

Challenges and Issues in Adhoc Network

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Abstract

The Wireless Ad-hoc Networks do not have gateway, every node can act as the gateway. Although since 1990s', lots of research has been done on this particular field, it has often been questioned as to whether the architecture of Mobile Ad-hoc Networks is a fundamental flawed architecture. Reason behind is that Mobile Ad-hoc Networks are almost never used in practice, almost every wireless network nodes communicate to base-station and access points instead of co-operating to forward packets hop-by-hop., we try to clarify the definition, architecture and the characters of MANET, as well as the main challenges of constructing the MANET. Although many works have been done to solve the problem, we will show in this paper that it is very difficult to solve these limitations which made the Mobile Ad-hoc Networks a flawed

Keywords

MANET, Ad-hoc Network, Security, Energy

I. Introduction

Since their emergence in 1970's, wireless networks have become increasingly popular in the communication industry. These networks provide mobile users with ubiquitous computing capability and information access regardless of the users' location. There are currently two variations of mobile wireless networks: infrastructure and infrastructureless networks.

The infrastructure networks have fixed and wired gateways or the fixed Base-Stations which are connected to other Base-Stations through wires. Each node is within the range of a Base-Station. A "Hand-off" occurs as mobile host travels out of range of one Base-Station and into the range of another and thus, mobile host is able to continue communication seamlessly throughout the network. Example applications of this type include wireless local area networks and Mobile Phone

The other type of wireless network, infrastructureless networks, is known as Mobile Ad-hoc Networks(MANET). These networks have no fixed routers, every node could be router. All nodes are capable of movement and can be connected dynamically in arbitrary manner. The responsibilities for organizing and controlling the network are distributed among the terminals themselves.

The entire network is mobile, and the individual terminals are allowed to move freely. In this type of networks, some pairs of terminals may not be able to communicate directly with each other and have to relay on some terminals so that the messages are delivered to their destinations. Such networks are often referred to as multi-hop or store-and-forward networks. The nodes of these networks function as routers, which discover and maintain routes to other nodes in the networks. The nodes may be located in or on airplanes, ships, trucks, cars, perhaps even on people or very small devices. Mobile Ad-hoc Networks are supposed to be used for disaster recovery, battlefield communications, and rescue operations when the wired network is not available. It can provide a feasible means for ground communications and information access.

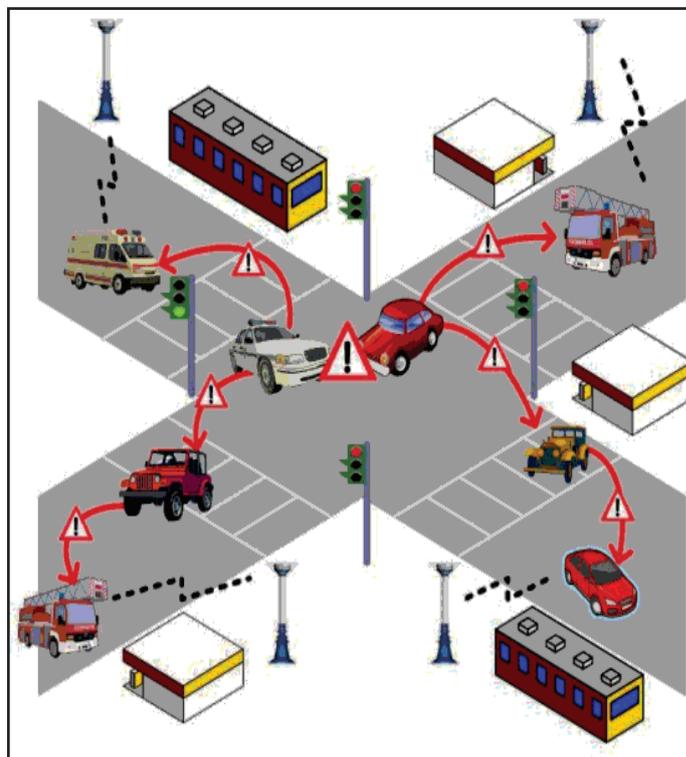


Fig. 1: 01 Ad-hoc Network Architecture

II. Challenges in Wireless Ad-hoc

Wireless Ad-hoc Networks are different from the well-known wired networks, it is an absolutely new architecture. Thus some challenges arise from the two key aspects: self-organization and wireless transport of information.

First of all, since the nodes in a Wireless Ad-hoc Network are free to move arbitrarily at any time. So the network topology of MANET may change randomly and rapidly at unpredictable times. This makes routing difficult because the topology is constantly changing and nodes cannot be assumed to have persistent data storage. In the worst case, we do not even know whether the node will still remain next minute, because the node will leave the network at any minute.

Energy constrained operation. Some or all of the nodes in a MANET may rely on batteries. In this scenario, the most important system design criteria for optimization may be energy conservation.

Bandwidth constrained is also a big challenge. Wireless links have significantly lower capacity than their hardwired counterparts. Also, due to multiple access, fading, noise, and interference conditions etc. the wireless links have low throughput.

Limited physical security: Mobile networks are generally more prone to physical security threats than are fixed cable networks. There are increased possibility of eavesdropping, spoofing and denial-of-service attacks in these networks.

A. Routing Challenges in Ad-hoc Network

MANETs are internetworks formed by mobile wireless routers, with each router having one or more associated host devices. MANET's routing algorithms organize the network by automatically discovering the topology of the connectivity among constituent nodes.

The ability to independently self-organize and serve as its own infrastructure makes MANETs particularly attractive for the industrial communications requirements in harsh manufacturing environments.

People develop lots of routing protocols to fit the mobility of the Wireless Ad-hoc Networks. The routing algorithms become more and more fit the rapid changing network topology of Wireless Adhoc Networks.

Self-organized networks can act in an independent way from any provider. Self-organized networks are also potentially very large and not regularly distributed. For example, one single network can cover the entire world. Also, self-organized networks are highly co-operative, the tasks at any layer are distributed over the nodes and any operation is the results of the cooperation of a group of nodes the most important characteristic which sets Wireless Ad-hoc networks apart from cellular networks is the fact that they do not rely on a fixed infrastructure. They also think Mobile Ad-hoc networks are very attractive for tactical communication in military and law enforcement.

Mobile Adhoc networks, we think they are a flawed architecture, because first, until now, we haven't seen any practice of the Wireless Ad-hoc Networks, are the routing protocols, self-organization, security solutions are all theories based on simulation. Second, today, almost every wireless network nodes communicate to base-stations and access points, instead of co-operating to forward packets hop-by-hop. In the following section, we will discuss in detail the major technical topics about the Wireless Ad-hoc networks. The results show us that even consider for the basic technical topics, the Wireless ad-hoc networks are fundamentally flawed architecture

III. Issues in Adhoc Network

Challenging task to enable fast and reliable communication within such a network. The inherent characters of MANET make it a flawed architecture no matter what we have done or will do to improve the performance of the networks. Below are the factors that prevent the mobile ad hoc networks to be an in-flawed Architecture.

A. Security Issues

Security issues for Wireless Ad Hoc Networks are difficult than the ones for fixed networks. This is due to system constraints in mobile devices as well as frequent topology changes in the Wireless networks.

B. Mobile Ad-hoc

Networks, security is difficult to implement because of the networks constrains and the rapidly topology changes. After investigation, we found that there are two kinds of security related problems in the Mobile Ad-hoc Networks.

One is the attacks based on the networks which are just similar

to the Internet, the other is Fault Diagnoses. Fault Diagnoses algorithm is used to pick out the faulty nodes and at the same time remove the node from the whole networks. This process should be real-time as to guarantee the performance of the whole networks. In order to solve the fault diagnoses problem, many fault diagnoses algorithms [6] were bring out. After carefully surveying the existing algorithm today, we found that they cannot correctly diagnose faulty node with the presence of the changing of the network topology during the process of diagnosis, and these algorithms are analyzed with repetitious diagnosis for all the mobile hosts and cause the great system overhead due to the transmission of diagnosis messages by means of flooding throughout the whole networks. While the topology of Mobile Ad-hoc Networks changes from time to time, then we cannot use this kind of Fault Diagnoses Algorithm to solve the questions. Therefore, we can see that the current fault diagnosis algorithms cannot solve the fault diagnosis problem.

There are several factors of security that we should consider. First, Availability ensures the survivability of network services despite denial of service attacks. Confidentiality ensures that certain information is never disclosed to unauthorized entities. Integrity guarantees that a message being transferred is never corrupted. Authentication enables a node to ensure the identity of the peer node it is Mobile Ad hoc networks are inherently vulnerable to security attacks. MENAT can not satisfy the security requirement of the applications, so this makes that MANET is a flawed architecture.

A. Routing Protocol in Ad-hoc Networks

If we look up the key words "Wireless Ad hoc Networks Routing Protocols" in Google, we could find tons of millions of all kinds of routing protocols. However, after survey various types of routing, we find the truth is all these routing protocols are all have inherent drawbacks and cannot be considered as good routing protocols for Wireless ad hoc Networks.

The main problems about the routing protocols are as following:

- Energy consumption is major issues.
- First, the topology of the network changed rapidly, which lead to the lost of packets. Second, we have to modify every node's routing table that within the communication distance of the rapid-passing node, that will greatly improve the
- consumption of the bandwidth and the overhead of the
- networks.
- Many routing protocols may create redundant routes, increase the whole networks overhead
- Periodically sending routing tables will waste network bandwidth

Energy consumption is also one of the most important performance metrics for wireless ad hoc networks, it directly relates to the operational lifetime of the networks.

Energy consumption is also one of the most important performance metrics for wireless ad hoc networks. This point will have a harmful effect on the operation time as it will have on the connection quality and bandwidth.

In the Wireless Ad-hoc Networks, battery replacement may not be possible. So as far as energy consumption concerned, we should

try to preserve energy while maintaining high connectivity.

We emphasize energy consumption not only because that it is the key problem in the research of Wireless Ad-hoc Networks, but also, we find that Energy consumption problem also affects the routing protocols and the QoS of the whole networks.

IV. Conclusion

We concluded that from the above discussion, Adhoc network is flawed architecture because of security, routing and energy consumption.

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