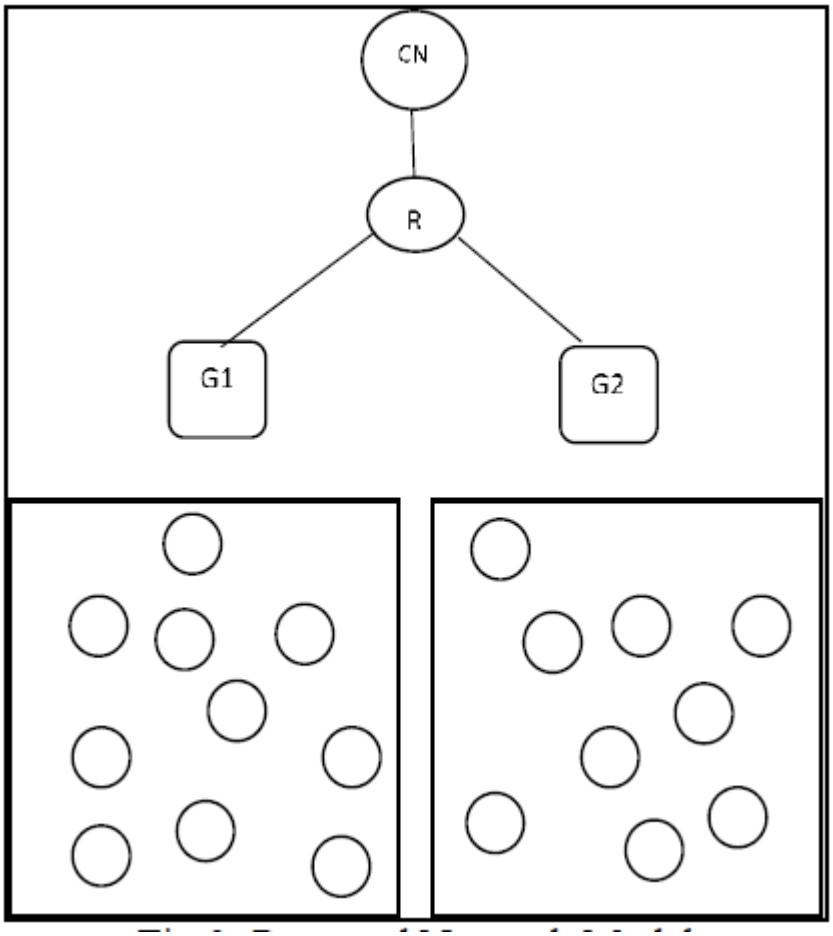


Fig.3: Proposed Network Model

PROPOSED SCHEME

We have proposed a new scheme which consists of three different parts.

Part 1: When a mobile node wants to communicate with another node inside the same MANET to communicate with another host in the MANET, the ad hoc node checks its routing table. If the destination is inside the ad hoc network, it will find routing entry in the routing table and packets will be forwarded to next hop in the routing table according to the DSDV protocol.

Part 2: When ad hoc host wants to communicate with CN on Internet to communicate with CN on the Internet, the ad hoc host checks its routing table, if no routing information to the CN is found, the ad hoc host forward the packet to the base station (Home Agent) of the area, which forward the packet to CN by using Internet IP routing protocol.

Part 3: When CN on the Internet wants to communicate with ad hoc host If a CN wants to send packets to an ad hoc host, the packets will be delivered to HA of the ad hoc host. If the ad hoc host is roaming away from its HA, HA maintains the ad hoc host's current location via FA registration. Using the COA of FA, HA forwards the packet to the FA visited by the destination ad hoc host. The FA checks its routing table and delivers the packets to the requested destination ad hoc host via DSDV routing protocol.

SIMULATION MODEL

We have used a simulation model based on network simulator NS2. We have taken two simulation scenarios. One has an area of 500 x 500 meters, and the other has an area of 750 x 750 meters. no. of Wired nodes is 2. One is the correspondent node CN, and other is a router which is connected with each other with a wired link and two gateway nodes G1 and G2 which are related with the wired connection with the router R. The distributed coordination function (DCF) for wireless LAN is used as MAC layer. For routing in MANET, DSDV protocol is used. Simulation runs for 250 seconds. Two ray ground propagation is used. An omnidirectional antenna is used for simulation purposes. No. of mobile nodes is 20. Initially, all the nodes are under the gateway node G1, and then they are moved to the area under the gateway node G2, which is also serving as the Foreign Agent.

Table 1. Simulation Parameters

Parameter	Value
Simulation Area	500 x 500 m 750 x 750 m
Channel Type	Wireless
Simulation Time	250 Seconds
MAC Type	802.11
Antenna Model	Omni
Radio Propagation Model	Two Ray Ground
Traffic Type	FTP
Interface Queue Length	50
Interface Queue Type	DropTail/ Priqueue
Max. No. of Nodes	20
Max No. of FTP Connections	20

PERFORMANCE EVALUATION AND RESULT ANALYSIS

We have taken packet delivery ratio, average end to end delay and throughput as the performance parameters.

PACKET DELIVERY RATIO

It is calculated by dividing the no. of data packets delivered to the destination by the no. of packets generated by the FTP sources.

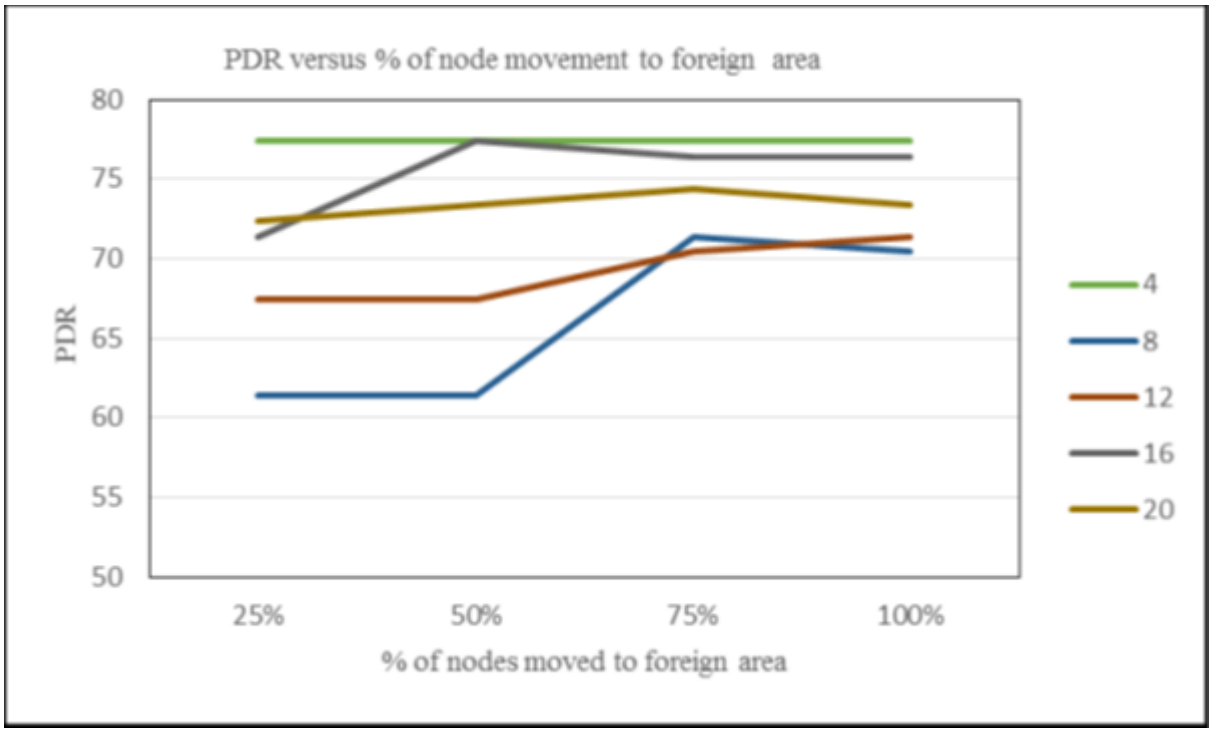


Fig.4: PDR versus % of nodes movement to a different area with varying no. of connections in a 500 x 500 m scenario.

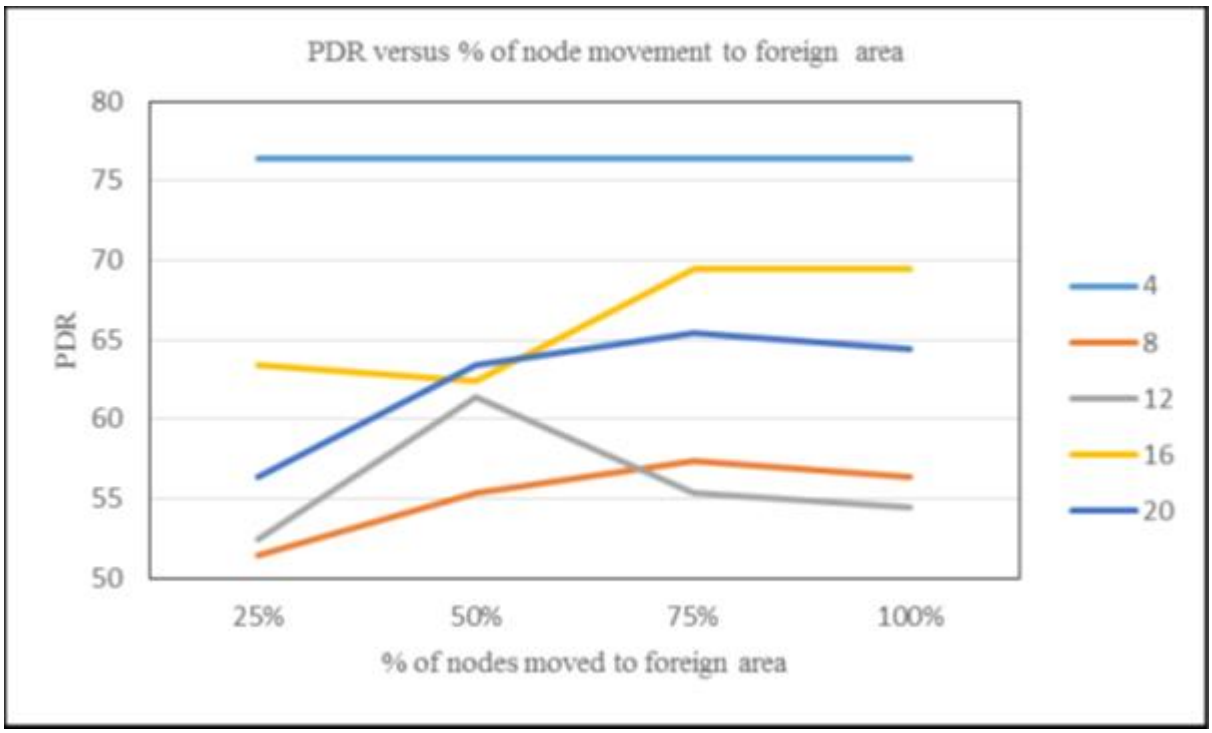


Fig.5: PDR versus % of nodes movement to a different area with varying no. of connections in 750 x 750 m scenario

Figure 4 shows the packet delivery ratio versus % of nodes movement to a different area with changing no. of connections in a 500 x 500 m scenario. Figure 5 shows the PDR versus % of nodes movement to a different area with varying no. of connections in 750 x 750 m scenario. In our proposed framework, PDR is not much affected by the node movement.

AVERAGE END TO END DELAY

It's far the entire time taken through each packet to reach the vacation spot. It consists of all delays including buffering at some stage in path discovery, queuing at the interface queue, retransmission postpone at the MAC layer, propagation and transfer time.

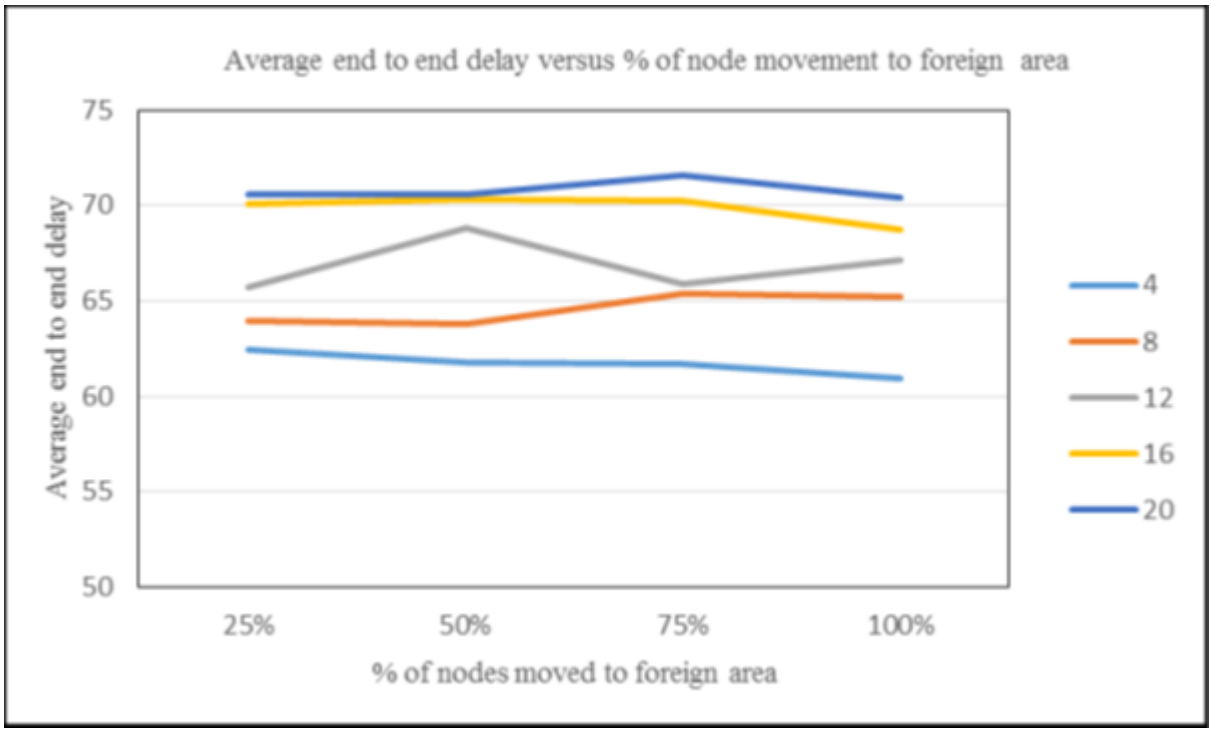


Fig.6: Average end to end delay versus % of nodes movement to a different area with varying no. of connections in 500 x 500 m scenario

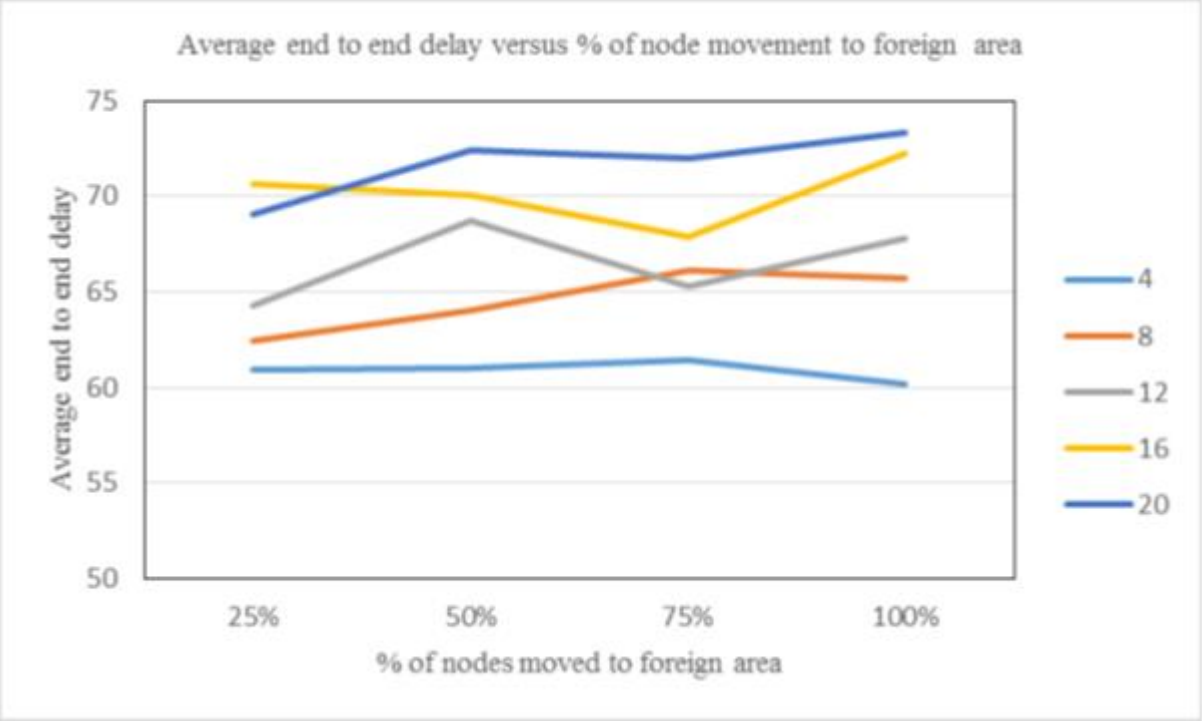


Fig.7: Average end to end delay versus % of nodes movement to a different area with varying no. of connections in 750 x 750 m scenario.

Figure 6 shows the average end to end delay versus % of nodes movement to a different area with varying no. of connections in a 500 x 500 m scenario. Figure 7 shows the average end to end delay versus % of nodes movement to a different area with varying no. of connections in 750 x 750 m scenario. The average end to end delay increases as % of node movement increases from 25% to 100%.

THROUGHPUT

Throughput is the average fee of successful message delivery over a conversation channel. The performance is measured in bits per second.

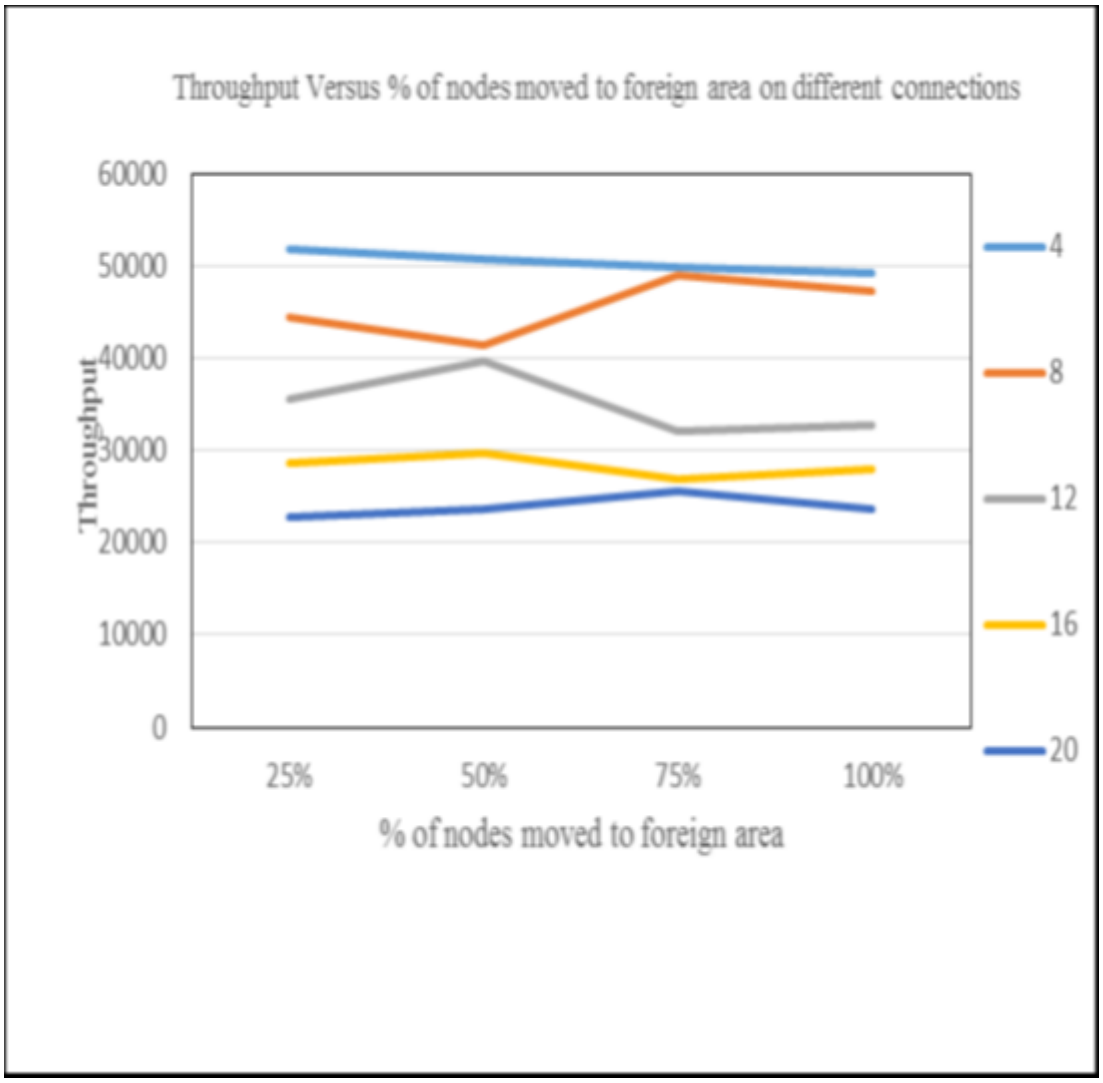


Fig.8: Throughput versus % of nodes movement to a different area with varying no. of connections in a 500 x 500 m scenario.

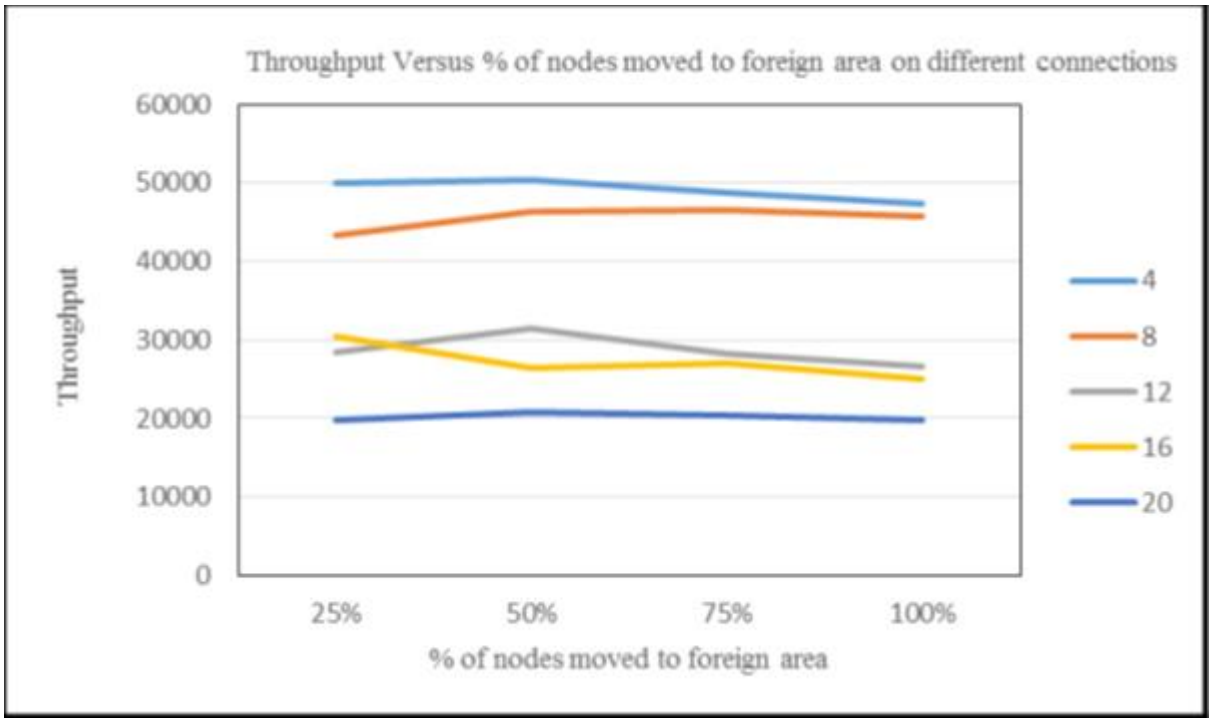


Fig.9: Throughput versus % of nodes movement to a different area with varying no. of connections in 750 x 750 m scenario.

Figure 8 shows the throughput versus % of nodes movement to a different area with varying no. of connections in a 500 x 500 m scenario. Figure 9 shows the throughput versus % of nodes movement to a different area with varying no. of connections in 750 x 750 m scenario. There is a little change in the throughput when the node movement is increased from 25% to 100% in our proposed framework.

CONCLUSION

The integration of MANETs to the IP based fixed infrastructure wired networks is useful in many scenarios. It enables the mobile nodes to move in different MANETs without losing the connection. In this paper, we have proposed a framework that enables a MANET node to connect to IP based fixed infrastructure wired networks using Mobile IP enabled gateway nodes. We implement Mobile IP with DSDV protocol for hybrid MANETs. The proposed framework for hybrid MANETs is simulated in the ns2 simulator. We have considered two network scenarios with 500m x 500m and 750m x 750m network area. This research paper evaluates the performance of the proposed framework under different scenarios 25% nodes leaves the base station area, 50 % nodes leaves the base station area, 75 % nodes leaves the base station area and visiting foreign area and 100 % nodes leaves the base station area and visiting the different area with respect to varying parameters including packet delivery ratio, average end to end delay and throughput. The proposed framework is able to provide a high packet delivery ratio and performance irrespective of the node mobility.