# A Study of Various Routing Techniques with Issues and Challenges in Mobile Ad-Hoc Network

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## ABSTRACT
Wireless ad hoc network is dispersing type of wireless network. The network is called as "ad hoc" network as it is not dependent on already existing infrastructure, like routers in wired networks or access points in managed network. Ad hoc networks become reliable for emergency response situation such as natural disasters, military conflicts, etc by using minimum composition of system and quick distribution methods. Mobile ad hoc network relies on the existence of the least some infrastructure. Mobile IP requires home agent, tunnels, and default router. DHCP requires servers and broadcast capabilities of the medium reaching all participants or relays to server. Cellular phone network requires base stations, infrastructure network etc. However, there may be several situations where users of a network cannot rely on an infrastructure, it too expensive, or there is none at all. It is necessary to note that it target on so-called multi hop ad-hoc network when describing ad-hoc networking. The ad-hoc setting up of a connection with an infrastructure is not the main issues here. These networks should be mobile and use wireless communications. This research paper focuses on routing techniques in Mobile ad hoc networks and it also deciphers the issues and challenges of Mobile ad hoc networks.

KEYWORDS: ad-hoc, MANETs, DSDV, AODV

## 1. INTRODUCTION
A mobile ad hoc network is infrastructure less network of mobile devices which are connected without wires as it is a self-configuring and self-organizing [2]. Mobile ad hoc network are formed dynamically by a sovereign system of mobile node which are connected through wireless links. There is no existing infrastructure or centralized administration- no base station. Mobile nodes can move randomly. It may be operated independently and it can be connected to larger internet. Each node work as router.
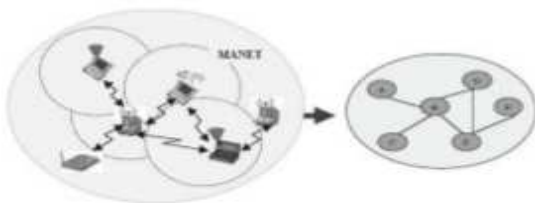


MANETs

Mobile IP and DHCP are used to handle the connections of mobile devices to a fixed infrastructure. Mobile devices can be connected either directly with an infrastructure using mobile IP for mobility support and DHCP as a source of many parameters, such as an IP address. MANET research is responsible for developing protocols and components to enable ad-hoc networking between mobile devices. It should be noted that separation of end system and router is only a logical separation. Typically, mobile nodes in an ad-hoc scenario comprise routing and end system functionality [2].

Mobile ad hoc network (MANETs) represents a large class of telecommunications networks, in which the nodes share the same physical medium. MANETs continue to provide only a fraction of their potential capacity this is the reason for the include scarcity of spectrum, lack of stable infrastructure, and non-commercial requirements such as mission-critical systems that cannot tolerate. Ad-hoc networking concept is not a new one, having been around in various forms for more than 20 years. A MANET is an attractive and cost-effective solution for providing communication in areas where fixed infrastructure is not available and not reliable.

In spite of having several advantages, it also consist some of the challenges issues that are required to be taken into account in order to increase MANET survivability.

## 2. Review Literature:
Mobile Ad-Hoc Network are very difficult in distributed system that consist of various wireless mobile node which can actively organize on momentary ad-hoc network topologies. Routing is the main problem in wireless networks which display the obligation of integrated the data transmission in the networks.

### 2.1. Issues of mobile ad hoc networks:
### 1. No fixed topology:
In this term it signifies that there are many nodes which transmission can be terminated due to its moving aspects. There are significant routing protocols:

A. Route acquisition: In routing acquisition it delay while transmission and doesn't not understand route.
B. Reconfiguration of route: Reconfiguration use various algorithms to re-transmit the node of mobile network, to achieve load balancing in wireless access points.

## 2. Battery power devices:
Battery power is major issue in wireless network. [1]A node can transmit data through longer distances only when it has sufficient amount of battery capability power. Area coverage by nodes is important aspects in mobile ad hoc network. It consist of sensor nodes which can transmit power and monitor battery.

## 3. Security in ad hoc network:
Ad hoc wireless network are highly vulnerable to security attack which is prime issue. There is no single node ( centralized node) and no secure protocol is placed. [2] It consist of many requirement in network security such as confidentiality, integrity, availability and non reputation which adhere with digital signature.

## 4. Quality of service:
QOS is ambitious to a developer because its topology keep on changing constantly.[1] There is some loss of data packets. It is very challenging to sustain network condition in quality of services. QOS goal to modify the network pattern and provide guarantees of performance. In this nodes act as hosts and routers both at a time. Routing path are formed and replaced to node mobility.

## 5. Secure multicast:
It is a communication method where a single data packet can be transmitted from a sender and replicated to set of receiver.[2] Confidentiality guarantees that the network information cannot be revealed to illegal unit. Integrity is very important to maintain the data to transmitted among nodes without any change or degradation.

## 2.2. Challenges in Mobile Ad Hoc Network:
## 1. Medium Access scheme protocol in ad-hoc wireless network:
Mac protocol is responsible for sharing use of transmission medium. [1]It consist of distributed operation, maximum throughput, real-time traffic support, power control capabilities, hidden terminal problem, exposed terminal problem.

## 2. Routing protocols in ad-hoc networks:
It is responsible for determining a feasible path to a destination based on certain criterion which discovering, storing and exchanging routing information. [2]Challenges consist of mobility, bandwidth constraints, resource constraints, erroneous transmission medium, location-dependent contention.

## 3. Multicasting:
Multicasting is an important traits in wireless ad-hoc network which secure and rescue operations: distribution of commands and military application.[5] Challenges occur with fast recovery, control overhead, efficient group management, scalability, security.

## 4. Transport Layer protocol in ad-hoc network:
Transport layer has major function of connection-based it consist of setting up and maintain end-to -end connection, flow control, congestion control.[5] There are various performance degradation stems from high error rate, frequent path breaks, network partitioning.

## 5. Self-organization protocol in ad-hoc network:
Self-organization consist of set of a mobile nodes with unique identifiers and wireless medium of communication into a connected network, which can do things like self-configure or self-organize. [12]It concerns maintain the structure when topological changes occur.

Self-organization is the main attractive property of ad-hoc networks to perform self-organization which consist of following requirement:

A. Neighbor discovery: A node should gather network information (transmission of reception of discovery packets).
B. Topology organization: Every nodes gathers information about the entire network (a part of) and construct and maintain the network topology.
C. [8]Topology reorganization: It has links break, nodes switch off etc and requires periodic or aperiodic exchange of topology information.

## 6. Security in ad-hoc network:
What makes ad hoc more vulnerable to attacks:
➢ lack of central coordination;
➢ shared wireless medium.

The attacks against ad-hoc networks are generally classified into:
A. passive attacks is how malicious nodes attempt to obtain information relayed in the network;
➢ **active attack:** Active attacks disrupt the operation of the network and classified into the following types:
• external attacks is attacks implemented by nodes outside the network.
• Internal attacks is attacks implemented by nodes belonging to the same network.

There are following security threads in ad-hoc networks:
➢ Resource consumption Energy depletion to deplete the power of the node relaying the traffic through them. Buffer overflow fill the routing table with 'bad' entries to consume the buffer space of the target node.
➢ Host impersonal act as an another node responding with control packets and interrupting data traffic.
➢ Information disclosure is disclose information destined for a certain node.

## 3. Research Methodology:
## 3.1. Routing In Mobile Ad-Hoc Network:
Routing consist of problem which determination and management of routes between nodes in ad hoc network. Routing has significant solution characteristics has different metrics to optimize should be address frequent changes in topology and traffic patterns etc.[10] It handle any system characteristics such as unidirectional links it should address trade-off between latency in determining a route and overhead of route management (control traffic and state).
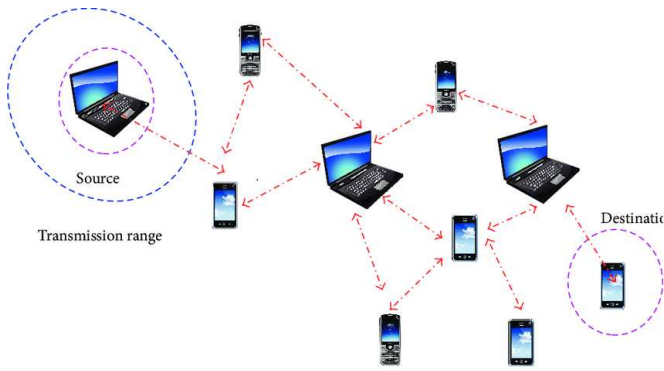
## 3.2. Classification of Ad Hoc routing protocols:

Classification of mobile ad hoc network in routing technique protocol can be excuted in various form, but most of these has to rely on routing strategy and network structure.[11] The routing protocol scan be differentiate as flat routing, hierarchical routing and geographic position on the network structure. There are different classification in mobile ad hoc network which consist of proactive routing, active routing and hybrid routing which is based on routing information updates.
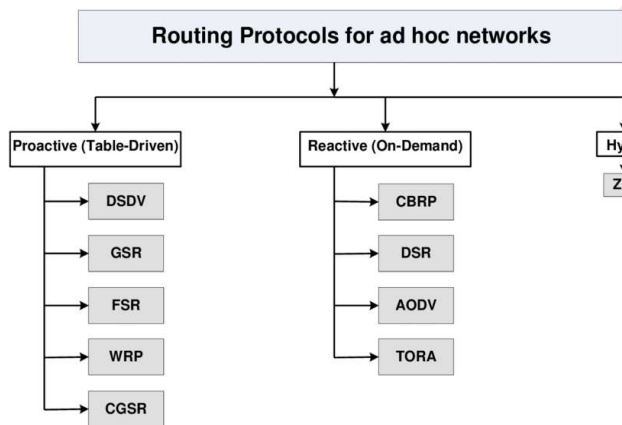


**Figure: Classification of routing protocol for ad hoc network.**

### A. Proactive Routing:
Proactive routing is table-driven routing protocol in mobile ad hoc networks. In this each node maintains a routing table which consist on example of algorithm on DSDV, STAR, CGSR.[3] It is based on temporal information for routing these based on two classification of past history (DSDV, AODV) and future history (LBR). This type of protocols maintains lists of destinations and their routes by periodically distributing routing tables into network.[5]
The main disadvantages of such algorithms are:
➢ Respective amount of data for maintenance.
➢ Slow reaction on restructuring and failures.

### B. Reactive Routing:
In reactive routing it is based on (On-Demand Routing) which signifies only when there is demand of node.[6] No node maintain a routing table they obtain necessary path required. Connection establishment process is method to occur the required path when it demands for node. It consist of DSR and AODV example algorithm. This type of protocol signifies a route on demand by flooding the network with Route Request packets. The main disadvantages of such algorithms are:
➢ High latency time in route finding.
➢ Excessive flooding can lead to network clogging.

[7] Examples of on-demand algorithms are:
➢ ABR - Associativity-Based Routing
➢ Ad hoc On-demand Distance Vector(AODV)
➢ Dynamic Source Routing
➢ Power-Aware DSR-based

### C. Hybrid Routing:
Hybrid routing is combination of both network (Proactive and Reactive routing) which is divided into zones. [9]It obtains the best feature of proactive and reactive routing protocols. It has two important algorithm:
➢ CEDAR(Core- Extraction Distributed Ad Hoc Routing Algorithm)
➢ ZRP(Zone Routing Protocol)

It has classification based on:
➢ Utilization of specific resources it consist of flooding and geographical.

## 4. Conclusion:
The mobile ad hoc network (MANETs) is a collection of wireless mobile host dynamically establishing a short live network without the support of a network infrastructure. In this type of environment, it's expected that a large number of ad hoc connection will exist in the small region without any mutual coordinations. [4]Mobile ad hoc networks are the future of wireless network. Nodes in these networks will generate both users and application traffic and perform various network function in ad hoc networks.

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