

MOBILITY MOVEMENT PATTERNS TRAITS FOR ROUTING PROTOCOL

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Abstract- Mobile Ad-Hoc Network is dynamic infrastructure based network of mobile nodes. Nodes are connected by wireless links to form random topology without the use of existing infrastructure. It consists of a number of mobile nodes that uses data packets through a wireless medium. In all the routing protocols, mobility of a node is one of the vital characteristics in determining the by and large performance of the ad hoc network, so it is necessary to know about various movement mobility models and their effect on the routing protocols. In this paper, we have compared different mobility models. The performance of mobile ad-hoc network protocol change significantly with the change of the mobility model.

Keywords- Mobile Ad-hoc Networks, Mobility Models, Routing Protocols, Pause time, Speed.

I. INTRODUCTION

Mobility Movement Patterns (Models) represent the movement of mobile nodes, and how their location, velocity, pause time, network interface type, interface queue type and acceleration change over time. These movements are frequently used for simulation when communication or navigation techniques are investigated. In the performance evaluation of a routing protocol the protocol must be experienced under conditions like transmission range, initial energy, buffer space for storage of messages, data traffic models, and movement of mobile users. In Mobility movement patterns nodes movements may be dependant or independent of other nodes as shown in Fig1.

ensure that none of the mobile nodes can travel outside the network simulation area [1].

II. LITERATURE SURVEY

Entity Mobility Models mobile causes nodes to move independently within the simulation area [2][3]. They consist of Random Walk Mobility Model, Random Direction Mobility Model and Random Waypoint Mobility Model, etc.

A. Random Walk Mobility Model

Mobile node moves from its existing location to a new location by randomly choosing a direction and speed. The new speed and direction are both chosen from predefined ranges [0, max-speed] respectively [5]. All movements in the Random Walk Mobility Model occur in either a constant time interval t_i or a constant distance traveled and new direction and speed are calculated. The advantage of this model is that it is a simplest model to implement. It generates unpredictable movements, enabling a long-running simulation to consider all locations and node interactions. On disadvantage side this model has unrealistic movement patterns. It has sharp and sudden turns so it's wrapping not observed in real applications,

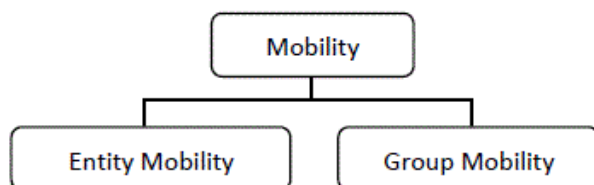


Fig. 1 Types of Mobile node movement Patterns

First class is Entity Mobility Models and second one is Group Mobility Models. One of the characteristics features of mobility model is to

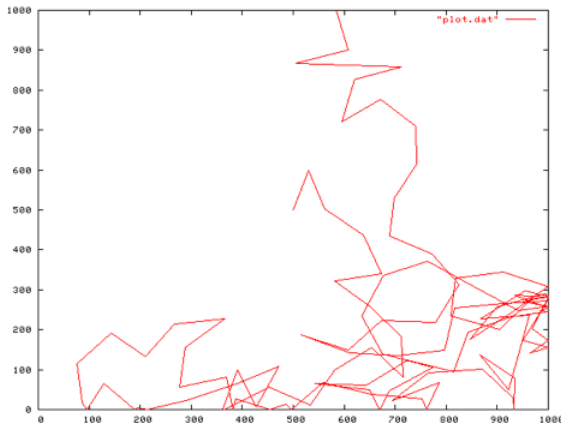


Fig. 2 Random Walk Mobility Model

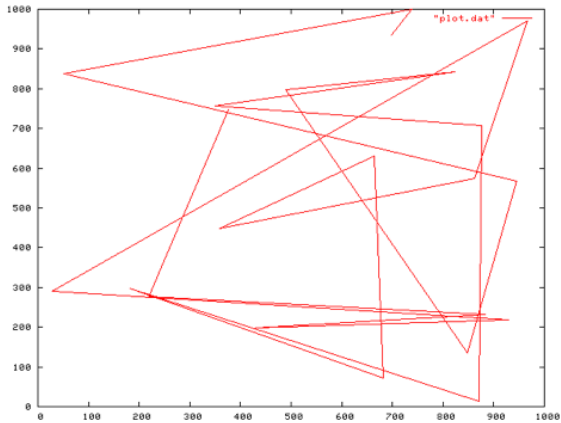


Fig. 3 Random Waypoint Mobility Model

B. Model Random Waypoint Mobility

This model is a variant of the random waypoint model. This model includes pauses where ever there is change in direction and or speed [6]. A Mobile node stays in one location for a certain period of time equal to its pause time in seconds. After this time the mobile node chooses a unsystematic destination and a speed that is uniformly distributed between [0, max-speed]. The source node then travels toward the new destination at the predefined speed. Upon arrival, the mobile node pauses for a specified period of time starting the process again. This is most common use mobility model, because of its simplicity so it is a building block for developing a variety of mobility models.

Disadvantages: - It shows lack of regular movement modeling and exhibits speed decay. Its behaviors is memory-less movement

C. Random Direction Mobility Model

The Random Direction Mobility Model [6] was created in order to overcome a flaw discovered in the Random Waypoint Mobility Model. In this model, MNs choose a random direction instead of a random destination. A MN tends to travel to the

middle of the simulation area up to the boundary or nest intermediate location in that direction.

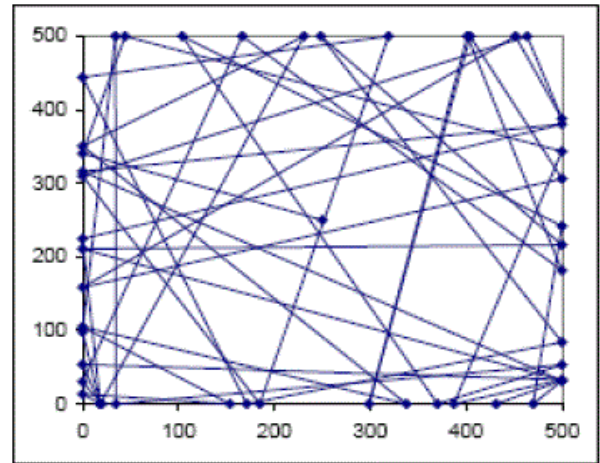


Fig 4 Random Direction Mobility Model

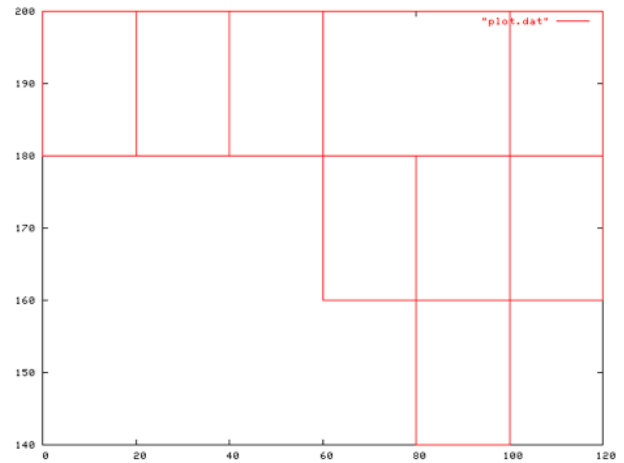


Fig 5 City Section Mobility Model

Advantages: A variation of the random waypoint without drawback of density wave. It shows uniform distribution of chosen routes.

Disadvantages: It has unrealistic movement pattern. Average distances between mobile nodes are much higher than other models, leading to incorrect results for routing protocols evaluation.

D. City Section Mobility Model

In this model the simulation area is a network representation of a city. Source mobile node begins the simulation at a defined point of some street [8]. The movement from the current location to the new destination locates a path corresponding to the algorithm based between the two points, with characteristics such as a speed limit, pause time and a minimum distance allowed between any to mobile nodes. If the pause time is zero it means nodes are continuously moving. At the destination node, the mobile node pauses for a specific time and then randomly chooses another

destination and repeats the process.

E. Manhattan Mobility Model

The Manhattan mobility model uses a grid road topology of the area. This mobility model was mainly proposed for the movement in area, where the streets are in prearranged manner. The mobile nodes are free to move in horizontal or vertical direction based on chosen grid road topology. This model employs a probabilistic approach in the selection of nodes movement because at each intersection, the probability of going straight is 0.5 and taking a left or right is 0.25 each.

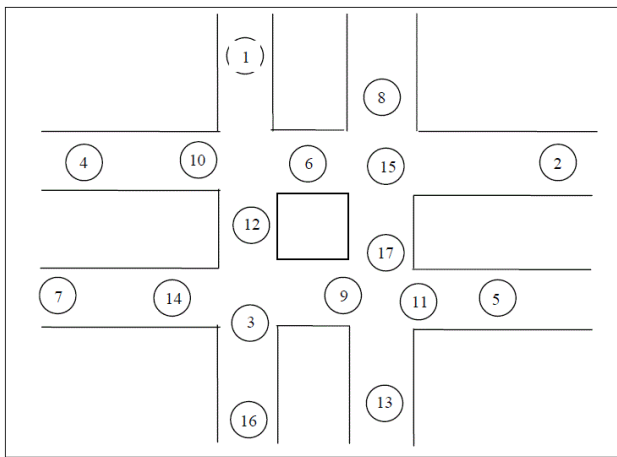


Fig 6 Manhattan Mobility model

In above discussion we have discussed mobility models where nodes action are completely independent of each other. In mobile adhoc network, however, there are many situations where it is necessary to model the behavior of mobile nodes as they move together.

F. Reference Point Group Mobility Model

This model represents the two types of random motion, one for the group of mobile nodes and second from the random motion of each individual mobile node within the group. Group movements are decided by the a logical center for the group[9]. It is used to calculate group motion via a group motion vector, GM. The motion of the group center completely characterizes the by their pause time, their direction and speed range [min, max]. Individual mobile nodes move on their predefined reference points. The movement of individual mobile node also depends on the group movement.

G. Column Mobility Model

In this model a set of mobile nodes move around a given column, which is moving in a forward

direction (a row). Generally it is a simulation of soldiers marching together toward their enemy. The Modification of the Column Mobility Model allows the individual mobile nodes to follow one another (e.g., a group of young children walking in a single file line to their classroom)[9].

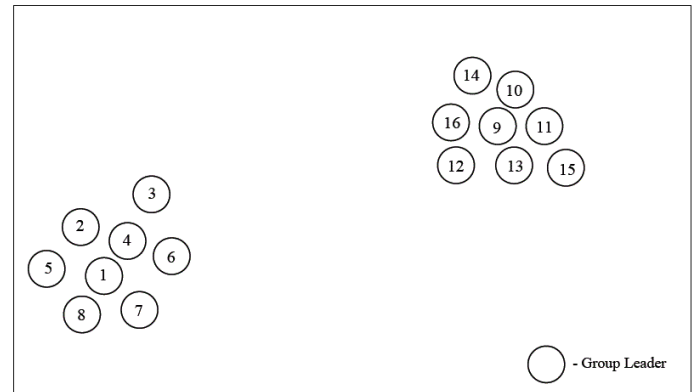


Fig 5 Reference Point Group Mobility Model



Fig 6 Column Mobility Model

For the implementation of this model, an initial grid forming a column of mobile nodes is defined. All the mobile node are placed in relation to its reference point in already created reference grid. The mobile nodes are then allowed to move randomly around its reference point with chosen mobility model. The new reference point for a given mobile node is the sum of current reference point and advance vector.

III. CONCLUSION

We attempt to conduct a survey of mobility models. Different model have unique and specific mobility characteristics. While evaluating the performance of routing protocols the chosen mobility model has key role in the success of simulation. The prime role of a mobility model is

to imitator the movement behaviors of actual users in practical scenario. Different mobility models have different characteristics therefore instead of sticking to a same mobility model the researchers should conduct a comprehensive analysis of mobility models before beginning their simulations.

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