Wireless Ad-Hoc Network: Types, Application and Routing Protocol

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ABSTRACT

An ad hoc network is a collection of wireless mobile hosts forming a temporary network without the aid of any established infrastructure or centralized administration. In such an environment, it may be necessary for one mobile host to enlist the aid of other hosts in forwarding a packet to its destination, due to the limited range of each mobile host's wireless transmissions. The Dynamic Source Routing protocol (DSR) is a simple and efficient routing protocol designed specifically for use in multi-hop wireless ad hoc networks of mobile nodes. DSR allows the network to be completely self-organizing and self-configuring, without the need for any existing network infrastructure or administration. The protocol is composed of the two mechanisms of Route Discovery and Route Maintenance, which work together to allow nodes to discover and maintain source routes to arbitrary destinations in the ad hoc network. This paper presents a study analysis for the routing protocol in ad hoc networks that uses dynamic source routing and other techniques.

Keywords:- Mobile ad-hoc network, Dynamic source routing, Data link layer, Wireless network.

INTRODUCTION

An Adhoc network is a continuously and dynamically self-configuring network without any pre-existing infrastructure containing devices called nodes that are connected to each other forming a temporary network.

Adhoc networking describes a mode of connecting electronic devices to one another without the use of a central device that conducts the flow of communications. The devices that are connected to an adhoc network (called nodes) forward data to other nodes that are within its reach. An adhoc network is a local area network (LAN) that requires minimal configuration and can be deployed quickly for specific or temporary needs.

An ad hoc network is a collection of wireless mobile hosts that form a temporary network without the aid of any centralized administration or standard support services, where all the mobile nodes communicate with each other by wireless channels. A physical medium that can sustain data communication between two nodes is called a link. A link may be asymmetric between two nodes. The transmission characteristics of a link depend upon the relative position or design characteristics of the transmitter and the receiver on the link. Due to the property of asymmetric links, a node may receive a message from another node but its transmitting message cannot reach the one that was transmitting Additionally, a link may be symmetric, in which case the nodes can communicate with each other by local broadcast. If there is a symmetric link between two nodes, they will be referred to as neighbors of each other.
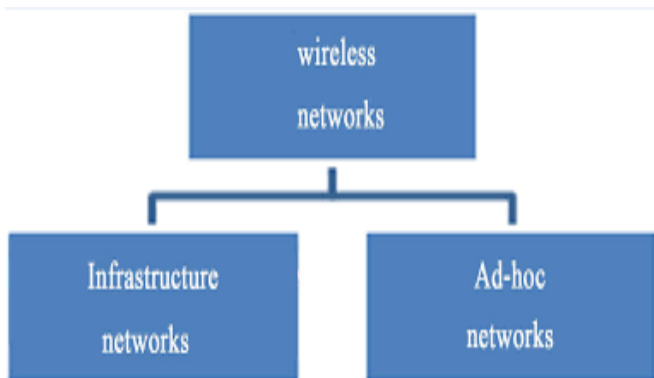
Fig 1: Types of wireless network.

When there is an asymmetric link between two nodes, these will be called semi-neighbors. Since there are two types of links in ad hoc networks, it is assumed that each node in the network must be detect their nodes of neighbors, and semi-neighbors that are transmitting by local broadcast. Each node will broadcast a beacon control signal within a given time period so that it can detect the state of a link either connected or disconnected. The control signal may communicate over the dedicated control channels. In ad hoc networks, the message is routed along the links in the multi-hop style. All the mobile nodes act as routers. They are assumed to be willing to forward the message when a forwarding request is made. There is no cheating along these intermediate nodes when a message is forwarding.

II APPLICION OF MANET
Some of the typical applications include [13]:
➢ Collaborative work*:* For some business environments, the need for collaborative computing might be more important outside office environments than inside and where people do need to have outside meetings to cooperate and exchange information on a given project.
➢ Military battlefield: Ad-Hoc networking would allow the military to take advantage of commonplace network technology to maintain an information network between the soldiers, vehicles, and military information head quarter.
➢ Local level: Ad-Hoc networks can autonomously link an instant and temporary multimedia network using notebook computers to

spread and share information among participants at e.g. conference or classroom. Another appropriate local level application might be in home networks where devices can communicate directly to exchange information.
➢ Personal area network and Bluetooth : A personal area network is a short range, localized network where nodes are usually associated with a given person. Short-range MANET such as Bluetooth can simplify the inter communication between various mobile devices such as a laptop, and a mobile phone.
➢ Commercial Sector: Ad hoc can be used in emergency/rescue operations for disaster relief efforts, e.g. in fire, flood, or earthquake [13].
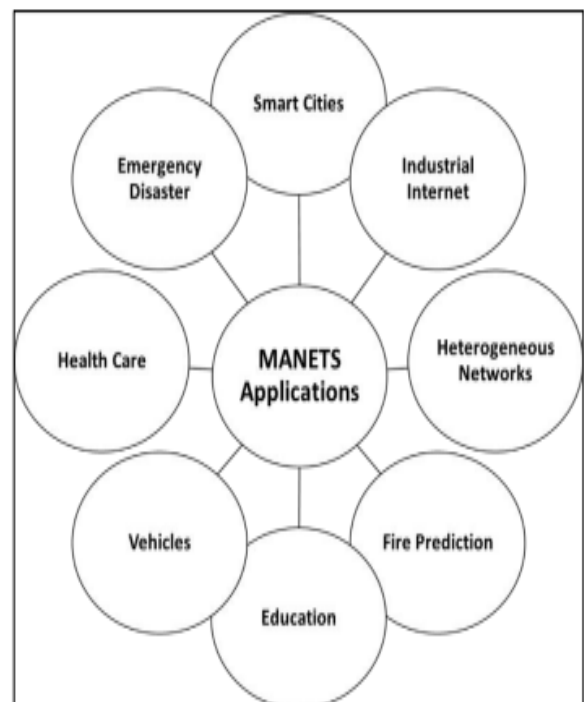

Fig 2: Applications of MANET.

III RELATED WORK
[1] In this paper, author has shown that the target is to provide a stable routing protocol with high efficiency for these kinds of networks, by improving the DSR routing protocol. In the provided protocol, beside the path stability, the energy of the path nodes and path length has been considered too, in order to discover a path with

higher quality and use it. Their proposed protocol has called as ST-DSR. The result of stimulation in the NS-2 environment shows that the ST-DSR has a better operation toward the base protocol, meaning DSR. [2] In this paper, author has extended the standard ad hoc on-demand multi-path distance vector protocol as the base routing protocol to evaluate this model. Their proposed mesh based multipath routing scheme to discover all possible secure paths using secure adjacent position trust verification protocol and better link optimal path find by the Dolphin Echolocation Algorithm for efficient communication in MANET. [3] In this paper, author has compared the Dynamic Source Routing (DSR) and Ad-hoc On Multipath Demand Distance Vector (AOMDV) protocols using Network Simulator NS2.35. DSR is a reactive gateway discovery algorithm whereby the connection of a MANET mobile device is established only on demand. Basically, AOMDV was specially tailored for ad-hoc networks that are highly dynamic to respond to link failures and breakages in the network. It ensures that the paths for destinations are sustained, and it defines the new routing information using destination serial numbers to ensure loop freedom always while avoiding problems. [4] In this paper, author has proposed a new reactive routing protocol, which is considered as a major extension of Adhoc On-demand Distance Vector (AODV) routing protocol, namely, Mobility Aware and Dual Phase Ad-hoc On-demand Distance Vector with Adaptive Hello Messages. It primarily concentrates on building routes considering nodes' speeds and direction of motion with respect to source nodes, thereby establishing more stable routes and reducing the route breakages. Moreover, they proposed an adaptive control packet announcement mechanism, which is directly connected to the periodic hello messages approach, with nodes' speeds, yielding a significant reduction in the amount of control overhead and congestion over the network. [5] In this paper, author has compared the performance of five most used routing protocol. The routing protocols consider in this comparative analysis are Dynamic Source Routing (DSR), Destination Sequenced Distance Vector (DSDV), On-demand Distance Vector (AODV), Zone Routing Protocol (ZRP), and Temporally Ordered Routing Algorithm (TORA). In order to analysis the performance of these protocol, which are implemented with same configuration and performed for same a common objective. [6] In this paper, author presents an investigation into some popular MANET routing protocols. This investigation aims to evaluate the performance of MANET routing protocols using the key performance indicators: throughput, end to end delay, and data packet delivery ratio. These indicators are commonly used in such evaluations. Their investigation results showed that DSR and AODV outperform DSDV. [7] In this paper, author presents the comparison of four routing protocols using Network Simulator 2 taking throughput, packet delivery ratio, average end-to-end delay, routing overhead, routing load, packet loss and packets dropped as performance parameters as a function of node mobility. The overall performance of AODV and DSR protocols is superior to the DSDV and OLSR. DSDV consumes more bandwidth as it periodically broadcasts routing information, whereas in AODV there is no need to maintain route table, which results in less bandwidth consumption as well as less overhead. For small network with lesser nodes, DSDV and OLSR work well. But AODV and DSR are best suited for larger network. [9] In this paper, author provides a comprehensive survey of the existing routing protocols for MANETs, which are broadly classified as proactive, reactive, and hybrid. Through simulation studies, they performed a comparative study of AODV, DSDV, and DSR protocols in respect of end-to-end delay, PDR, and throughput under various data rates. The simulation results reveal that DSR can be used for constrained network situation where better throughput and PDR are crucial requirements, whereas AODV can be used for low-delay network. [10] In this paper, author has evaluated performance of the two most widely used protocols DSR and AODV by varying speed and constant pause time. Their experiment results have shown that AODV has outperformed

DSR when speed of the node is low and pause time is kept constant. While AODV has performed well under high mobility of the nodes. It has also been found that the DSR has better results as compared to AODV in terms of throughput and end-to-end delay when pause time is kept constant. On the other side, AODV is performed better when pause time is varied.

IV CONCLUSION

Mobile hosts and wireless networking hardware are becoming widely available, and extensive work has been done recently in integrating these elements into traditional networks such as the Internet. Routing protocols in conventional wired networks generally use either distance vector or link state routing algorithms, both of which require periodic routing advertisements to be broadcast by each router. This paper describes the design and performance of a routing protocol for ad hoc networks that instead uses dynamic source routing of packets between hosts that want to communicate. In this paper our main goal to make review of Wireless Ad Hoc networks where we study different types of network namely MANET, WMN, WSN and subtypes of MANET namely VANET, IMANET, In VANET. So the study of this network will be helpful to understand Ad Hoc networks and its various application area, various routing prtocol and security goals.

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