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Optimal Path Routing using Reactive Routing Protocol in Mobile Ad-hoc Network

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ABSTRACT
Ad hoc network is a distributed, temporary network system. It is formed by the dynamic link of nodes and does not rely on the existing network infrastructures, such as router, gateway, regular power supply, etc. Ad hoc network is a kind of peer to peer networks and each node has functions of data collecting, storage, processing and forwarding. It is the cost-effective solution for the short-range communication in some particular scenarios, such as battlefield, disaster rescue, environment sensing etc., In this paper we present the reactive routing protocol and enhance the performance of ad-hoc on demand distance vector routing protocol.

Keywords:- Mobile ad-hoc network, Cognitive radio network, Throughput, Wireless sensor networks, Local area networks.

INTRODUCTION

Ad hoc network is a distributed, temporary network system. It is formed by the dynamic link of nodes and does not rely on the existing network infrastructures, such as router, gateway, regular power supply, etc. Ad hoc network is a kind of peer to peer networks and each node has functions of data collecting, storage, processing and forwarding. It is the cost-effective solution for the short-range communication in some particular scenarios, such as battlefield, disaster rescue, environment sensing etc [13]. Ad hoc and wireless sensor networks (WSNs) have enabled a large variety of applications. Environmental and wildlife monitoring, clinical medical and home-care monitoring, monitoring and control of industrial processes including agriculture, and smart houses or cities are just some of the examples of ad hoc and WSN applications, where low-cost and easily deployed multi-functional sensor nodes are the ideal solution. As a result, during the past few years we have experienced the emergence of a new paradigm called the Internet of Things (IoT) in which smart and connected objects cooperatively construct a (wireless) network of things. However, the unique features of ad hoc and WSN technologies can pose significant challenges. Hence, envisioned solutions must be verified before being deployed in a real-world WSN deployment, either by utilizing simulators or emulators or through experimentations by employing test beds.

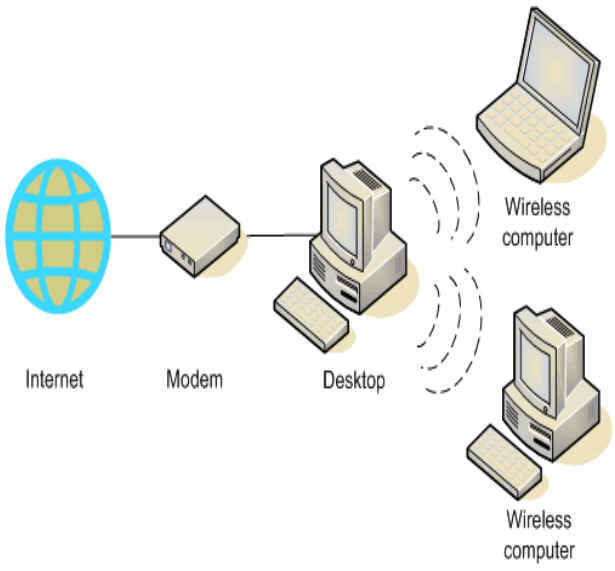

Fig 1: Ad Hoc Network.

Recent scientific and technological developments are so rapidly paced that what was not even predicted before has become a reality and part of our life today. One of the notable inventions of the recent time is the small sized electronic device called sensor which has the capability to observe various parameters like object movement, light intensity, temperature, magnetism, seismic activities, and so on. These sensors, often with own capability of communicating within themselves or with other devices, are developed to gather data and store the recorded data to process further if needed. Such communications could take place via wired as well as wireless mode giving scope to their (i.e. the sensors) increase in number for a particular system or network. In general, a WSN requires no infrastructure or very little infrastructure which consists of sensor nodes that can range from few tens to thousands and those sensors in the network could work collectively for monitoring purpose.

The number of wireless devices has been growing over the last decade. Most of these devices operate in the license-free bands and these bands are getting crowded. On the other hand, several portions of the licensed spectrum are poorly under-utilised. Due to scarcity of spectrum resource, a technology has emerged known as cognitive radio network (CRN). A CRN is a network of cognitive radios. Such radios can sense the environment and adapt accordingly. The IEEE 802.22 working group on wireless regional area networks (WRAN) provides the required specifications for using TV white spaces. The users who have the license to operate at certain spectrum bands are known as primary users (PUs) whereas secondary users (SUs) are those who do not have the license to use any specific band but use the licensed bands opportunistically [12].

The rest of this paper is organized as follows in the first section we describe an introduction of about the mobile ad-hoc network and their application. In section II we discuss about the cognitive radio network, In section III we discuss about the proposed work and experimental solutions for the reactive routing protocol in mobile ad-hoc network, finally in section IV we conclude the about our paper.

II COGNITIVE RADIO NETWORK

The number of wireless devices has been growing over the last decade. Most of these devices operate in the license-free bands and these bands are getting crowded. On the other hand, several portions of the licensed spectrum are poorly under-utilised. Due to scarcity of spectrum resource, a technology has emerged known as cognitive radio network (CRN). A CRN is a network of cognitive radios (Mitola, 2000). Such radios can sense the environment and adapt accordingly. The IEEE 802.22 (Cordeiro et al., 2005) working group on wireless regional area networks (WRAN) provides the required specifications for using TV white spaces. The users who have the license to operate at certain spectrum bands are known as primary users (PUs) whereas secondary users (SUs) are those who do not have the license to use any specific band but use the licensed bands opportunistically [4].

The rapid increase in the usage of wireless technology and the extensive wireless communication networks offer a range of individual and societal benefits. Wireless technologies have affected the use of user devices like PDAs, laptops, and cell phones, and they have also been utilized in many applications like security and safety operations, smart grids, home automation, medical, entertainment, and systems processing. Broader access to a variety of wireless applications has caused an increasing demand for more spectrums.

However, most of the spectrum bands have been allocated, and studies have shown that those spectrum bands are significantly underutilized. This situation has spurred research towards radio technology, which can fulfil the future spectrum demand in terms of both efficiency and application performance. Fixed-spectrum utilization policies in wireless technologies have caused the spectrum shortage problem, affecting the performance and

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efficiency of applications. The Federal Communications Commission (FCC) has approved the utilization of licensed spectrum by dynamically assigning it to unlicensed users. Cognitive radio technology (CRT) appears to be a promising solution for this static spectrum allocation problem; its advantages will help to enable the future wireless world. CRNs consist of two types of users: primary users, also known as licensed users, and secondary users or cognitive radio (CR) devices, also known as unlicensed users. PUs is assigned a fixed spectrum band which they can utilize during their licensed duration [9].

III PROPOSED WORK AND RESULT

Ad hoc On-Demand Distance Vector, AODV, is a distance vector routing protocol that is reactive. The reactive property of the routing protocol implies that it only requests a route when it needs one and does not require that the mobile nodes maintain routes to destinations that are not communicating [5, 6]. AODV guarantees loop-free routes by using sequence numbers that indicate how new, or fresh, a route is. The AODV protocol is one of the on-demand routing protocols for ad-hoc networks which are currently developed by the IETF Mobile Ad-hoc Networks (MANET) working group.

In the ad-hoc on demand distance vector (AODV) routing process every node carry a routing table having ultimate destination and next hop information. This information is used to discover route from source to destination. Here, every node check routing table to know whether the route is available or not. In case of indirect communication it forward packets to next hop node to forward packet to destination. The objective of this dissertation work is to explore the most suitable solution to mitigate various numbers of attacks and improve the performance of ad-hoc on demand distance vector routing as well as mobile ad-hoc network during insecure situation.

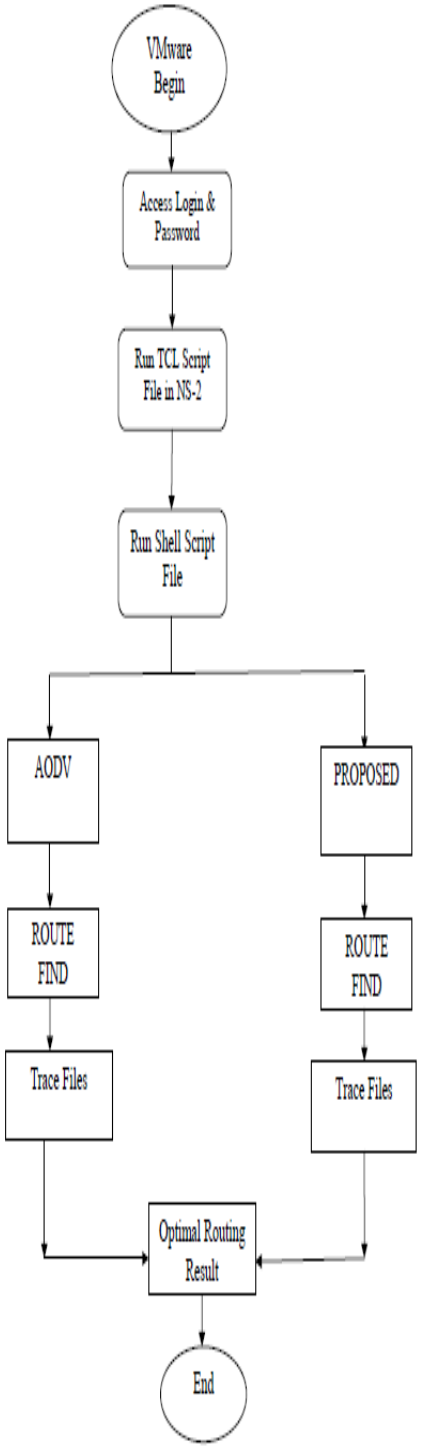

Fig 2: Comparative performance diagram for ad-hoc on demand distance vector routing protocol.

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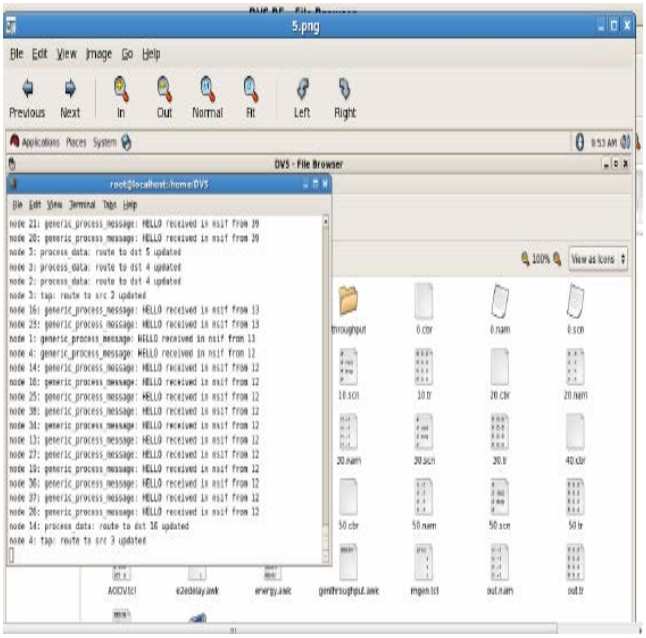

Fig 3: This window shows the running shell files in a network simulator.

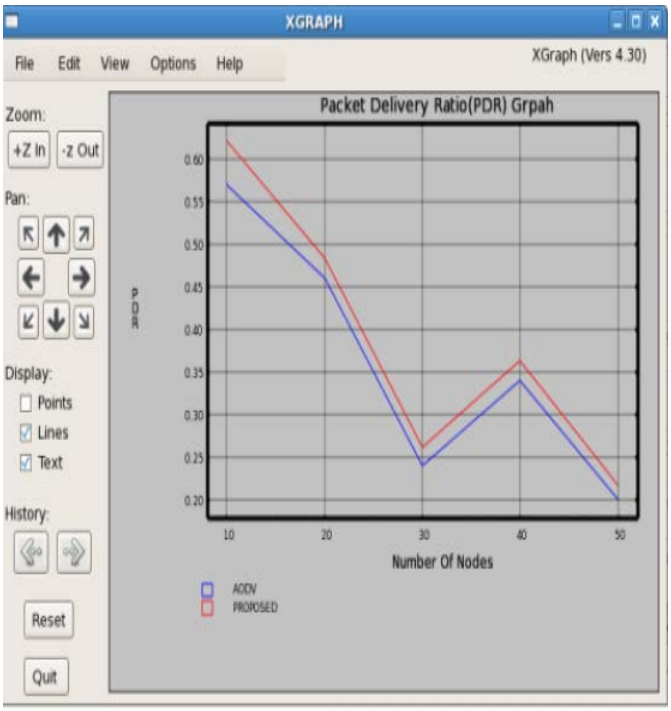

Fig 4: These graph shows that the comparative performance evaluation for the existing AODV and proposed methods.

IV CONCLUSIONS

Mobile Ad-hoc network is a type of emerging technical achievement concept used in a communication network, meaning, a temporary network can be formed where nodes can participate to communicate with each other without an infrastructure network administrator. Each node relies on dual roles in the network, such as router and computational role. Achieving this role, a routing protocol is designed to adapt dynamic topological configuration. In this paper we enhance the performance of ad-hoc on demand distance vector routing protocol in the terms of end to end delay, throughput etc.

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