AN OVERVIEW OF CHARACTERISTICS OF MOBILE AD HOC NETWORKS

Vidhiya Madhu Sriee S.K.M
1st M.Sc(Computer Technology), Sri Krishna Arts and Science College, Coimbatore
madhumathikrish17@gmail.com

ABSTRACT:

Mobile Ad Hoc Networks (MANETs) is a group of multi hop wireless mobile nodes, dynamic topology and infrastructure less connectivity in nature. Constructing a protected protocol for Mobile Ad Hoc Network is a difficult task. There are several protocols planned for secure routing in MANETs, and there is a hybrid routing protocol and it is a group of both proactive and reactive routing method in MANETs. The accomplishment of proposed protocol is based on the clustering technique in Routing. Routing Disorder [RD] attack is the major issue in MANETs, clustering can provide a basis for the safe contact between mobile nodes.

Keywords: *MANETs, Secure Routing Protocol, Routing Protocol.*

1. INTRODUCTION

The wireless technology has been experiencing rapid growth in the past few decades. Wireless networking uses radio frequency to communicate the information. Mobile Ad Hoc Network (MANET) is described as a collection of multi hop wireless mobile node, and dynamic in nature. Since it does not depend on any particular topology, the movements of the nodes are unpredictable. Nodes in the network are used for exchanging data and the nodes are free to move dynamically. MANETs uses shared communication medium and each node in the network act as a routers or hosts. Each node in the network can communicate with all other nodes in the network through wireless medium.

There are large numbers of applications and services run by mobile devices, network connections and data services are most demanding ones. Most of the associates among the wireless devices are permanent infrastructure-based service, or private networks. For example, connections between two mobile phones are

setup by Base Station Controller and Mobile Switching Center in cellular networks.

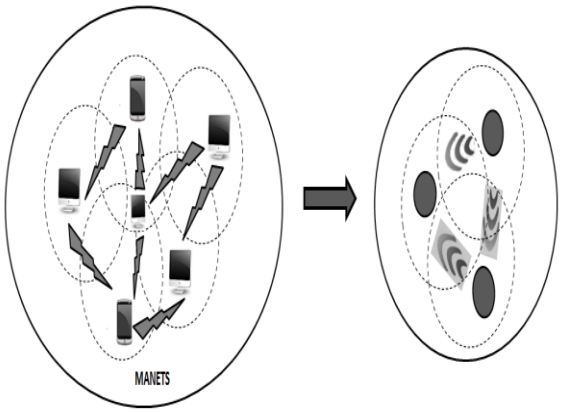

Figure 1.1 Mobile Ad Hoc Networks

MANETs contain large number of nodes so the energy consumption is high. Mobile Ad Hoc Networks (MANETs) are visualized to become major component in 4G architecture functionalities. As shown in Figure 1.1 Mobile Ad Hoc Network consist of many devices, including mobiles, PCs, notebook etc. Each node in the network within transmission range communicates with all the other nodes.

1.1 Characteristics of MANET:

Some of the basic characteristics of MANETs are listed below:

i) *Wireless:* There is no physical connection in between the nodes. Nodes are share information wirelessly through radio frequency.

ii) *Ad hoc based:* Each node in the network are temporary and dynamic in nature.

iii) *Infrastructure less:* Mobile ad hoc network does not have any centralized control so the nodes are free to move.

iv) *Multi hop routing:* Each node act as router and they are independent to transfer information.

v) *Mobility:* Communication between node to node changes continuously as it is independent and free to move dynamically.

vi) *Energy Constrained:* All the nodes completely rely on batteries. To conserve the energy of each node the network is to be optimized.

1.2 MANET Applications:

With the increase of progress in wireless communication, Mobile Ad Hoc Networking is gaining more importance with the large number of widespread applications. Mobile Ad Hoc Network came be implemented anywhere where there is no fixed infrastructure or no centralized control. Nodes in the network exchange information regardless of their physical position. Due to dynamic nature of the MANET it has main advantage of decentralization. MANETs has

wide range of applications in several domains such as:

- Military Battlefield
- Commercial Sector (Eg: Earth-quake, flood, fire)
- Personal Area Network (Eg: Cellular Phone, PDA, Laptops)
- Search and Rescue operations
- Sensor Networks (Eg: Temperature, pressure, pollution)

1.3 Vulnerabilities in MANET

The important issue for MANET is security, mainly in some applications, such as military field, and in sensor network. The characteristic of MANET is dynamic topology and it has higher level of security for routers and gateways. As the node does not have any centralized control it has weak physical protection. The topology of the network is not constant so the node do not have well-defined boundary.

When comparing with wired network wireless communication is much more vulnerable to attack by intruders. Each node in the network is router and they share information, so it can be easily corrupted by malicious node and send incorrect information. The attacker send incorrect message by modifying the forwarded packets. Mobile Ad Hoc networks are open to several attacks, including black hole attack, spoofing attack, routing disorder attack.

1.4 Design Issues and constraints

Mobile Ad Hoc Network has some problems in wireless communication, includes bandwidth optimization, power consumption, etc. Some of the design constraints in mobile ad hoc network architecture are multi hop nature, mobility, lack of fixed infrastructure, mobility in node. Mobile ad hoc networks reduce the constraint of infrastructure set up and enable devices to create and join networks anywhere, at any time and for any application. These flexibilities in Mobile ad hoc networks come at price and inherit the common problems of wireless networking in general. Some of the design issues and constraints in MANET are presented below:

1.4.1 No Centralized Control

Mobile Ad Hoc Network does not have centralized control for data transmission this may lead to fault detection and create issues more than fixed networks. It is also a infrastructure less multi-hop wireless network.

1.4.2 Dynamic Network Topology

Nodes in the mobile ad hoc network are free to move in arbitrary manner as the network does not depend on any particular topology. Topology changes dynamically and it is unpredictable. Figure 1.2 shows dynamic changes in topology for MANET.

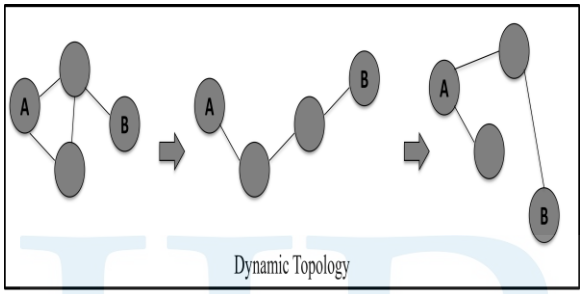

Figure 1.2 Dynamic Topology in MANET

1.4.3 Limited Bandwidth

The bandwidth of the mobile ad hoc network is very much limited and to perform maximum efficiency the network is to be optimized within the limited bandwidth. And also wireless communication has lower bandwidth than the wired communication.

1.4.4 Network Security

Mobile Ad Hoc Networks are generally more vulnerable when compared with other wired networks. As it do not have any centralized control it is very difficult to implement centralized security to all nodes.

1.4.5 Network Robustness

In MANETs, data are transmitting is obtained by forwarding information amount multiple mobile nodes. Due to lack of centralized control it is very difficult to monitor misbehaving nodes and isolated quickly.

1.4.6 Limited Availability of Resource

Each mobile node in the network carries battery with it and it has limited power supply, and processing power is limited, it limits the services and applications that can be supported by each mobile node. This becomes a bigger concern in MANET because, each node is acting as both an router and an end system at the same time, added energy is required for communication.

2. Routing Protocols is MANET:

Routing protocol defines the communication between the nodes which acts as source and destination in the network. There are different types of routing protocol have been proposed in MANETs. Basic categories of routing protocols are proactive routing protocol, reactive routing protocol and hybrid routing protocol. Figure 1.3 shows the classification in routing protocol for MANET and their example.

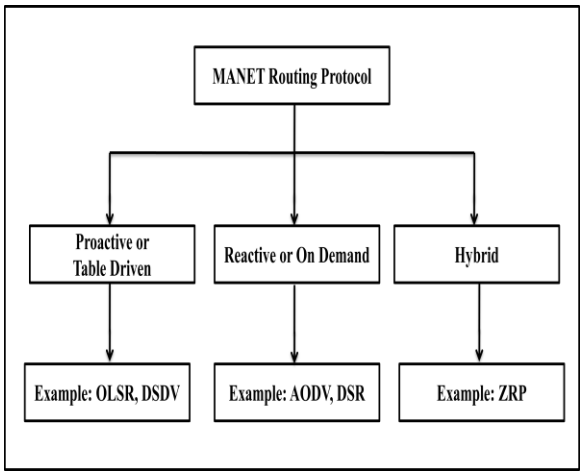

Figure 1.3 Routing Protocols in MANET

3. CONCLUSION:

The characteristics of MANETs presented in this paper considers that, the mobile ad hoc network for routing and are free from any kind of attacks caused either by external advisory or internal malicious nodes. Additionally we have assumed that, in future the Neighborhood Discovery Protocol (NDP) is implemented as a physical layer protocol. But in some special cases the physical layer does not include an implementation of NDP.

4. REFERENCES:

[1] C. Siva Ram Murthy and B. S Manoj, "*Ad Hoc Wireless Networks, Architecture and Protocols*", Prentice Hall PTR, 2004. [2] B. G. Claybrook, File Management Techniques. New York: Wiley, 1983.

[2] Imrich Chlamtac, Marco Conti, Jenifer J.-N. Liu, "*Mobile Ad Hoc Networking: Imperatives and Challanges*", Elsevier Network Magazine, vol. 13, pages 13-64, 2003 [4] S. Dolev, D. K. Pradhan, and J. L. Welch, "*Modified tree structure for location management in mobile environments*," Comput. Commun., vol. 19, no. 4, pp. 335–345, 1996.

[3]George Aggelou, "*Mobile Ad Hoc Networks*", 2nd edition, Mc GRAW Hil professional engineering, 2004 [6] J. S. M. Ho and I. F. Akyildiz, "*Dynamic hierarchical database architecture for location management in PCS networks*," IEEE/ACM Trans. Networking, vol. 5, pp. 646–660, Oct. 1997.

[4] Stefano Basagni, Macro Conti, Silvia Giordano and Ivan Stojmenovic, "*Mobile Ad Hoc Networks*" , IEEE press, A john Wily & Sons, INC. publication, 2003

[5] E.M. Belding-Royer and C. K. Toh, "*A review of current routing protocols for adhoc mobile wireless networks*", IEEE Personal Communications Magazine, pages 46–55, April 1999.

[6] C. E. Perkins and P. Bhagwat, "*Highly Dynamic Destination-Sequenced Distance-Vector Routing (DSDV) for Mobile Computers*," Comp. Commun. Rev., Oct. 1994, pp. 234–44.

[7] C.-C. Chiang, "*Routing in Clustered Multihop, Mobile Wireless Networks with Fading Channel*," Proc. IEEE SICON '97, Apr. 1997, pp. 197–211.

[8] S. Murthy and J. J. Garcia-Luna-Aceves, "*An Efficient Routing Protocol for Wireless Networks*," ACM Mobile Networks and App. J., Special Issue on Routing in Mobile Communication Networks, Oct. 1996, pp. 183–97.

[9] A. Laouiti, A.Qayyum, and L.Viennot, "*Multipoint Relaying; An Efficient Technique for Flooding in Mobile Wireless Networks*," in Proceeedings of the 35th Annual Hawaii International Conference on System Science (HICSS' 2002), Waikoloa, HI, January 2002.

[10] D.B. Johnson, D.A. Maltz, "*Dynamic source routing in adhoc wireless networks*", in: T. Imielinski, H. Korth (Eds.), Mobile Computing, Kluwer Academic Publishers, Dordrecht, 1996, pp. 153–181.