

MANET Routing Protocols: A Review

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Abstract -The MANET is the self-configuring network in which mobile nodes can join or leave the network any time. Due to its decentralized nature routing is the major concern or major issue on MANET. In this work properties of reactive, proactive and hybrid is highlighted and discuss in terms of discussion or concern. In this work best performing AODV protocol for path establishment for improved using bio inspire techniques.

Keywords- Mobile Ad Hoc Networks, Routing Protocol, AODV, DSDV, DSR

I. INTRODUCTION

The explosive growth in wireless networks over the last few years resembles the rapid growth of the internet within the last decade the first professional wireless network was developed under the brand ALOHA net in 1969 at the university of Hawaii. It became operational in June, 1971. The first commercial wireless network was the WaveLAN product family, developed by NCR in 1986. Wireless communication continues to enjoy exponential growth in the cellular telephony, wireless internet and wireless home networking areas. With advent of Wireless LAN (WLAN) technology, computer networks could achieve connectivity with a useable amount of bandwidth without being networked via a wall socket. New generations of handheld devices allowed users access to stored data even when they travel. Users could set their laptops down anywhere and instantly be granted access to all networking resources. This was, and is, the vision of wireless networks, and what they are capable of delivering. In day-to-day communication wireless networks plays a prominent role. There are many applications where it is widely used like military applications, industrial applications and in personal area networks [1]. Wireless network has further two categories: Infrastructure and Infrastructure less. In Infrastructure wireless networks, the base stations are fixed, the mobile node can move while communicating. Moreover when nodes go out of the range of one base station it comes to the range of other base stations. In infrastructure less network or an ADHOC network, base station is not fixed and router moves in any network, base station is not fixed and router moves in any direction during communication. So this network makes their own route for using routing protocol [2]. As mentioned in the introductory section of the

paper:-Arma Amir Mehdi et.al (Feb 2016) [13] defined Topology-based routing protocols; both proactive (DSDV) and reactive protocols (AODV, DSR) have been considered for the study. The objective of this work is to assess the capability of these protocols in different mobile traffic scenarios. Performance metrics such as packet delivery ratio, throughput, are simulated through Qualnet 5-0 simulator. Suneel Kumar Duvvuri et.al (Aug 2016) [14] in this paper survey the Manet wireless networks has various applications in real life. The Manet wireless network setup without any infrastructure in a short time. There are various faults create the malfunctioning nodes in the network due to transmission. To eliminate the faults to design the fault tolerance routing protocol to gain the highest packet delivery ratio. There are various protocols that are End to End Estimation based Fault Tolerant routing algorithm (E2FT), the performance of these protocols increases the packet delivery probability. Ritu Parasher et al. (April 2015) [15] Researcher compared the traditional AODV with AODV routing protocols. These protocols shrink the active path whenever optimal pathway is available and switches the traffic on it. Using NS2 to prove that proposed approach enhance network performance when network size, load or the mobility increases. The simulation results clearly indicate the efficiency and effectiveness of proposed approach over the traditional AODV routing protocol. Tripti Pandey, et al. (July 2014) [16] in this paper the analyzing the performance of AODV using Travelling Salesman Problem by increasing number of nodes as it is known that routing protocols makes an important task for improving Qos in Mobile Ad hoc Network. The QoS can measure by using several parameters like throughput, network load etc. The simulation work has been carried out in Network Simulator (ns-2). By using the simulation performance for 50 nodes well; here throughput rises at the

initial stage and as the time increases throughput also increases and reaches to maximum, but the packet loss is minimum. For future work for other parameters can be considered such as end to end delay, packet delivery ratio and varying simulation time. Mina Vajed Khiavi et al. (2012) [17] in this paper compared AODV, DSDV, DSR and TORA routing protocol in mobile ad hoc networks to determine the best operational conditions for each protocol. The comparison measure the performance in the terms of Packet Delivery Ratio, Network Life Time, System Life Time, End-to-End Delay and Routing Overhead. Random Way point Model used in the mobility and the traffic sources are CBR (continuous bit rate), in this the improvement shown by using the simulator the DSDV gives the good performance.

II. WIRELESS NETWORK

Ad-hoc Wireless networks can be classified into three categories: Wireless Mesh Networks (WMNs) and Wireless Sensor Networks (WSN), Mobile Ad-hoc Networks (MANETs).

A. Wireless Mesh Networks (WMNs)

Wireless mesh network is an upcoming technology that has the potential to deliver Internet broadband access, wireless local area network coverage, and network connectivity for network operators and customers at low costs. It is a communication network that has increasingly attracted Internet Service Providers (ISPs). WMNs will greatly help the users to be always on-line anywhere anytime by connecting to wireless mesh routers[10].

B. Wireless Sensor Networks (WSN)

Wireless Sensor Network (WSN) is type of network which consists of collection of tiny device called sensors nodes. Sensor node has a resource constraint (i.e. battery power, storage and communication capability). A wireless sensor network (WSN) consists of spatially distributed autonomous sensors to monitor physical or environmental conditions (i.e. temperature, sound, vibration, pressure, humidity etc) and to cooperatively pass their data through the network to a main location [9].

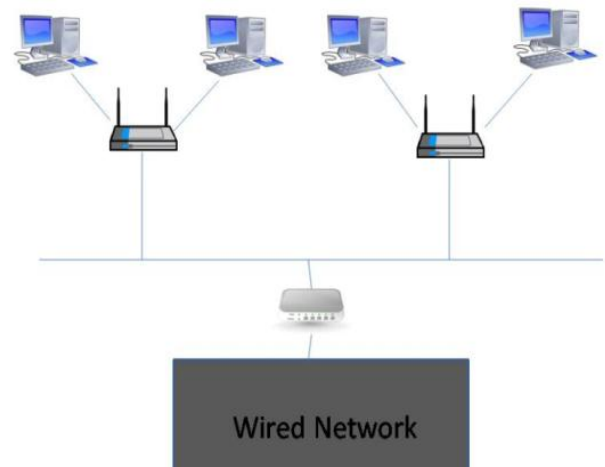


Figure 1:Infrastructured wireless networks[1]

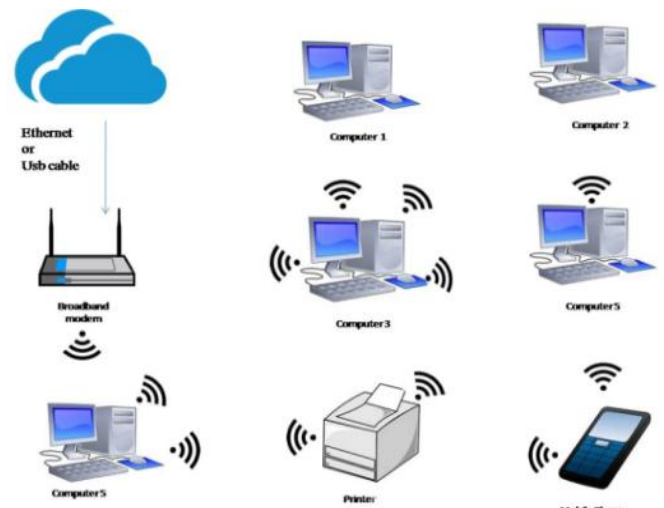


Figure 2:Infrastructureless wireless networks[1]

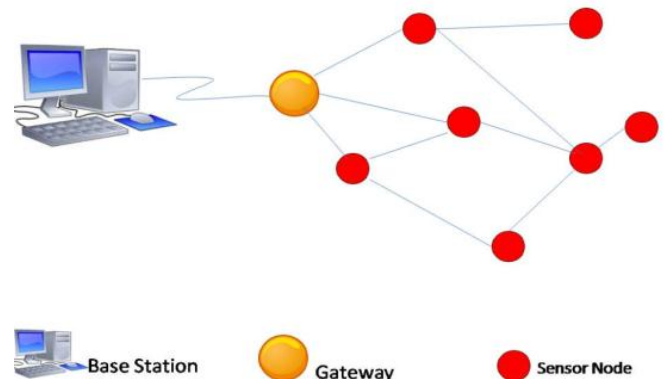


Figure 3: Wireless Sensor Network (WSN)

C. MANET

MANET is a self configuring network, in which topology is dynamic. These nodes are struggling to cope with the normal effect of radio communication channels, multi-user interference, multi-path fading etc [3].

i. MANET ARCHITECTURE

The Mobile ad hoc network has become a very popular in wireless network communication technology. A mobile ad hoc network (MANET) is a combination of wireless mobile nodes that dynamically creates the network in the absence of fixed physical infrastructure and centralized access point. In MANET each node works as a router and an end system for all other nodes in the network. [7].

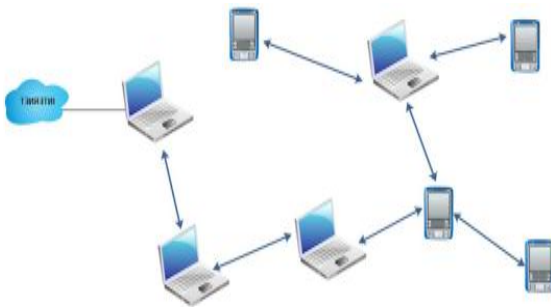


Figure 4: A Simple Mobile Ad Hoc Networks [1]

The nodes in MANETs are interrelated using the multi-hop communication paths. Simply it mentions that all the nodes in the hop must be prepared to contribute in the procedure of deliver a packet by forwarding it from source to destination[4]

D. CHALLENGES OF NETWORK

- i. **Security** The ad hoc nature of MANETs brings various new security challenges to the network design. The wireless medium is a vulnerable attack to eavesdropping and the ad hoc network functionality is established through node cooperation of the mobile ad hoc networks are intrinsically exposed to various security attacks.
- ii. **Quality of Service** the dynamic changes in topology in adhoc network, providing the QOS. Because of rapid development in mobile technology and real time applications like multimedia, voice providing Quos in adhoc network is necessary to maintain best-effort-of-service.
- iii. **Routing Overhead** the wireless adhoc networks nodes often change their location within network. There are some stale routes are generated in the routing table which leads to the unnecessary routing overhead.

- iv. **Inter-networking** the communication in adhoc networks the inter-networking between MANET and fixed networks mainly IP based. The coexistence of routing protocols in such a mobile device is a challenge for the harmonious mobility management.
- v. **Power Consumption** For most of the light-weight mobile terminals, the communication-related functions should be optimized for low power consumption. Conservation of power and power-aware routing must be taken into consideration.
- vi. **Location-aided Routing** Location-aided routing uses positioning information to define associated regions so that the routing is spatially oriented and limited. This is analogous to associatively-oriented and restricted broadcast in ABR.

III. AD-HOC ROUTING PROTOCOLS

The principle objective of these protocols is to create an optimal pathway with minimal number of intermediary nodes between source and destination, the route should have less overhead and reasonable bandwidth consumption in order to transmit the message on time [5]. The routing protocols are of these categories, which include proactive routing protocols, reactive routing protocols and hybrid routing protocols with respect to the routing topology used in MANET. The Proactive routing protocols constantly retain the updated state of the network topology and are typically table-driven [6]. As they are on demand routing protocols, so they start route discovery only when they are asked. DSR & AODV are example of these types of routing protocols [7].

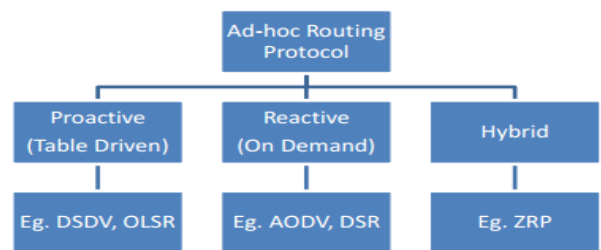


Figure 5: Routing Protocols

A. Proactive Routing Protocol

Routing protocols constantly retain the updated state of the network topology by creating a routing table and having the routing information before it is needed. Therefore they are also called as Table Driven protocols. All the nodes present in the network creates & maintains routing information to every other node in the network which is

kept in the routing tables and is updated periodically as the network topology changes [8].

- i. **DSDV (Destination sequenced Distance Vector)** DSDV protocol is a proactive routing protocol which follow conventional Bellman-Ford routing algorithm. In this protocol each nodes maintains routing table. This routing information must be periodically updated [11]. If a node invalidates its entry to a destination due to loss of next hop node, it increments its sequence number and uses new sequence number in its next advertisement of the route. Data broadcast by each mobile computer will contain new sequence number and [12]

- Destination IP address
- Number of hops required to reach the destination.
- Sequence number of the information received regarding that destination [14].

- B. **Reactive Routing Protocol** The reactive protocols are also known as source-initiated on-demand routing protocols. They do not have any procedure for creating & updating routing tables with routing information at regular intervals. They finding the suitable route to the destination and establishing the connection in order to transmit and receive the packet [8].

- i. **On demand distance vector routing protocol (AODV)** it is a routing protocol for mobile ad hoc networks and other wireless ad-hoc networks it is a reactive routing protocol, meaning that it establishes a route to a destination only on demand. In AODV route request, route reply and route error are the control messages. When source node wants to establish route to the destination nodes, source node first route request control packets to their adjacent nodes [8].

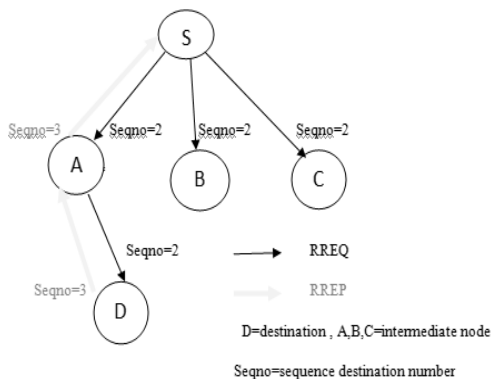


Figure 6: AODV protocol

- ii. **DSR Protocol** The DSR Protocol is the reactive type of protocol in which the path from the source to destination is selected when required. The Source node

floods the route request packets in the network. The intermediate nodes, which are having route to the destination, will respond with the route reply packets.. When the source node starts broadcasting the route request packets, the header of the route request packet is empty. The header of the route request packet starts populating [8].

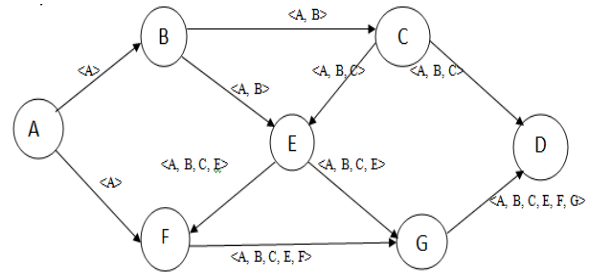


Figure 7: Route Request Flooding

C. Hybrid Routing Protocol

These types of protocols make use of the strengths of both the previously discussed protocols by combining them together to obtain better results. In the initial stage routing is done with some proactively prospected routes and then formation serves the demand from additionally activated nodes through reactive flooding [4].

- i. **ZRP Hybrid Routing Protocol** Zone Routing Protocol (ZRP) is a hybrid protocol which combines the advantages of both proactive and reactive schemes. ZRP routing protocols consists of different modules such as: Intrazone routing protocol, Interzone routing protocols [4].

- Intrazone routing protocol:** - This protocol is adopted from the proactive routing protocols that is used to support only the local topology. This protocol works in the within the specified zone only.
- Interzone routing protocol:** This protocol is adopted from the reactive protocol which is used when the route between the different zones is needed for the communication in between the source and destination [2].

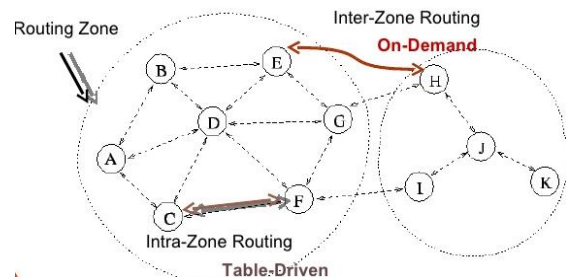


Figure 8: ZRP routing protocol

IV. CONCLUSION AND FUTURE SCOPE

In this paper, we basically focused on three different approaches of MANETS routing protocols and their examples: Reactive (AODV, DSR), Proactive (OLSR, DSDV), Hybrid (ZRP) routing protocols. We have reviewed the various papers related to this work and conclude that it is a critical issue to select an efficient and reliable path establishment between sources to destination. After the review of several papers we found some drawbacks in existing work. To analyze the performance of AODV, DSR and DSDV routing protocol in terms of PDR, end-to-end delay and packet loss. To propose improvement in protocol this is higher performance for path establishment between source and destination. To improve the quality of service based multipath routing in Mobile Ad hoc Networks (MANETs) based on Ant Colony Optimizations (ACO) look-ahead approach. If we implement proposed technique in future the result may be better.

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