"Partition and its effect in Mobile Adhoc Network: Performance analysis on Packet dropped & Route error sent"

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Abstract

In this paper we have shown with the help of performance analysis done on the scenario for fixed and Nodes_leaves and found that when nodes leave from the mobile adhoc network abruptly then the performance decreases. Due to this movement of mobile nodes other nodes in the adhoc network are not aware of their leaving .So other starts sending packet and route there packets to the leaving node which results in route error and packets are dropped at high rate. This paper helps to understand the effect of leaving node(s) abruptly. Further discussion may include the procedure to avoid the leaving of nodes abruptly.

Keywords: MANET, IP address, Partition

Mobile adhoc networks are infrastructreless self-organizing wireless networks. Each node can be mobile and has routing capabilities to be able to forward packets on behalf of other nodes Adhoc networks are typically composed of homogeneous nodes that communicate over wireless links without any central control. Adhoc wireless networks inherit the traditional problem of wireless and mobile communication, such as bandwidth optimization, power control and transmission quality enhancement .In addition topology is highly dynamic & random & very hard to predict. Physical security is limited. Mobile Ad-hoc Network serves as a temporary wireless network in which node changes its IP address with the help of an intelligent auto-configuration protocol [3, 14, 18]. The main role of IP address auto-configuration protocol is to manage the address space .The protocol must be able to allocate a unique network address [4] to un-configured node.

Related Work:

There are several scenarios in which a mobile node will change its IP address:

i) Partitions of a network in MANET[7,15]

If some mobile nodes in the MANET move out of the transmission range of the other nodes, the network becomes partitioned as in Fig 1. Because these nodes may not be aware of the partition, they may still use the previous allocated addresses. If IP address of a node in one partition is allocated to the new node in the other partition, address conflict occurs when these two partitions become connected. Partition of adhoc network is demonstrated as in Fig. 2, Fig. 3a, Fig. 3.b and Fig. 3c.

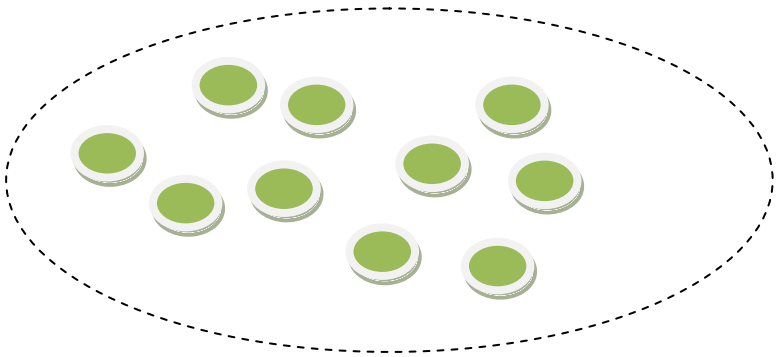
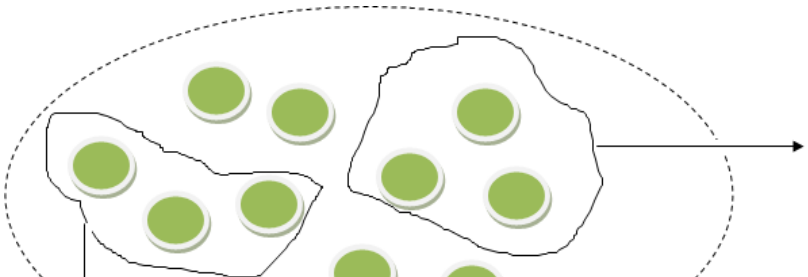


Fig. 1: Adhoc network with mobile nodes



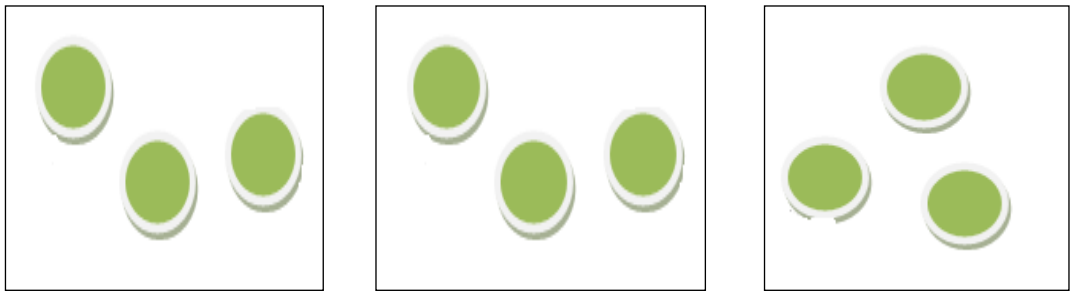


Fig. 3: Independent adhoc network after partition (a), (b) and (c)

ii) Merger of two independent Mobile networks [7,15]

The second scenario is that two independent (Fig 4) configured MANETs are merged. Because these two networks are auto configured separately, there may be some duplicate addresses in both networks, such as node A in MANET1 and node B in MANET2. Thus one needs to change its addresses due to the merger. Conflict Free Address Allocation Mechanism for Mobile Ad Hoc Networks should be used [65, 66, and 67]. This algorithm leads to a tree structure in the way the addresses are generated. Conflict Free Address Allocation Mechanism for Mobile Ad Hoc Networks should be used [7, 17]. This algorithm leads to a tree structure in the way the addresses are generated. three independent MANET are coming to each other which results in a merged network. Due to this merging it may be possible that some of the nodes are having same private IP address. As from the Fig. 4 node C has the same IP address 192.168.1.3 in each MANET.

Possible Effects:

In this paper we have taken a Scenario to check performance when one or more than one nodes leave. It is shown in the

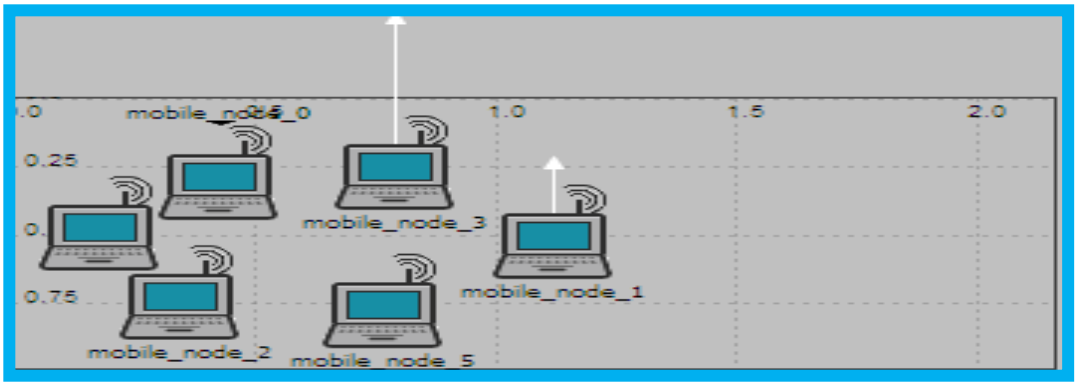


Fig. 4: Scenario of leaving nodes

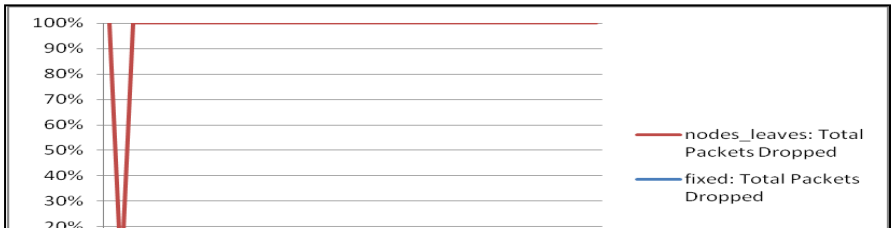
Fig. 4 that the scenario consist of six mobile nodes .The line inside the Fig. 4 shows the boundary of a mobile adhoc network and the white arrow represents the trajectory path followed by the mobile nodes. Initialy all the nodes are fixed and

Table 2: Data collected for the above scenario

time (sec)	fixed: Total Packets Dropped	nodes_leaves: Total Packets Dropped	fixed: Total Route Errors Sent	nodes_leaves: Total Route Errors Sent
102	#N/A	2	2	19
108	#N/A	2	2	19
114	#N/A	1.5	2	19
120	1	12.66667	2	19
126	1	9.75	2	19
132	1	9.75	2	19
138	1	15.4	2	19
144	1.25	15.4	2	19
150	1.25	15.4	2	19
156	1.4	13.33333	2	19
162	1.5	17.42857	1.5	19
168	2	17.375	1.5	19
174	2.25	15.66667	2.333333	19
180	2.25	19.8	2.333333	19
186	2.111111	18.09091	2.333333	19
192	2.1	18.09091	2.333333	19
198	2.090909	18.09091	2.333333	19
204	2	19.5	2.333333	19
210	2.076923	18.15385	2.333333	10
216	2	16.92857	2.333333	10
222	1.933333	17.66667	2.25	10
228	1.875	18.4375	2.25	10

234	1.882353	18.4375	2.25	10
240	1.882353	17.41176	2.25	10
246	1.833333	19	2.25	10
252	1.833333	18.10526	2.25	10
258	1.833333	17.25	2.25	7
264	1.789474	16.47619	2.25	7
270	1.8	17.54545	2.2	7
276	1.761905	17.54545	2	7
282	1.761905	16.82609	2	7
288	1.727273	16.20833	2	7
294	1.695652	17.32	2	7
300	1.695652	16.69231	2	7
306	1.708333	16.11111	2	7
312	1.76	17.21429	2	7
318	1.76	17.21429	2	7
324	1.730769	17.21429	1.857143	7
330	1.703704	17.21429	1.75	7
336	1.714286	18.34483	1.75	7
342	1.689655	17.76667	1.75	7
348	1.7	17.22581	1.75	7

after some time Mobile_node_1 & Mobile_node_3 starts moving at a speed 6.213582 m/sec.Then After some time both the nodes leaves the mobile network or adhoc network .After leaving the performance is changed of each node and can be compared in terms of Total Packet dropped and total route error sent. The performance is shown in the table 1.



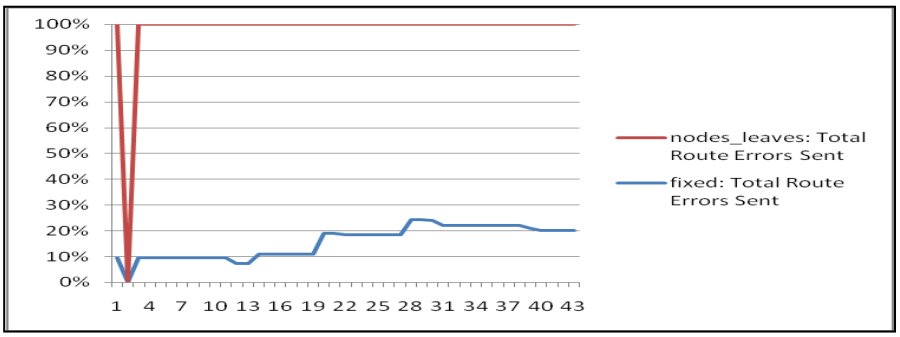


Fig. 6: Total route error sent

Table 1: Possible effect on performance

Characteristics	Total Packets Dropped	Total Route Errors Sent
fixed (%)	7.6%	9.5%
Nodes_ leaves (%)	92%	90%

In the result analysis for the total Route Errors sent (Fig. 6) of the scenario, Value of Total Packets Dropped (Fig. 5) on fixed is 1 and value of Total Packets Dropped on Nodes_ leaves is 12.66667 on start of the simulation but after some time where constant value of Total Packets Dropped for the fixed is 1.622951 and for Nodes_ leaves it is 16.96774. On analyzing them we concluded that Total Packets Dropped on nodes_leaving is larger than the fixed. Similarly data is collected for other parameter shows that performance (see Table 2) decreases when address conflict occurs.

Conclusion:

In this paper we have shown with the help of performance analysis done on both the scenario fixed and Nodes_leaves and found that when nodes leave from the network abruptly then the performance decreases. Further discussion may include to stop leaving the node abruptly and discussion may include the designing of algorithm for connectivity to outside world using IPV4/IPv6 and internet clouds and to obtain the optimum result for the proposed procedure of IP Address Configuration in MANET. The aim of the research is to solve the problem of connectivity of mobile nodes to the internet clouds.

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