WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Survey on Wireless Adhoc Networks methods and Issues: Perspective view

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A B S T R A C T

The term "mobile ad hoc network" is a new term for an old technology: a network that is not dependent on pre-existing infrastructure. Because each device in a MANET is free to move in any direction, it will regularly change its connections to other devices. The key problem in constructing a MANET is supplying each device with the necessary information to appropriately route traffic. Due to the desire to route packets through every other node, this gets more difficult as the MANET grows in size. These networks can run alone or be linked to the wider Internet. They may contain one or more transceivers in various node transceivers. As a result, the topology is highly dynamic and self-contained.

Keywords: ad hoc networks, MANET, VANET, MAC protocols, routing protocols.

1. Introduction

Ad-hoc networks arise when devices connect and communicate with one another on their own time. The term ad hoc comes from the Latin word "for this," which implies "on the spot." The majority of ad hoc networks are wireless local area networks (LANs). Instead of depending on the base station or access points in wireless LANs to coordinate data transport, the devices communicate directly with one another. Each device participates in routing activities by utilising the routing algorithm to determine a route and forwarding data to other devices along that route. Wireless networks have grown in popularity in the communication business since their introduction in the 1970s. These networks provide mobile users with access to omnipresent computing and information no matter where they are. There are two types of mobile wireless networks now available: infrastructure and infrastructure-less networks. Mobile Ad-hoc Networks are another sort of wireless network that does not require any infrastructure (MANET). There are no fixed routers in these networks; every node could be a router. All nodes are capable of mobility, and they can be dynamically joined in any way. The terminals themselves are responsible for organising and controlling the network. A MANET is a network architecture that can be quickly deployed without relying on pre-existing fixed network infrastructure. The nodes in a MANET dynamically join and depart the network on a regular basis, typically without warning and perhaps without disrupting the communication of the other nodes. Finally, network nodes can be highly mobile, causing node constellations and link presence or absence to change rapidly. The following are some examples of MANET applications:

- Tactical operation - for fast establishment of the military communication during the deployment of the forces in unknown and hostile terrains

- rescue missions - for communication in the areas without adequate wireless coverage;

• National security - for communication in times of national crisis, where the existing communication infrastructure is the non-operational due to the natural disaster or a global war;

A wireless ad hoc network (WANET) is a sort of local area network (LAN) that is created on the fly to connect two or more wireless devices without the use of traditional network infrastructure equipment such as a wireless router or access point. Connecting two or more laptops (or other supported devices) to one other directly without a central access point, either wirelessly or through cable, is an example of an ad-hoc network. If you want to quickly set up a peer-to-peer (P2P) network between two devices, use the ad-hoc network.

2. Types of Adhoc networks

1. Mobile ad hoc network (MANET): An ad hoc network of the mobile devices.
2. Vehicular ad hoc network (VANET): Used for the communication between vehicles.
3. Smartphone ad hoc network (SPAN): Wireless ad hoc network created in a Smartphone's via existing technologies like a Wi-Fi, Bluetooth.

2.1 MANET

They are made up of a group of mobile nodes that are connected wirelessly in a self-configuring, self-healing network that does not require any fixed infrastructure. If the network topology changes regularly, MANET nodes are free to roam around at will. Each node in a network acts as a router, forwarding traffic to other designated nodes.

2.2 VANET

VANET, a subclass of MANETs (mobile ad hoc networks), is a viable option for the future intelligent transportation system (ITS). These networks lack fixed infrastructure, relying instead on cars to provide network functionality.

Communicate vehicles in VANET

In VANET, vehicles communicate through wireless links that are mounted on each vehicular node. Each node within VANET acts as both the participant and router of the network.

Types of VANETs

VANETs offer 3 types of communication modes, namely,

- Vehicle-to-Vehicle (V2V),
- Vehicle-to-Infrastructure (V2I) and
- Inter-Infrastructure communication.

2.3 SPAN network

The Smart Phone Ad-Hoc Networks (SPAN) project reconfigures a Smartphone's inbuilt Wi-Fi chip to operate as a Wi-Fi router, forming an ad-hoc mesh network with other nearby similarly equipped Smartphones. Without a working carrier network, these Smartphones can connect with one another. The following are examples of wireless ad hoc networks: Ad hoc networks do not require infrastructure devices such as access points or wireless routers, and they provide a low-cost way for clients to communicate directly with one another.

Wireless Ad-hoc Networks are fundamentally different from traditional wired networks; they have a brand-new architecture. As a result, several obstacles arise from two major aspects: self-organization and wireless information transmission. As a result, the topology of a MANET network may alter at unanticipated moments. Because nodes cannot be trusted to have durable data storage, routing becomes extremely challenging. In the worst-case scenario, we have no idea whether the node will still be there the following minute because it could quit the network at any time.

2.4 Ad hoc networking

The above-mentioned MANET difficulties and limits present substantial challenges in ad hoc network architecture. To address these unique challenges and limits, a vast body of research has been accumulated. We outline current research activity and problems in some of the primary study topics within the mobile ad hoc network domain in this paper. We will use the simplified design as a reference for the current massive quantity of research activity on ad hoc networks in a systematic/organic approach. The research efforts will be divided into three categories based on the layered approach:

- Enabling technologies;
- Networking;
- Middleware and applications

In addition, as shown in the figure, several issues (energy management, security and cooperation, quality of service, network simulation) span all areas, and we discuss them separately.

3. Security in Wireless Adhoc networks

For all types of networks, including Wireless Ad Hoc Networks, security is crucial. It is clear that security challenges for Wireless Ad Hoc Networks are six times more difficult than for fixed networks. Wireless Ad-hoc Network topologies are very dangerous due to the mobility of relaying nodes and the fragility of routes. There is no guarantee that any entity will be present at all times, making it difficult to rely on a centralised design to implement network structure or even authentication. People who believe that Mobile Ad hoc Networks are not a broken design and that the main reason we don't see it in practise is because most of its applications are in the military are completely wrong.

But perhaps those individuals overlooked one of the most crucial factors: security! Everyone knows that trust and security are critical requirements for military applications! That is to say, for ad hoc networks, security is the most critical consideration, particularly for security-sensitive applications. Wireless Ad-hoc Networks do not have a fixed infrastructure. Multi-hop, mobility, big network size mixed with device heterogeneity and bandwidth, and battery power limits are all issues that make designing routing protocols difficult. Many academics worked tirelessly on Wireless Ad-hoc Routing Protocols.

The network routing protocols have traditionally been classified into proactive and reactive protocols. Proactive protocols exchange topological information across network nodes to continually learn the network's topology. As a result, when route information to a place is required, it is quickly available. Proactive Distance Vector protocols based on the Distributed Bellman-Ford (DBF) algorithm [Ber92] were the first protocols suggested for routing in ad hoc networks.

Modifications were suggested to address the drawbacks with this DBF algorithm - convergence and excessive control traffic, which is especially a concern in resource-constrained ad hoc networks - (i.e., [Che89], [Gar93], and [Per94]). The introduction of Link State protocols to the ad hoc environment is another way explored to overcome the convergence problem. It is not always the case that transmission between two hosts via a wireless network works equally well in both directions. As a result, some routes determined by certain routing protocols may not work in certain situations.

Energy consumption is another significant performance indicator for wireless ad hoc networks, as it is directly related to the networks' operational lifetime. When operating in hostile and isolated places, each node relies on small low-capacity batteries as energy sources and does not expect replacement. Energy depletion and reduction is a major component in the loss of connection and the operational lifetime of Wireless Ad-hoc Networks. Overall performance is highly reliant on the algorithm's energy efficiency.

4. Conclusion

In this position paper, Mobile Ad hoc Networks is an ideal technology for establishing an instant communication infrastructure that is less for military applications or a defective architecture. It is much more crucial for these Wireless Ad hoc Networks because of its military uses. MANET is unable to adequately address the issue of security. Routing is also a

major issue. Patches are required for all wireless ad hoc network routing technologies. Even after tremendous work, the energy consumption problem remains unsolvable.

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