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OVERVIEW OF MOBILE AD-HOC NETWORK

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ABSTRACT

A mobile ad hoc network (MANET) is a group of mobile nodes that dynamically self-organize in a wireless network without using any pre-established infrastructure and that serve as both hosts and routers in an ad hoc wireless network. Typically, nodes only send broadcast messages to other nodes in their immediate vicinity. This paper reflects overview of Mobile Ad-Hoc Network.

Keywords: Mobile Ad Hoc Network, Connectivity, Wireless Communication.

MOBILE AD-HOC NETWORKS

Mobile Ad Hoc Network (MANET) is a decentralized type of wireless network. The network is ad hoc because it does not rely on a pre-existing infrastructure, such as routers in wired networks or access points in wireless networks. Instead, each node participates in routing by forwarding data for other nodes, so the determination of which nodes forward data is made dynamically on the basis of network connectivity and the routing algorithm in use.

Every device in a MANET has the freedom to travel autonomously in any direction, which causes it to regularly swap ties with other devices. Each must act as a router by forwarding traffic unrelated to its own usage. Equipping each device to keep the data necessary for appropriate traffic routing is the key problem in creating a MANET. This becomes harder as the scale of the MANET increases due to 1) the desire to route packets to/through every other node, 2) the percentage of overhead traffic needed to maintain real-time routing status, 3) each node has its own goodput to route independent and unaware of other's needs, and 4) all must share limited communication bandwidth, such as a slice of radio spectrum. Such networks may operate by themselves or may be connected to the larger Internet. They may contain one or multiple and different transceivers between nodes. This results in a highly



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dynamic, autonomous topology. MANETs usually have a routable networking environment on top of a link layer ad hoc network.

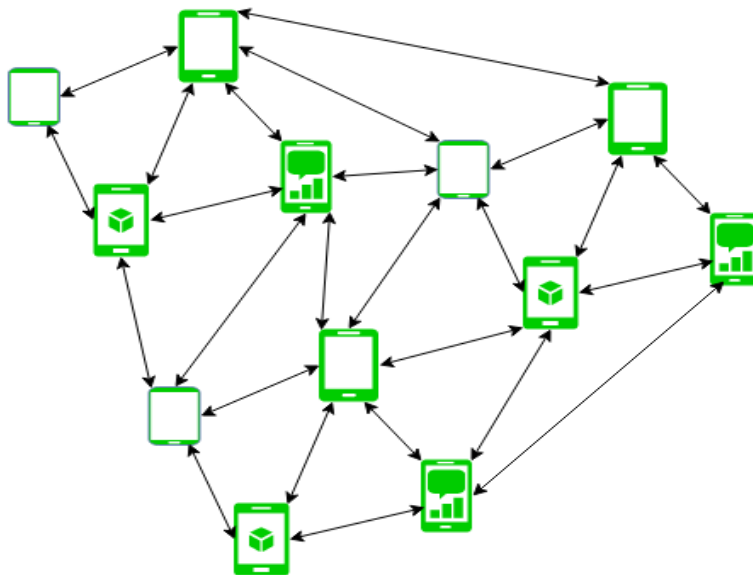


Figure 1: Mobile Ad-Hoc Networks

MANETS CHARACTERISTICS

The special characteristics of MANET bring the wireless technology as a great opportunity along with severe challenges. It is important to understand the fundamental properties of these networks. The characteristics of these networks are as follows:

Communication In Wireless

A MANET consists of wireless communication devices which are free to move in an arbitrarily way. The nodes may be located in or on people, trucks, cars, or very small devices. The network may operate in isolation, or it may have gateways to a fixed network.

No Centralized Controller and Infrastructure

Ad-hoc Networks have no fixed infrastructure, making their deployment fast and easy. At any instant of time, the connectivity of an ad-hoc network can be shown by a graph (connectivity topology), which is time-varying. Nodes can be connected dynamically in an arbitrary manner.



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Dynamic Network Topology

The network topology may change rapidly and the connectivity among the nodes may vary with time due to the mobility of nodes. The mobile nodes in the network dynamically establish routing among themselves and form their own network.

Frequent Routing Updates

Each node in an ad-hoc network is allowed to move freely in any direction and will therefore change its connectivity to other nodes frequently. Thus, routing table is updated frequently.

Power Constraint

The power supply of the nodes participating in MANETs will be batteries or other fast discharging power supplies. The development of MANETs must therefore take this limited resource into consideration with a view to limit the traffic in each of the nodes to save battery.

Variation In Scale

Ad-hoc networking allows the devices to maintain connections to the network and makes easy to add and remove devices to and from the network.

Heterogeneity

Each node may have different capabilities and form hybrid network.

Energy Constraints

The energy consumption is a critical issue in the design of adhoc networks. The mobile nodes usually have limited storage and less computational capabilities. They depend on other nodes and resources for data access and information processing.

Limited Security

MANETs are more vulnerable to physical threats than regular wired networks. A network topology must be reliable and assured through efficient secured routing protocols for adhoc networks.



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Multi-Hop Routing

Basic types of ad-hoc routing algorithms can be single-hop or multihop, based on different link layer attributes and routing protocols. Single-hop network is simpler than multi-hop network in terms of structure and implementation, with the cost of lesser functionality and applicability. When delivering data packets from a source to its destination, the packets are forwarded via one or more intermediate nodes.

Fluctuating Link Capacity

The chance of high bit-error rates of wireless connection might be more profound in a MANET. One end-to-end path can be shared by many sessions. The wireless communication channel is subject to noise, fading, and interference, and has limited bandwidth than a wired network. In some situations, the path between any pair of users can traverse multiple wireless links and the link themselves can be heterogeneous.

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