

MOBILITY MODELS in MOBILE Ad Hoc NETWORKS

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A Mobile Ad hoc NETWORK (MANET) is a collection of wireless mobile nodes forming a self-configuring network without using any existing infrastructure. Since MANETs are not currently deployed on a large scale, research in this area is mostly simulation based, figure 1

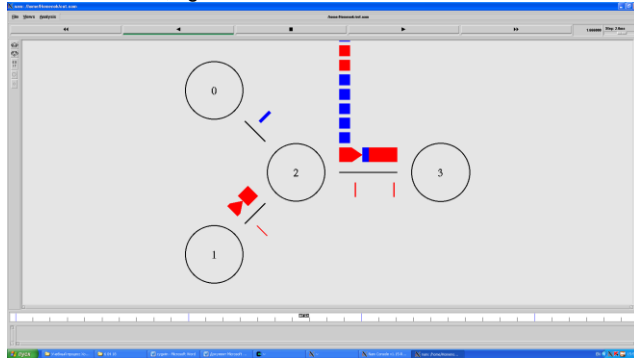


Fig. 1 - Simulation Process by NS2.

The mobility model is designed to describe the movement pattern of mobile users, and how their location, velocity and acceleration change over time. Since mobility patterns may play a significant role in determining the protocol performance, it is desirable for mobility models to emulate the movement pattern of targeted real life applications in a reasonable way. Otherwise, the observations made and the conclusions drawn from the simulation studies may be misleading.

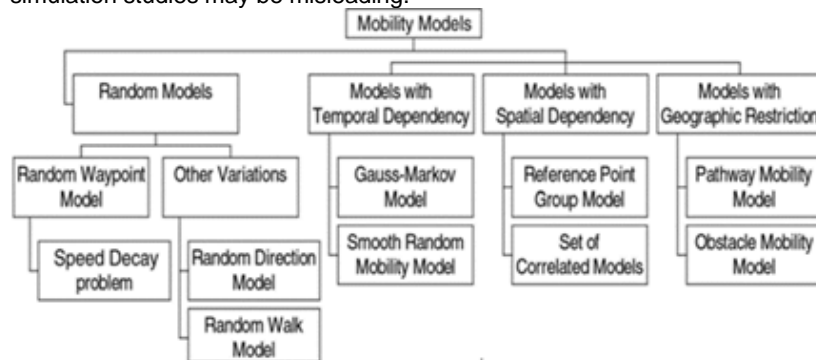


Fig.2 - A Survey of Mobility Models.

understanding of mobility models and their impact on protocol performance.

One intuitive method to create realistic mobility patterns would be to construct trace-based mobility models, in which accurate information about the mobility traces of users could be provided. However, since MANETs have not been implemented and deployed on a wide scale, obtaining real mobility traces becomes a major challenge. Therefore, various researchers proposed different kinds of mobility models, attempting to capture various characteristics of mobility and represent mobility in a somewhat 'realistic' fashion. Much of the current research has focused on the so-called synthetic mobility models that are not trace-driven.

For mobility patterns in wireless cellular networks, researchers mainly focus on the movement of users relative to a particular area (i.e., a cell) at a macroscopic level, such as cell change rate, handover traffic and blocking probability. However, to model and analyze the mobility models in MANET, we are more interested in the movement of individual nodes at the microscopic-level, including node location and velocity relative to other nodes, because these factors directly determine when the links are formed and broken since communication is peer-to-peer.

One frequently used mobility model in MANET simulations is the Random Waypoint model, in which nodes move independently to a randomly chosen destination with a randomly selected velocity. The simplicity of Random Waypoint model may have been one reason for its widespread use in simulations. However, MANETs may be used in different applications where complex mobility patterns exist. Hence, recent research has started to focus on the alternative mobility models with different mobility characteristics. In these models, the movement of a node is more or less restricted by its history, or other nodes in the neighborhood or the environment. Figure 2 provides a categorization for various mobility models into several classes based on their specific mobility characteristics. For some mobility models, the movement of a mobile node is likely to be affected by its movement history. This type of mobility model is mobility model with temporal dependency. In some mobility

Among simulation parameters, the mobility model plays a very important role in determining the protocol performance in MANET. Thus, it is essential to study and analyze various mobility models and their effect on MANET protocols. In the near future, MANETs could potentially be used in various applications such as mobile classrooms, battlefield communication and disaster relief applications.

To thoroughly and systematically study a new Mobile Ad hoc Network protocol, it is important to simulate this protocol and evaluate its protocol performance. Protocol simulation has several key parameters, including mobility model and communicating traffic pattern, among others.

Thus, when evaluating MANET protocols, it is necessary to choose the proper underlying mobility model. For example, the nodes in Random Waypoint model behave quite differently as compared to nodes moving in groups. It is not appropriate to evaluate the applications where nodes tend to move together using Random Waypoint model. Therefore, there is a real need for developing a deeper

scenarios, the mobile nodes tend to travel in a correlated manner. Such models are mobility models with spatial dependency. Another class is the mobility model with geographic restriction, where the movement of nodes is bounded by streets, freeways or obstacles.

Список использованных источников:

1. Kyeong-Eun Han, Design of AWG-based WDM-PON Architecture with Multicast Capability
2. Урядов В.Н., Глущенко Д.В. Использование технологии WDM для повышения эффективности пассивных оптических сетей // Международная научно-техническая конференция, посвященная 45-летию МРТИ-БГУИР : тез. докл. Междунар. науч.-техн. конф., Минск, 19 марта 2009. – Минск : БГУИР, 2009. – 19с.
3. Урядов В.Н., Глущенко Д.В. Коллективная пассивная WDM сеть с независимым доступом к оптической среде передачи // Современные средства связи : материалы XIV Междунар. науч.-техн. конф., 29 сент.-1 окт. 2009 года, Минск, Респ. Беларусь. – Минск : ВГКС, 2009. – 23с.