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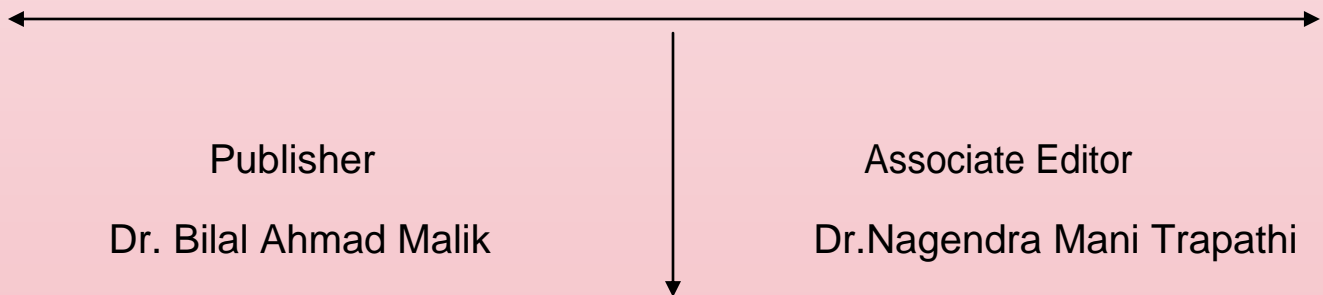
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A REVIEW PAPER ON APPLICATION AND CHALLENGES OF MOBILE AD HOC NETWORK

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ABSTRACT

This paper has a center of attention on the study of Ad Hoc network its protocols and different types of networks in detail as we know this is an up and coming field which places lot of contribution in networking. In the past few years we have seen a rapid expansion in the field of mobile computing due to the proliferation of inexpensive widely available wireless devices a mobile ad hoc network or MANET consists of mobile wireless nodes in which the communication between nodes is carried out without any centralized control. MANET is a self organized and self configurable network where the mobile nodes move arbitrarily. The mobile nodes can receive and forward packets as a router. In this paper provides insight into the potential applications of ad hoc networks and discusses the technological challenges that protocol designers and network developers are faced with.

KEYWORDS: Ad Hoc network, Challenges Application, WSN, MANET, WMN.

INTRODUCTION

A wireless network is a rising new technology that will allow users to access services and information electronically irrespective of their geographic position. Wireless networks can be classified in two types' infrastructure network and infrastructure less ad hoc networks. Infrastructure network consists of a network with fixed and wired gateways. A mobile host interacts with a bridge in the network (called base station) within its communication radius. The mobile unit can move geographically while it is communicating. When it goes out of range of one base station, it connects with new base station and starts communicating through it. This is called handoff. Recent advancements such as Bluetooth introduced a fresh type of wireless systems which is frequently known as mobile ad-hoc networks. Mobile ad-hoc networks or short live networks control in the nonexistence of permanent infrastructure. Mobile ad-hoc network offers quick and horizontal network deployment in conditions where it is not possible.

Ad-hoc is a Latin word which means for this or for this only. Early Ad-hoc network only designed for the military application. In 1990's this method will combined with the wireless LAN and Bluetooth. 1997 internet engineering group launched MANET with the routing protocols. They implement routing protocols because to improve the data rate and the efficiency. At present there are more than fifty protocols are implemented in the wireless environment. Mobile ad-hoc network is an autonomous system of mobile nodes connected by wireless links each node operates as an end system and a router for all other nodes in the network. Mobile ad hoc network is a group of wireless mobile computers or nodes in which nodes collaborate by forwarding packets for each other to allow them to communicate outside range of direct wireless transmission. Ad hoc networks require no centralized administration or fixed network infrastructure such as base stations or access points, and can be quickly and inexpensively set up as needed.

ADVANTAGES OF MANET

There are several advantages of using mobile ad hoc network:

- Network can be extensive toward places which cannot be wired.
- Locating up a wireless system is simple and quick as well as it eradicate the need for pulling out the cables through walls and ceilings.
- Wireless network suggest more flexibility and adapt simply to changes in the configuration of the network.
- Multiple paths increase reliability

DISADVANTAGES OF MANETS

- **Routing Overhead:** In wireless ad hoc networks, nodes often change their location within network. So some out of date routes are generated in the routing table which leads to unnecessary routing overhead.
- **Interference:** This is the major problem with mobile ad-hoc networks as links come and go depending on the transmission characteristics, one transmission might interfere with another one and node might overhear transmissions of other nodes and can corrupt the total transmission.
- **Asymmetric links:** Most of the wired networks rely on the symmetric links which are always fixed. But this is not a case with ad-hoc networks as the nodes are mobile and constantly changing their position within network. For example consider a MANET or Mobile Ad-hoc Network where node B sends a signal to node A but this does not tell anything about the quality of the connection in the reverse direction.

- **Dynamic Topology:** This is also the major problem with ad-hoc routing since the topology is not constant. The mobile node might move or medium characteristics might change. In ad-hoc networks routing tables must somehow reflect these changes in topology and routing algorithms have to be adapted. For example in a fixed network routing table updating takes place for every 30sec. This updating frequency might be very low for ad-hoc networks.

CHARACTERISTICS OF MOBILE AD HOC NETWORKS

Does not rely on a fixed infrastructure for its operation autonomous transitory association of mobile nodes

- It can be rapidly deployed with user intervention.
- Need not to operate in a standalone fashion but can be attached to the Internet or Cellular networks.
- Devices are free to join or leave the network and they may randomly or probably.
- Resulting in rapid and unpredictable changes.

WORKING OF MANET

In mobile ad hoc networks where there is no infrastructure sustain and since a target node might be out of range of a source node transmitting packets a routing procedure is always needed to find a path so as to forward the packets appropriately between the source and the destination. A base station can reach all mobile nodes without routing via broadcast in common wireless networks. In the case of ad-hoc networks, each node must be able to forward data for other nodes.

TYPES OF MANET

Vehicular Ad-hoc Networks (VANETs) A Vehicular Ad-Hoc Network or VANET is a technology that uses moving cars as nodes in a network to create a mobile network. VANET turns every participating car into a wireless router or node allowing cars approximately 100 to 300 meters of each other to connect and in turn, create a network with a wide range. As cars fall out of the signal range and drop out of the network then other cars can join in connecting vehicles to one another so that a mobile Internet is created. It is estimated that the first systems that will integrate this technology are police and fire vehicles to communicate with each other for safety purposes.

Internet Based Mobile Ad-hoc Networks or I MANET Internet Based Mobile Ad hoc Networks are ad-hoc networks that link mobile nodes and fixed Internet gateway nodes. In such type of networks normal ad hoc routing algorithms don't apply directly. Wireless networks can generally be classified as wireless fixed networks

and wireless or mobile ad-hoc networks. MANETs or mobile ad-hoc networks are based on the idea of establishing a network without taking any support from a centralized structure.

INTELLIGENT VEHICULAR AD-HOC NETWORKS (IN VANETS)

In-VANET, or Intelligent Vehicular Ad-Hoc Networking, defines an intelligent way of using Vehicular Networking. In-VANET integrates on multiple ad-hoc networking technologies such as WiFi IEEE 802.11, WAVE IEEE 1609, WiMAX IEEE 802.16, Bluetooth, IRA, ZigBee for easy, accurate, effective and simple communication between vehicles on dynamic mobility. Effective measures such as media communication between vehicles can be enabled as well methods to track the automotive vehicles are also preferred. Vehicular Ad-hoc Networks are expected to implement a variety of wireless technologies such as Dedicated Short Range Communications (DSRC) which is a type of WiFi. In-VANET helps in defining safety measures in vehicles, streaming communication between vehicles, infotainment. Other candidate wireless technologies are Cellular, Satellite, and WiMAX. Vehicular Ad-hoc Networks can be viewed as component of the Intelligent Transportation Systems (ITS).

APPLICATIONS OF MANETS

Application	Possible scenarios
Tactical networks	<ul style="list-style-type: none"> • Military communication and operations • Automated battlefields
Emergency services	<ul style="list-style-type: none"> • Search and rescue operations • Disaster recovery • Replacement of fixed infrastructure in case of environmental disasters • Policing and fire fighting • Supporting doctors and nurses in hospitals
Commercial and civilian Environment	<ul style="list-style-type: none"> •E-commerce: electronic payments anytime and anywhere environments • Business: dynamic database access, mobile offices •Vehicular services: road or accident guidance, transmission of road and weather conditions, taxi cab network, inter-vehicle networks • Sports stadiums, trade fairs, shopping malls • Networks of visitors at airports

Home and enterprises Networking	<ul style="list-style-type: none"> • Home/office wireless networking • Conferences, meeting rooms • Personal area networks (PAN), Personal networks (PN) • Networks at construction sites
Educations	<ul style="list-style-type: none"> • Universities and campus settings • Virtual classrooms • Ad hoc communications during meetings or lectures
Entertainment	<ul style="list-style-type: none"> • Universities and campus settings • Virtual classrooms • Ad hoc communications during meetings or lectures
Sensor network	<ul style="list-style-type: none"> • Home applications: smart sensors and actuators embedded in consumer electronics • Body area networks (BAN) • Data tracking of environmental conditions, animal movements, chemical/biological detection
Context aware services	<ul style="list-style-type: none"> • Follow-on services: call-forwarding, mobile workspace • Information services: location specific services, time dependent services • Infotainment: touristic information
Coverage extension	<ul style="list-style-type: none"> • Extending cellular network access • Linking up with the Internet, intranets, etc

CHALLENGES IN MOBILE ADHOC NETWORK

Regardless of the attractive applications of MANET introduce several challenges that must be studied carefully before a wide commercial deployment can be expected.

- **Security and Reliability-** In addition to the common vulnerabilities of wireless connection, an ad hoc network has its particular security problems due to e.g. nasty neighbor relaying packets. The feature of distributed operation requires different schemes of authentication and key management.
- **Routing-** Since the topology of the network is constantly changing, the issue of routing packets between any pair of nodes becomes a challenging task. Most protocols should be based on reactive routing instead

of proactive. Multi cast routing is another challenge because the multi cast tree is no longer static due to the random movement of nodes within the network. Routes between nodes may potentially contain multiple hops, which is more complex than the single hop communication.

- **Quality of Service-** Providing different quality of service levels in a constantly changing environment will be a challenge. The inherent stochastic feature of communications quality in a MANET makes it difficult to offer fixed guarantees on the services offered to a device. An adaptive QoS must be implemented over the traditional resource reservation to support the multimedia services.
- **Power Consumption-** For most of the light-weight mobile terminals, the communication-related functions should be optimized for lean power consumption. Conservation of power and power-aware routing must be taken into consideration.
- **Bandwidth optimization-** Wireless linked has lower capacity than the wired network. Routing protocols in wireless network always use the bandwidth in an optimal manner by keeping the overhead as low as possible. The limited transmission range also imposes constrained on routing protocols in maintaining the topological information. Especially in MANETs due to frequent change topological information at all nodes involves more control overhead which, in turn, more bandwidth wastage.
- **Inter-networking-** In addition to the communication within an ad hoc network, inter-networking between MANET and fixed networks (mainly IP based) is often expected in many cases. The coexistence of routing protocols in such a mobile device is a challenge for the harmonious mobility management.
- **Multicast:** Multicast is desirable to support multiparty wireless communications. Since the multicast tree is no longer static, the multicast routing protocol must be able to cope with mobility including multicast membership dynamics (leave and join).
- **Autonomous-** No centralized administration entity is available to manage the operation of the different mobile nodes.
- **Location aided Routing-** Location-aided routing uses positioning information to define associated regions so that the routing is spatially oriented and limited. This is analogous to associatively-oriented and restricted broadcast in ABR.
- **Device discovery-** Identifying relevant newly moved in nodes and informing about their existence need dynamic update to facilitate automatic optimal route selection.
- **Limited Resources-** Mobile nodes rely on battery power, which is a scare resource also storage capacity and power are severely limited.

- **Scalability**-Scalability can broadly define as whether the network is able to provide an acceptable level of service even in the presence of a large number of nodes

Ad Hoc NETWORK ROUTING PROTOCOL

An **ad-hoc routing protocol** is a convention or standard that controls how nodes decide which mode to route packets between computing devices in a mobile ad hoc network. In ad-hoc networks, nodes are not familiar with the topology of their networks. Instead, they have to discover it. The explanations of Ad Hoc Network routing protocols is as follows:

- **Table-Driven or Pro-Active Routing** This type of protocols maintains fresh lists of destinations and their routes by periodically distributing routing tables throughout the network.

The main *disadvantages* of such algorithms are:

1. Respective amount of data for maintenance.
2. Slow reaction on restructuring and failures.

- **Reactive or on demand routing** This type of protocols finds a route on demand by flooding the network with Route Request packets.

The main *disadvantages* of such algorithms are:

1. High latency time in route finding.
2. Excessive flooding can lead to network clogging.

- **Flow Oriented Routing** This type of protocols finds a route on demand by following present flows. One option is to unicast consecutively when forwarding data while promoting a new link.

The main *disadvantages* of such algorithms are:

1. Takes long time when exploring new routes without a prior knowledge.
2. May refer to entitative existing traffic to compensate for missing knowledge on routes.

- **Hybrid- both pro-active and reactive Routing**

This type of protocols combines the advantages of proactive and of reactive routing. The main disadvantages of such algorithms are:

1. Advantage depends on number of Math van nodes activated.
2. Reaction to traffic demand depends on gradient of traffic volume.

- **Hierarchical Routing Protocol** With this type of protocols the choice of proactive and of reactive routing depends on the hierarchic level where a node resides.

The main *disadvantages* of such algorithms are:

1. Advantage depends on depth of nesting and addressing scheme.
2. Reaction to traffic demand depends on meshing parameters.

- **Host specific Routing Protocol** This type of protocols requires thorough administration to tailor the routing to a certain network layout and a distinct flow strategy.

The main *disadvantages* of such algorithms are:

1. Advantage depends on quality of administration addressing scheme.
2. Proper reaction to changes in topology demands reconsidering all parametrizing.

- **Power Aware Routing Protocol**

Energy required to transmit a signal is approximately proportional to d^α , where d is the distance and α is greater than or equals to two is the attenuation factor path loss exponent which depends on the transmission medium. When α is equals to two which is the optimal case transmitting a signal half the distance requires one fourth of the energy and if there is a node in the middle willing to spend another fourth of its energy for the second half data would be transmitted for half of the energy than through a direct transmission a fact that follows directly from the inverse square law of physics.

The main *disadvantages* of such algorithms are:

1. This method induces a delay for each transmission.
2. No relevance for energy network powered transmission operated via sufficient repeater infrastructure.

- **Backpressure Routing** This type of routing does not pre-compute paths. It chooses next-hops dynamically as a packet is in progress toward its destination. These decisions are based on congestion gradients of neighbor nodes.

CONCLUSION

Mobile ad hoc network is decentralized self-organized anytime anywhere network and provide cheap communications. In this paper Firstly the brief introduction was discussed, including the basic idea of MANET. Then the characteristic and application of MANET and various challenges faced by the developer and designer are discussed that helps us to understand more about MANET. Mobile Ad hoc networking is one of the most important and essential technologies that support future computing scheme the characteristic of MANET bring this technology as a great opportunity together with many challenges. MANET is becoming an interesting

research topic and there are many research projects employed by academic and companies all over the world. MANETs can be exploited in a wide area of applications like military, battlefields, emergency search and rescue, law enforcement, commercial, local and personal contexts. The most important thing for the networks is security. It is also important for Wireless Ad hoc Networks because its applications are in military.

REFERENCES

- ❖ A Mishra and K.M Nadkarni, security in wireless Ad -hoc network, in Book. “The Hand book of Ad Hoc Wireless Networks” (chapter 30), CRC press LLC, 2003.
- ❖ A.K. Gupta, Dr. H. Sadawarti and Dr. A. K. Verma, “Performance analysis of AODV, DSR & TORA Routing Protocols” in proceeding of IACSIT International Journal of Engineering and Technology, Vol.2, No.2, April 2010
- ❖ Abhay Kumar Rai, Rajiv Ranjan Tewari & Saurabh Kant Upadhyay “Different Types of Attacks on Integrated MANET-Internet Communication” under International Journal of Computer Science and Security (IJCSS) Volume(4):Issue(3) 265
- ❖ Anju yadav, “Simulation Study and Implementation on Routing Protocols in MANET” International Journal of Computer Science & Management Studies, 2012
- ❖ Ankur Bang, Prabhakar L. Ramteke. MANET: History, Challenges and Applications. Volume 2, issue9, September2013.ISSN2319-4847
- ❖ C. Siva Ram Murthy and B.S Manoj, “Mobile Ad Hoc Networks- Architectures & Protocols”, Pearson Education, New Delhi, 2004
- ❖ Chander Diwaker and Anju Gill “Comparative Analysis of Routing in MANET” International Journal of Advanced Research in Computer Science and Software Engineering, July 2012.
- ❖ Chlamtac, I., Conti, M., and Liu, J. J.-N. Mobile ad hoc networking: imperatives and challenges. Ad Hoc Networks, 1(1), 2003, pp. 13–6.
- ❖ D.G.Vaishnav College, Chennai s106.IJCSMC, Vol.3, Issue.1, January 2014, pg. 408-417.ISSN 2320-088X.
- ❖ Ebrahim Mohammed, Louis Dargin “Routing Protocols Security in Ad Hoc Networks” under Oakland University School of Computer Science and Engineering CSE 681 Information Security
- ❖ H. yang, et al.. Security in mobile Ad-hoc wireless network: Challenges and solutions. IEEE wireless commun. Mag. Vol.11 no.1, pp. 1536-1284 feb 2004
- ❖ HaoYang, Haiyun & Fan Ye — Security in mobile ad-hoc networks: Challenges and solutions, Pg. 38-47, Vol 11, issue 1, Feb 2004.

- ❖ Jagtar Singh & Natasha Dhiman, Department of computer Science & Engineering HCTM Technical Campuses, Kaithal, India Vol.2 Issue 4 July 2013.ISSN 2278-621X.
- ❖ Janne Lundberg, Helsinki University of Technology “Routing Security in Ad Hoc Networks” under Telecommunications Software and Multimedia Laboratory HUT TML 2000 Tik-110.501 Seminar on Network Security
- ❖ Jeroen Hoebeke, Ingrid Moerman, Bart Dhoedt and Piet Demeester, “An Overview of Mobile Ad Hoc Networks: Applications and Challenges.
- ❖ Malik N. Ahmed, Department of Computer science & Information. System, University Technology Malaysia. Johor, Malaysia. Abdul Hanan Abdullah, Ayman El –Sayed Department of Computer science and Engineering. Menouf, Egypt. VOL. IJCNS, 2013, 6,176-185
- ❖ Mr. Raja, Capt. Department of Computer application, Pachaiyappa ‘college, Chfnni30. Dr . S Santosh Baboo. Department of Computer Science,
- ❖ Ms.Ruchica A. Kale and Prof.Dr.S.R. Gupta Department of Computer Science & Engineering PRMIT & R, Bandera vol. 6, No.2, Apr 2013 (IJCSA) ISSN: 0974-1011 (Open Access).
- ❖ Nishu Garg, R.P.Mahapatra “MANET Security Issues” under IJCSNS International Journal of Computer Science and Network Security, VOL.9 No.8, August 2009
- ❖ P. Misra, “Routing Protocols for Ad Hoc Mobile Wireless Networks”, <http://www.cis.ohio-state.edu/~jain/cis788->
- ❖ Sankalp Bahadur Singh, Bharat Pesswani “A Performance Analysis Between AODV & DSR Routing Protocol” IJCTA | July-August 2012
- ❖ Shweta, Vinit Kumar, Anish Mittal, Dr. Pankaj Gupta, Deepak Goel “Analysis of Routing in Mobile Ad-hoc Networks”, International Journal of Computer Science & Management Studies, 2012
- ❖ Stephen Mueller, Department of Computer science, University of California, Davis, CA95616 Rose P. Tsang. and Deepak Ghosal Department of Computer science, University of California, live more, Ca94551 Multipath Routing in Mobile Ad Hoc Network: Issues and Challenge
- ❖ Swati Saxena, Birbal Saran, Mr. Vijendra Singh, “SIMULATION AND PERFORMANCE ANALYSIS OF DSDV, OLSR, DSR AND ZRP ROUTING PROTOCOLS IN MANETs”, International Journal of Computer Trends and Technology-2012



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