

# A REVIEW OF MANET PROTOCOLS AND APPLICATIONS

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**Abstract:** Mobile Ad hoc Network (MANET) is a collection of wireless mobile nodes that dynamically form a network temporarily without any support of central administration. Extensive use of wireless networks in different fields increases the need to improve their performance, as well as minimize the amplitude of loss messages. Device mobility, where there is no standard topology that can be applied or fixed routing that can be designed, is a topic that received recent attention in wireless networks. Every node in MANET moves arbitrarily making the multi-hop network topology to change randomly at unpredictable time. Mobile ad-hoc network (MANET) is one of the most promising fields for research and development of wireless network. This paper, we analyze a MANET's performance for protocols, Manet applications and their attacks.

**Keywords:** MANET, AODV, OLSR, ZPR

## I. INTRODUCTION.

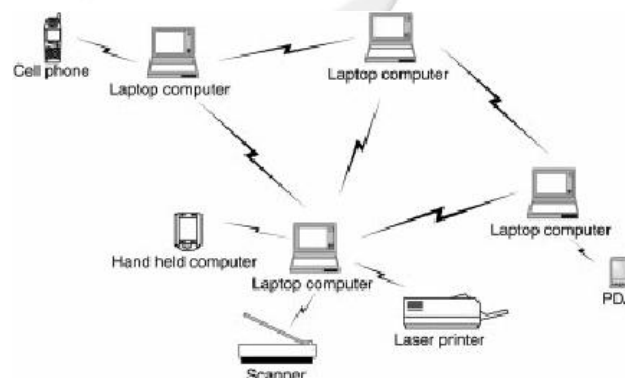
Moreover, the network can be extended to any place or building without the need for a wired connection. A mobile ad hoc network is a collection of wireless mobile nodes that dynamically establishes the network in the absence of fixed infrastructure [1]. One of the distinctive features of MANET is, each node must be able to act as a router to find out the optimal path to forward a packet. As nodes may be mobile, entering and leaving the network, the topology of the network will change continuously.

MANETs provide an emerging technology for civilian and military applications. Since the medium of the communication is wireless, only limited bandwidth is available. Another important constraint is energy due to the mobility of the nodes in nature. In order to facilitate communication within the network, a routing protocol is used to discover routes between nodes. The set of applications for MANETs is diverse, ranging from large-scale, mobile, highly dynamic networks, to small, static networks that are constrained by power sources. Besides the legacy applications that move from traditional infrastructure environment into the ad hoc context, a great deal of new services can and will be generated for the new environment.

## II. MOBILE AD-HOC NETWORKS

Ad hoc networks form spontaneously without a need of an infrastructure or centralized controller. The type of peer-to-peer system infers that the each node, or user, in the network can act as a data endpoint or intermediate repeater. Thus, all users work together to improve the reliability of network communications. These types of networks are also popularly

known to as "mesh networks" because the topology of network communications resembles a mesh [2]. Figure 1 shows the mobile ad hoc network process.



**Figure 1: Mobile ad hoc network structure**

The redundant communication paths provided by ad hoc mesh networks drastically improve fault tolerance for the network. Additionally, the ability for data packets to "hop" from one user to another effectively extends the network coverage area and provides a solution to overcome non-line of sight (LOS) issues.

Mobile application present additional challenges for mesh networks as changes to the network to topology are swift and widespread. Such scenarios require the use of MA hoc Networking (MANET) technology to ensure communication routes are updated quickly and accurately. MANETs self-forming, self-maintained, and self healing, allowing for extreme networks flexibility. While MANETs can be

completely self contained, they can also be tied to an IP-based global are local networks (e.g. internet or private networks). They are referred to as Hybrid MANETs.

### III. CHARACTERISTICS OF MANET

Mobile ad hoc network nodes are furnished with wireless transmitters and receivers using antennas, which may be highly directional (point-to-point), unidirectional (broadcast), probably steerable, or some combination. At a given point in time, depending on positions of nodes, their transmitter and receiver coverage patterns, communication power levels and co channel interference levels, a wireless connectivity in the form of a random, multihop graph or "ad hoc" network exists among the nodes. This ad hoc topology may modify with time as the nodes move or adjust their transmission and reception parameters[3].

The characteristics of these networks are summarized as follows: Communication via wireless means.

- Nodes can perform the roles of both hosts and routers.
- Bandwidth-constrained, variable capacity links. Dynamic network topology.
- Frequent routing updates.

### IV. MANET ROUTING PRINCIPLES

The first pieces of literature we will discuss are a pair of survey papers by these two survey papers gather together information on the wide variety of MANET routing protocols which researchers have developed to meet the challenges of MANET routing, many of which feature different methods of managing the issues associated with mobility. Reference performed an extensive research survey into the available routing protocols and attempted to categories them by the features they exhibit and provide details on the core protocols of each category. This is similar to work undertaken by [4] who took a similar approach in grouping routing protocols using the categories; geographical, multi-path, hierarchical, geo-cast and power aware routing protocols. The two survey papers both find that every protocol identified also fit into the core categories of reactive, proactive or hybrid routing protocols in addition to any other characteristics they exhibit.

### V. MANET ROUTING PROTOCOLS

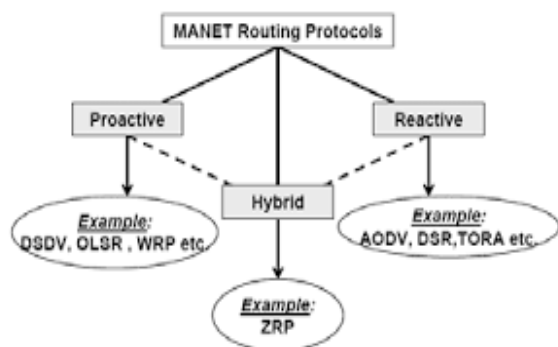


Figure 2: MANET routing protocol types

#### 5.1. Reactive routing protocols

Reactive or on-demand routing protocols route is Discover when needed. Reactive protocols tend to decrease the control traffic messages overhead at the cost of increased latency in discover a new routes. Source initiated route discovery in reactive routing protocols and less delay. In reactive protocols there is no need of distribution of information. It consumes bandwidth when transfer data source to destination. Reactive Protocols are AODV (ad-hoc on demand distance vector), DSR (distance vector routing) and ABR (Associatively Based Routing) protocols [5]. MANET is also called Mesh network. It is high adaptable and rapidly deployable network. MANET has a dynamic

##### 5.1.1 AODV

AODV stand for Ad-hoc On-Demand Distance Vector Routing .AODV is meaning that it establishes a route to a destination only on demand. AODV is capable of unicast, broadcast and multicast routing. AODV have some join feature of DSR and AODV.AODV avoids the counting to-infinity problem of other distance-vector protocols by using sequence numbers on route updates[7]. AODV reacts relatively quickly to the topological changes in the network and updating only the hosts that may be affected by the change, using the RREQ message. Hello messages, be dependable for the route maintenance, are also imperfect so that they do not create unnecessary overhead in the network. The RREQ and RREP messages are responsible for the route discovery.

##### Advantages

The AODV protocol is basically flat routing protocol so it does not require any inner organizational method to handle the routing process.

In AODV routes established on demand and that destination sequence numbers are applied for find the latest route to the destination. The connection setup delay is lower.

The AODV protocols are a loop free and avoid the counting to infinity problem. At most one route per destination maintain at each node.

##### Disadvantages:

- It can lead to heavy control overhead.
- In AODV unnecessary bandwidth consumption.

#### 5.2. Proactive or table driven

In Proactive routing protocols every node store information in the form of tables and when any type of change accrue in network topology need to update these tables according to update. The node swaps topology information so they have route information any time when required. There is no route discovery delay associated with finding a new route[6]. In proactive routing fixed cost generate, as normally greater than that of a reactive protocols[7]. Proactive protocols Traditional distributed shortest-path protocols Based on periodic updates high routing overhead. Proactive routing protocols are DSDV (destination sequenced demand vector), OLSR (optimized link state routing protocols)

##### 5.2.1 OLSR

Optimized Link State routing protocol is a proactive link state

routing protocol, which uses hello and topology control (TC) messages to discover and then disseminate link state information throughout the mobile ad-hoc network. Individual nodes utilize this topology information to work out next hop destinations for all nodes in the network using shortest hop forwarding paths. Being a proactive protocol, routes to all destinations within the network are known and maintain before using it. Having the routes available within the standard routing table can be useful for some systems and network applications as there is no route discovery delay associated with finding a new route. The routing operating cost generates, although commonly greater than that of a reactive protocol and does not increase with the number of routes being created. Being a link-state protocol, OLSR requires a reasonably large amount of bandwidth and CPU power to compute optimal paths inside the network.

### 5.2.2 OLSR version

is at present being developed inside the IETF. It maintains several of the key skin of the unique includes MPR selection and distribution. Key difference is the flexibility and modular design using collective components: packet format packet, and neighborhood invention protocol NHDP. These components are being planned to be frequent among next creation MANET protocols. Difference in the managing of several address and interface enable nodes is also there between OLSR and OLSRv2. Advantages. OLSR is moreover a flat routing protocol. It does not need central administrative system to handle its routing process. The proactive quality of the OLSR protocol that it provides all the routing Information to all participated hosts in the network. OLSR protocol does not need that the link is reliable for the control messages, since the messages are sent at regular intervals and the delivery does not have to be in order.

### Disadvantages:

However, as a drawback OLSR protocol desires that each host periodic sends the updated topology information throughout the whole network, this raise the protocols bandwidth usage. OLSR requires a reasonably large amount of bandwidth and CPU power to compute optimal paths inside the network.

### 5.3 Hybrid routing protocols

Hybrid routing protocols combination of both reactive and proactive routing protocols. It was proposed to reduce the control overhead of proactive routing protocols and also decrease the latency caused by route discovery in reactive routing protocols. Hybrid routing protocols are ZRP (Zone routing protocol) and TORA (Temporarily Ordered Routing Algorithm).

ZRP was planned to decrease the control overhead of proactive routing protocols and discovery in reactive routing protocols and also decrease the latency caused by route. It can be safely being assumed that most communication takes place between the node close to each other. ZRP provide framework to other protocols. The behavior of ZRP is adaptive. ZRP based on the Zone, these are local neighbors

each node within have many overlapping zones and each zone may be have dissimilar size. ZRP consists of several component, these component together give the benefits of ZRP. Each component work independently to give the efficient result. Components of ZRP are: IARP Intrazone Routing Protocol, IERP Interzone Routing Protocol

## VI. APPLICATIONS OF MANET

MANET The mostly discussed application scenario for pure general-purpose MANET is Battlefield or disaster-recovery networks. However, these kinds of networks have not yet achieved the envisaged impact in terms of real world implementation and industrial deployment.

### 6.1 users' perspective

Generally, MANET is justified by the possibility of building a network where no infrastructure exists, or to have a "free" network where users can communicate without cost, provided that the node density is sufficient. Reports about MANET perception from the users' perspective are missing. The users' evaluation indicates the following major problems in pure general purpose MANET:

- Users' motivations for using large-scale MANET are not clear.
- Application scenarios able to attract user interest are missing.
- There is a lack of effective MANET implementations that can be used by non-expert users.
- Mesh network is a more pragmatic approach to build multihop ad hoc networks.

### 6.2 Technical perspective

Although MANET research has been going on for some time, there are relatively few experiences with real ad hoc networks. The lack of accuracy in most MANET simulation studies in one or more of the previous points drastically reduces the credibility of MANET research. Here are the most common issues in MANET simulation that may result in the lack of realism in simulation studies. Simulation Modeling Simulation Model Solution Analysis of the Simulation Output.

## VII. CONCLUSION

Mobile ad hoc network is decentralized, self-organized, "anytime, anywhere" network and provide cheap communications. In this paper discuss the overview of different a application of the mobile adhoc network and various challenges faced by the developer and designer. In this paper also discuss the classification of routing protocols and done comparative analysis for wireless ad hoc networks routing protocols viz. reactive routing protocols, proactive ,hybrid routing protocols. All the routing protocols are doing good performance in wireless network but reactive protocol doing better performance. Because this reactive protocol path finding protocol perform new path discovery and path maintenance.

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