IMPLEMENTATION AND HIGH SECURITY IN MOBILE AD HOC NETWORKS WITH QOS

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ABSTRACT

A **Mobile Ad-hoc NETwork** (**MANET**) is an autonomous collection of mobile users that communicate over relatively bandwidth constrained wireless links. One of the main issues in such networks is performance- in a dynamically changing topology; the nodes are expected to be power-aware due to the bandwidth constrained network. Another issue in such networks is security - since every node participates in the operation of the network equally, malicious nodes are difficult to detect. There are several applications of mobile ad hoc networks such as disaster recovery operations, battle field communications, etc. To study these issues, a scenario based simulation analysis of a secure routing protocol is done and is compared with traditional non-secure routing protocols. The scenarios used for the experiments depict critical real-world applications such as battlefield and rescue operations, which tend to have contradicting needs. An analysis of the tradeoffs between performance and security is done to gain an insight into the applicability of the routing protocols under consideration.

Key word :MANET,Adhoc,Qos

INTRODUCTION

Over the past decade, there has been a growing interest in wireless networks, as the cost of mobile devices such as PDAs, laptops, cellular phones, etc have reduced drastically. The latest trend in wireless networks is towards *pervasive and ubiquitous computing* - catering to both nomadic and fixed users, anytime and anywhere. Several standards for wireless networks have emerged in order to address the needs of both industrial and individual users. One of the most prevalent forms of wireless networks in use today is the Wireless Local Area Network (WLAN). In such a network, a set of mobile nodes are connected to a fixed wired backbone. WLANs have a short range and are usually deployed in places such universities, companies, cafeterias, etc. However, there is still a need for communication in several scenarios of deployment where it is not feasible to deploy fixed wireless access points due to physical constraints of the medium. For example, consider communication amongst soldiers in a battlefield, involving troops spread out over a large area. In this case, it is not only feasible to deploy a fixed wireless access point, but also risky since an enemy attack would bring down the whole network. This problem has led to a growing interest among the research community in *mobile ad hoc networks*, wireless networks comprised of mobile computing devices communicating without any fixed infrastructure. The rest of this chapter is organized as follows – initially a classification of wireless networks in use today is described followed by the background and origins of ad hoc wireless networks. The general issues in ad hoc wireless networks are then discussed, followed by a few interesting applications.

The final section gives an outline of the chapters to follow.

Wireless LANs and PANs

A Wireless Local Area Network (WLAN) consists of a set of mobile users communicating via a fixed base station or an access point. The mobile node can be any device such as a palmtop, PDA, laptop etc. as shown in Figure 1.1.

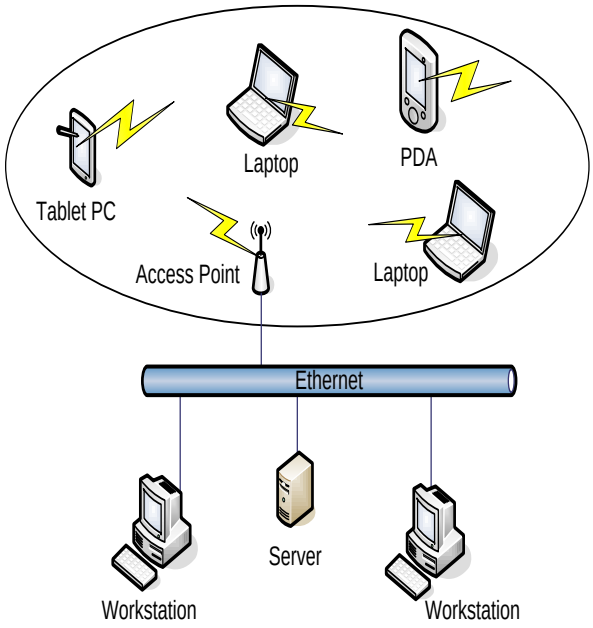


Figure 1.1: Wireless LAN

Such networks are usually deployed in offices, cafeterias, universities, etc. and are most prevalently used nowadays. There are three types of WLANs – Independent Basic Service Set (**IBSS**), Basic Service Set (**BSS**) and Extended Service Set (**ESS**). A detailed classification is beyond the scope of this thesis. IEEE 802.11

Wireless WANs and MANs

Nowadays, the trend is towards a *wireless internet* consisting of mobile nodes accessing the internet without the help of any backbone network. This type of network is based on the *cellular* architecture in which a large area to be covered is divided in to several cells, each having a fixed base station. Each cell consists of several mobile terminals (MT) which communicate to other mobile terminals in a same cell through the base station as shown in Figure1.2.

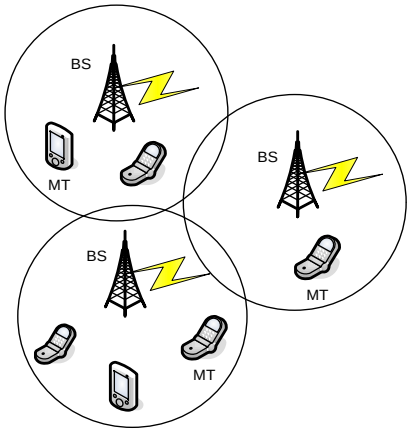


Figure 1.2: A Cellular network

The communication between nodes in different cells is carried on by a procedure called *handoff* which involves communication between the base stations in the two cells. Cellular networks have constantly evolved from the First Generation Cellular Systems (1G) to the Third Generation Systems (3G). Today, most wireless data communication takes place across 2G cellular systems such as TDMA, CDMA, PDC, and GSM, or through packet-data technology over old analog systems such as CDPD overlay on AMPS [1]. Although traditional analog networks, having been designed for voice rather than data transfer, have some inherent problems, some 2G (second generation) and new 3G (third generation) digital cellular networks are fully integrated for data/voice transmission. With the advent of 3G networks, transfer speeds should also increase greatly.

ROUTING IN MANETs

Unlike wired networks, routing in MANETs poses unique challenges. Designers of routing protocols for MANETs need to address several issues. In this chapter these issues are identified and the routing protocols available for MANETs are classified. Then working principle of a few protocols such as DSDV, DSR, AODV, etc. are explained. Their pros and cons are also identified. This chapter concludes with a summary of routing in MANETs.

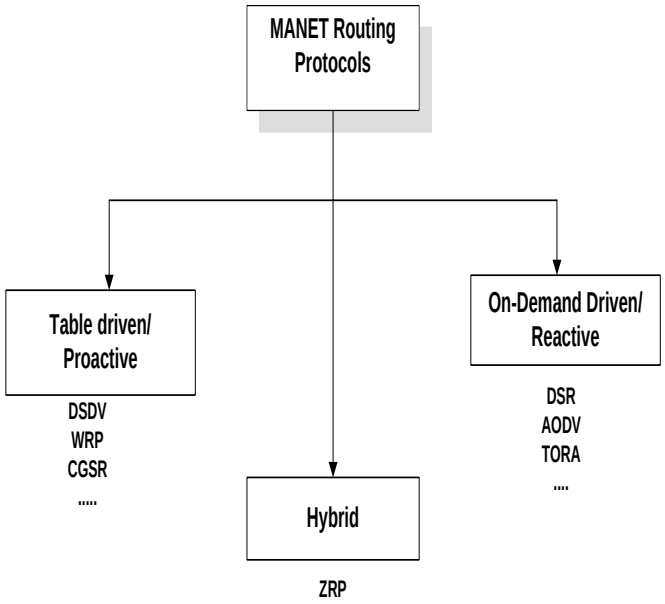
Design Issues

The following design issues must be considered before designing a routing protocol for MANETs [1]-

(a) *Dynamic Topology*: In a MANET, the network topology keeps changing with time due to the movement of the nodes, and hence the links between the nodes suffers frequent breaks. Thus the ordinary routing protocols for wired networks are not efficient since they are designed for static networks.

(b) *Bandwidth constraint*: The nodes in the network have a relatively low bandwidth when compared to traditional wired networks. This is an important issue to consider when designing routing protocols for MANETs since the utilization of bandwidth by the routing protocol in the network must be minimized.

Error prone broadcast channel: The nodes in the MANET broadcast the information to all the neighboring nodes on the wireless channel. The channel itself is prone to several errors such as attenuation, multi-path fading, etc. Thus the routing protocol itself must be designed taking into consideration these issues.



Classification of MANET routing protocols

Destination	Next hop	Metric	Sequence number
1	-	0	S40_1
2	2	1	S340_2
3	3	1	S22_3
4	4	1	S334_4
5	2	2	S76_5
6	3	2	S84_6
7	4	2	S98_7

Modified routing table for node 1

CONCLUSION AND FUTURE WORK

This paper focuses on the two most important issues in mobile ad hoc networks – performance and security. Each mobile node in a MANET acts as a router by forwarding the packets in the network. Hence, one of the challenges in the design of routing protocols is that it must be tailored to suit the dynamic nature of the nodes. The second chapter discusses some of the other

challenges faced by the designers of routing protocols for MANETs. A complete understanding of these issues will help in designing efficient and effective routing protocols. It also classifies the protocols and describes a few of them.

REFERENCES

[1] C. Siva Ram Murthy, B.S. Manoj, "*Ad Hoc Wireless Networks : Architectures and Protocols*", Prentice Hall Publishers, May 2004, ISBN 013147023X

[2] C.-K. Toh, "*Ad Hoc Mobile Wireless Networks: Protocols and Systems*", Prentice Hall publishers, December 2001, ISBN 0130078174

[3] C. Perkins and P. Bhagwat, *Highly Dynamic Destination-Sequenced Distance-Vector Routing* (*DSDV*) for Mobile Computers. In Proc. of the ACM SIGCOMM, October 1994. http://www.cs.umass.edu/~mcorner/courses/691M/papers/perkins.pdf

[4] Shree Murthy, J.J. Garcia-Luna-Aveces, "*A Routing Protocol for Packet Radio Networks*," Proc. ACM International Conference on Mobile Computing and Networking, pp. 86-95, November, 1995

http://www.pdos.lcs.mit.edu/decouto/papers/dube97.pdf

[5] C.-C. Chiang, "*Routing in Clustered Multihop, Mobile Wireless Networks with Fading Channel*," Proc. IEEE SICON '97, Apr. 1997, pp. 197–211. http://www.ics.uci.edu/~atm/adhoc/paper-collection/gerla-routing-clustered-sicon97.pdf

[6] [online] The Secan Lab, University of Luxembourg, Luxembourg. http://wiki.uni.lu/secan-lab/Distributed+Bellman-Ford.html

[7] [online] The Secan Lab, University of Luxembourg, Luxembourg. http://wiki.uni.lu/secan-lab/Count-To-Infinity+Problem.html

[8] D B. Johnson, D A. Maltz, and Y. Hu, "*The dynamic source routing protocol for mobile ad hoc network*," Internet-Draft, April 2003. http://www.ietf.org/internet-drafts/draft-ietf-manet-dsr-09.txt

[9] C.E. Perkins, E. Royer, and S.R. Das, "*Ad hoc on demand distance vector (AODV) routing*," Internet Draft, March 2000. http://www.ietf.org/internetdrafts /draft-ietf-manet-aodv-05.txt

[10] Samir R. Das, Charles E. Perkins, Elizabeth M. Royer and Mahesh K. Marina. *"Performance Comparison of Two On-demand Routing Protocols for Ad hoc Networks."* IEEE Personal Communications Magazine special issue on Ad hoc Networking, February 2001, p. 16-28. http://www.ronai.hu/././library/Performance_comparison_of_AODV_and_DSR-Perkins.pdf

[11] David B Johnson and David A Maltz. "*Dynamic source routing in ad hoc wireless networks"*. In Imielinski and Korth, editors, Mobile Computing, volume 353. Kluwer Academic Publishers, 1996.

