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A STUDY ON PROACTIVE, REACTIVE AND HYBRID ROUTING PROTOCOLS IN MOBILE AD-HOC NETWORK

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Abstract: A mobile ad hoc network (MANET) is a collection of wireless mobile nodes dynamically forming a network topology without the use of any existing network infrastructure or centralized administration. Routing is the process which transmitting the data packets from a source node to a given destination. .Many routing protocols such as proactive, reactive and hybrid. Reactive routing protocols have been found to be user friendly and efficient when compared to other routing protocols. The main boon of routing protocols when compared with proactive and Hybrid routing protocols is the relatively unconditional low storage requirements, higher mobility and the availability of routes when needed. In this paper, we have present three types of Routing Protocols are studies i.e. proactive, reactive, and hybrid in MANETs

Keywords: Mobile ad-hoc network, application and challenges, routing protocol.

I. INTRODUCTION

A wireless sensor network is a self configuring network of small sensor nodes communicating among themselves using radio signals, monitor and understand the physical word [1]. A WSN can be generally described as a network of sensor nodes that cooperatively sense and may control the environment enabling interaction between persons or computers and the surrounding environment [2]. Sensor nodes are also known as motes. These motes are highly constrained in terms of size, CPU power, bandwidth and memory.

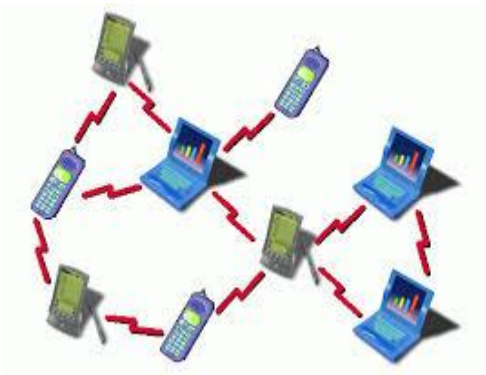

Figure 1: Mobile Ad-hoc Network

It provides a bridge between the real physical and virtual words. These sensor nodes are autonomous devices using a variety of sensors to monitor the environment in which it is deployed. Due to the feature of ease of deployment of sensor nodes, wireless sensor networks (WSNs) have a vast range of applications such as monitoring of environment and rescue missions. Wireless sensor network is composed of large number of sensor nodes. The event is sensed by the low power sensor node deployed in neighborhood and the sensed information is transmitted to a remote processing unit or base station [3]. Wireless sensor networks are used in various types of applications like seismic sensing, military applications, health applications, home applications and environmental applications. There are two main applications of wireless sensor networks which can be categorized as: monitoring and tracking and other commercial applications [4].

In general the two types of wireless sensor networks are: unstructured and structured. The structured wireless sensor networks are those in which the sensor nodes deployment is in a planned manner whereas unstructured wireless sensor networks are the one in which sensor nodes deployment is in an ad-hoc manner.

As there is no fixed infrastructure between wireless sensor networks for communication, routing becomes an issue in large number of sensor nodes deployed along with other challenges of manufacturing, design and management of these networks. There are different protocols that have been proposed for these issues.

II. APPLICATION AND CHALLENGES

Akin to packet radio networks, ad hoc networks have an important role to play in military applications. Soldiers equipped with multimode mobile communicators can now communicate in an ad hoc manner without the need for fixed wireless base stations. In addition, small vehicular devices equipped with audio sensors and cameras can be deployed at targeted regions to collect important location and environmental information which will be communicated back to a processing node via ad hoc mobile communications. Commercial scenarios for ad hoc wireless networks include:

- Conferences/meetings/lecture
- Emergency services
- Military environment
- Personal Area Networking

People today attend meetings and conferences with their laptops, palmtops, and notebooks. It is therefore attractive to have instant network formation. In addition to file and information sharing without the presence of fixed base stations and systems administrators. Ad hoc mobile communication is particularly useful in relaying information (status, Situation awareness, etc.) via data, video, and/or voice from one rescue team member to another over a small handled or wearable wireless device. Current challenges for ad hoc wireless networks include:

- Multicast
- QOS support
- Power aware routing
- Location-aided routing

As mentioned above , multicast is desirable to support multiparty wireless communications. Since the multicast tree is no longer static (i.e., its topology is subject to change over time), the multicast routing protocol must be able to cope with mobility, including multicast membership Dynamics (e.g., leave and join).Another important is the limited factor supply in handled devices, which can seriously prohibit packet forwarding in an ad hoc mobile environment. Hence, routing traffic based on nodes‟ power metrics is one way to distinguish routes that are more long lived than others. Finally, instead of using beaconing or broadcast search, location-aided routing uses positioning information to define associated regions so that the routing is spatially oriented and limited.

III. AD-HOC ROUTING PROTOCOLS

In Several routing protocols have been developed for ad hoc Mobile networks [5] [6]. Such protocols must deal with typical limitations of these networks which include high power consumption, low bandwidth and high error rates. Routing is the act of moving information from a source to a destination in an internetwork.

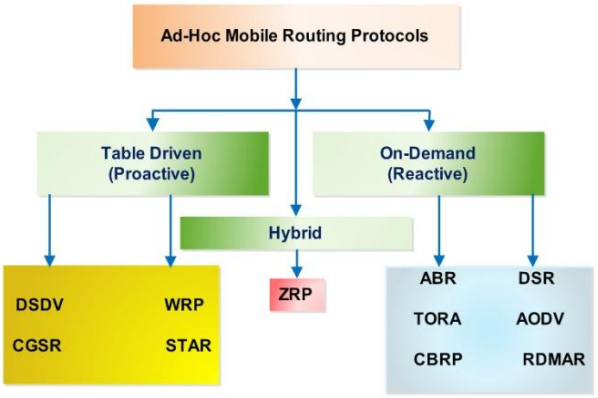

Figure 2: Routing Protocols in MANET

Proactive protocols:

Proactive protocols keep track of routes for all destinations in the ad hoc network are called proactive protocols or Table-driven protocols, the routes can be assumed to exist in the form of tables. The main advantage is that communications with arbitrary destinations experience minimal initial delay from the point of view of the application. The Disadvantages of proactive protocols is that Additional control traffic is needed to continually update stale route entries. Some of the proactive Routing Protocols are:

1. AWDS(Ad hoc Wireless Distribution Service)
2. CGSR (Cluster head Gateway Switch Routing Protocol)
3. DFR (Direction Forward Routing)
4. DBF (Distributed Bellman-Ford Routing Protocol)
5. HSR (Hierarchical State Routing protocol)
6. IZRP (Intra Zone Routing Protocol)

Reactive Protocols:

Reactive Protocols acquire routing information only when it is actually needed. The Advantage is that due to the high uncertainty in the position of the nodes, however, the reactive protocols are much suited and perform better for ad-hoc networks. The Disadvantages of reactive protocols include high latency time in route finding and excessive flooding leading to network clogging. Some of the Reactive Routing Protocols are:

1. Admission Control Enabled On Demand routing (ACOR)
2. Associativity Based Routing (ABR)
3. AODV (Ad hoc on-demand Distance Vector)
4. DSR (Dynamic Source Routing)
5. CHAMP (CacHing And Multipath Routing)
6. LAR1 (Location Aided Routing- Scheme 1)

Hybrid Protocols:

Hybrid routing are protocols in which the routing is initially established with some proactively prospected routes and then serves the demand from additionally activated nodes through reactive flooding Disadvantages of hybrid protocols is that success depends on amount of nodes activated and Reaction to traffic demand depends on gradient of traffic volume. Some of the Hybrid Routing Protocols are:

1. HRPLS (Hybrid routing Protocol for Large Scale Mobile Ad hoc Networks with Mobile Backbone)
2. HSLS (HAZY Sighted Link State Routing Protocol)
3. HWMP (Hybrid Wireless Mesh Protocol)
4. OORP (Order One Routing Protocol)
5. ZRP (Zone routing Protocol)

IV. PERFORMANCE PARAMETERS

The performance of these routing protocols can be analyzed for the below mentioned parameters. These parameters will help us to identify which routing protocol is better for various network scenarios.

a. Packet Delivery Ratio

Packet Delivery Ratio is defined as the ratio of the to-tal number of data packets received by the destination node to the number of data packets sent by the source node. This measure tells us how many data packets are successfully delivered at their destinations.

b. Network Throughput

The network throughput represents the numbers of data packets generated by the source node to the number of data packets received in the destination. A routing protocol should try to maximize this value.

c. Energy Consumption

This metric measures amount of energy consumed by a node with respect to its initial energy. The percentage energy consumed by all nodes in a scenario is calculated as the average of their individual energy consumption of the nodes.

d. Routing Overhead

The ratio of the bandwidth occupied by the rout-ing/control packets and the total available bandwidth I the network are routing overhead. In wireless ad-hoc networks, nodes often change their location within net-work. Some stale routes are generated in the routing table which leads to unnecessary routing overhead.

V. CONCLUSION

In the recent time there has been a lot of interest in the field of wireless networks. The fast moving world demands seamless communication facilities, so former types of connectively like wired networks, radio waves are fast becoming obsolete. One of the recent developments in the world of wireless technology is the use of mobile ad hoc networks which was initially developed for military applications but now has expanded to include many commercial applications. The rapid use of MANET has resulted in the identification of several problems. MANET protocols did not focus on the quality of service but the recent applications like multimedia has impressed the importance of quality of service in MANET and this has become the area of potential interest. The study has been done by comparing two reactive routing protocols AODV and DSR. The parameters studied include average jitter, average end to end delay and throughput. The result were analyzed using simulation method and NS-2 Simulator was used for the analysis The two routing protocols, all result in improvements of the various parameters such as average jitter, average throughput and average end-to-end delay but these improvements are greater in DSR than in the AODV, therefore it can be concluded that DSR is the best routing protocols.

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