

MANET's Great Challenges in The General Field of Networking

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Abstract—

A mobile ad hoc network is a continuously self-configuring, infrastructure-less [network](#) of mobile devices connected [without wires](#). A wireless Adhoc network is a collection of mobile nodes with no pre-established Infrastructure. Laptop computers and personal digital assistants that communicate directly with each other are some examples of nodes in an Adhoc network. Each of the nodes has a wireless interface and communicates with others over either radio or infrared channels.

Keywords: Mobile, Network, MANET, Node, Routing

1 INTRODUCTION

A mobile ad hoc network (MANET) is a continuously self-configuring, infrastructure-less network of mobile devices connected without wires. Adhoc is Latin and means "for this purpose". A wireless Adhoc network is a collection of mobile nodes with no pre-established Infrastructure [5]. Laptop computers and personal digital assistants that communicate directly with each other are some examples of nodes in an Adhoc network. Each of the nodes has a wireless interface and communicates with others over either radio or infrared channels. Nodes in the Adhoc network are often mobile, but can also consist of stationary node. Figure shows a simple



Adhoc network. The outermost nodes are not within reception range of each other and thus cannot communicate di-

rectly. However, the middle node can be used to forward packets between the outermost nodes[1].

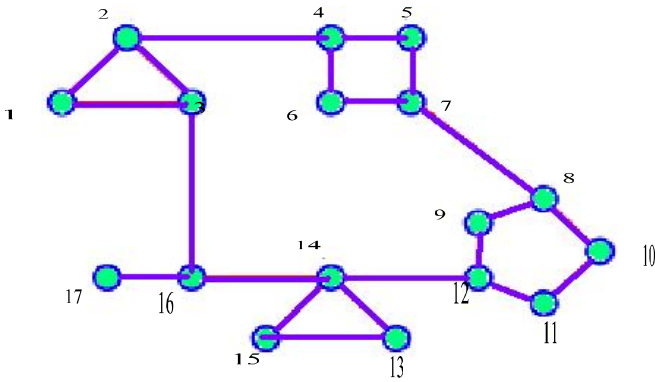
This enables all three nodes to share information and results in an Adhoc network. An Adhoc network uses no centralized administration. This ensures that the network will not cease functioning just because one of the mobile nodes moves out of the range of the others. Nodes should be able to enter and leave the network as they wish. Because of the limited transmitter range of the nodes, multiple hops are generally needed to reach other nodes.

There are two different types of wireless networks: The easiest network topology is where each node is able to reach all the other nodes with a traditional radio relay system with a big range. Users of connected technology, which is an ever growing number of people and machines, are getting more and more accustomed with constantly being able to have access to different on line services. It may be e-mail or on line dictionary services, ticket booking, or travelling information such as road maps and driving directions. The networks for mobile phones are usually available in most inhabited areas.

2 MATERIAL AND METHOD :

Routing is the process of selecting best paths in a network. In the past, the term routing was also used to mean forwarding network traffic among networks[8]. However this latter function is much better described as simply forwarding.

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The routing protocol's main functions are the selection of routes for various source destination pairs and the delivery of messages to their correct destination. In wireless networks, due to host mobility, network topology may change from time to time. It is critical for the routing protocol to deliver packets efficiently between source and destination. Routing protocols can be divided based on when and how the routes are discovered into two categories: Table-Driven and On-Demand routing. In table-driven routing protocols, each node maintains one or more tables containing routing information to every other node in the network. All nodes update these tables so as to maintain a consistent and up-to-date view of the network. When the network topology changes the nodes propagate update messages throughout the network in order to maintain consistent and up-to-date routing information about the whole network. Routing protocols in this category differ in the method by which the topology change information is distributed across the network and the number of necessary routing-related tables[3]. The two main types of table-driven routing are: Distance Vector and Link State.

3 PROPERTIES OF ADHOC NETWORKS:

- Adhoc networks do not rely on pre-existing infrastructure and this may be their most distinguishing attribute.
- Adhoc networks can be characterized as autonomous in the sense that most commonly they offer connectivity between the participating nodes and not connectivity to external LANs or internets.
- Another very important property of Adhoc networks is their dynamic topology.
- The devices that are usually employed in the Adhoc networks have their own limitations. Since, the only hardware component that is required to connect a device in an Adhoc network is a wireless interface, PDAs and mobile telephones can be utilized. Adhoc networks suffer from limited hardware resources like limited battery, constrained

CPU's and small memory capacity.

4 ADHOC ROUTING PROTOCOLS:

In Adhoc networking environments an application packet from a specific node may have to travel several hops in order to reach its destination. The main function of a routing protocol is to form and maintain a routing table with information relevant to which the next hop for this packet should be in order to reach its ultimate destination[6]. All the nodes have their own routing tables that they consult to forward the routing traffic that it is not destined for them.

Although the problem of routing is not a new one in computer networks, routing in Adhoc networks due to its unique requirements cannot be successfully handled by utilizing existing routing schemes such as traditional link-state and distance vector routing protocols. One of the reasons that for example OSPF and RIP cannot be used in Adhoc networks is that these protocols were originally designed to operate in environments with relatively static topology. However, the nature of the Adhoc networks allows the participating nodes to move freely in and out of the network. Another issue that contributes to the fact that the available routing protocols cannot operate in Adhoc mode is that they were designed with the assumption that all the links are bidirectional. In mobile Adhoc networks this is not always the case. The differences of the wireless networking hardware of the nodes or the radio signal fluctuations may result in some links becoming unidirectional. Finally, both OSPF and RIP attempt to maintain routes to all the reachable destinations, but in Adhoc networks with high density this may lead in having very large numbers of routing entries imposing performance overhead. Therefore, there is a need for special routing protocols that will be able to cope with the unique attributes and limitations of mobile wireless Adhoc networks[7].

5 CHALLENGES WITH ADHOC NETWORKS:

As we have seen in the previous sections there are many different approaches to the routing dilemma in fast changing topology networks as mobile Adhoc networks. Even though there are a lot of different approaches to consider they fit well into different needs. On the commercial market the use of Adhoc networking techniques have only started to be available in some networks[4]. Most notably within the companies own wireless networks or building to building links. The use in more everyday products such as mobile phones have low commercial interest since the operators of the networks probably will lose some of the traffic. Also, not everyone is happy with having their mobile phone forwarding traffic for someone else. Not because of the traffic itself but because the battery power drain. The largest pos-

sibility for the commercial breakthrough is probably within the wireless local area networks where the standards already has support for some limited Adhoc connections, or peer to peer support.

The use of multi hop wireless networks can help keeping the power consumption down due to lowering the link length. However, the need to make the routing protocols power aware and not waste too much power on control messages instead of actual information traffic is essential. Also, multi hop networks are dependent on the intermediate nodes being available even though that node may not be in transceiver mode. The use of multiple available routes might be a solution where some nodes can go down in power saving mode while others peek up now and then to sense the communications.

When all the traffic starts to flow around between everybody seemingly uncontrolled the need for security and authentication arises.

6 CONCLUSION

The Mobile Adhoc Networking paradigm poses great challenges in the general field of networking. Parameters such as network size, mobility and traffic load have a great impact on the suitability of each protocol. In the case of a mobile Adhoc network the topology is highly dynamic. This leads to quickly changing link states. Some links get broken while other links are created by other pairs of routers as is depicted. The routing algorithms used in the wired case have problems with topology changes, and if these happen often the problems are just getting worse. Another problem that arises in wireless networks that is not as common in wired routing is the asymmetrical links. That is, one node can reach another but the return path is not the same.

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