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STUDY ON MANET: CONCEPTS, FEATURES AND APPLICATIONS

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ABSTRACT

Mobile Ad-hoc Networks (MANETs) is one of the fastest growing areas of research as communicating technology. This is an attractive technology for many applications, such as rescue and tactical operations, due to the flexibility provided by their dynamic infrastructure for an organization. In the near time to come, an ad-hoc environment can be expected based on the recent procession and advancement in computing and communication technologies. Next generation of Mobile communications will include both prestigious infrastructure wireless networks and novel infrastructure-less mobile ad-hoc networks (MANETs). Ad-hoc Networking concept is not a new one, having been around in various forms for over two decades. This paper describes the descriptive research on ad-hoc networking by providing its related research background including the concept, features, and applications of MANET. Some of the technical challenge MANETs poses are also presented, based on which the paper points out some developing of research topic for ad-hoc networking technology that is expected to promote the development and accelerate the commercial message coating of the MANETs technology.

Keywords: MANETs, ad-hoc networking technology, infrastructure network, infrastructure-less network, mobile communications.

I. INTRODUCTION

Today smart communication connect our world more than we ever thought possible. The common vision of such communication is usually associated with the concepts of MANETs where the entire physical infrastructure is closely coupled with information and communication technologies; where intelligent monitoring and management can be achieved via the usage of networked embedded devices. In such a sophisticated dynamic system, devices are interconnected to transmit useful measurement information and control

instructions via ad-hoc networking technology. [1]

The people's future living environments are emerging based upon information resource provided by the connections of various communication networks for users. New small devices like Personal Digital Assistants (PDAs), mobile phones, handhelds, and wearable computers enhance information processing and accessing capabilities with mobility. Moreover, traditional home appliances, e.g. computerized cameras, cooking stoves, clothes washers, fridges, vacuum cleaners, and indoor regulators, with figuring and

imparting powers appended, stretch out the field to a completely unavoidable registering condition. With this in see, now-a-days advances ought to be framed inside the new worldview of unavoidable registering including new architectures, standards, devices, services, tools, and protocols.

(Refer Figure-1: Communication via MANETs)

A MANET is an accumulation of wireless nodes that can dynamically shape a network to exchange information without using any pre-existing fixed network infrastructure that is very beneficiary for the dynamic growth for an organization. The special highlights of MANET bring that this technology has great opportunities together with severe challenges for portable framework.

Mobile networking is one of the most critical innovations supporting pervasive computing. During the last decade, advances in both hardware and software techniques have resulted in mobile hosts and wireless networking common and miscellaneous.

Mobile Ad-Hoc Networks are complex distributed systems that comprise wireless mobile nodes that can freely and dynamically self – organize into arbitrary and temporary “ad-hoc” network topologies, enabling individuals and gadgets to internetwork in areas with no pre-existing communication infrastructure. These current advancements have been creating a reestablished and developing enthusiasm for the innovative work of Mobile ad-hoc network. [3]

During the last few years, Internet has become the major driving force behind most of the new developments in the

telecommunication networks field. The volume of packet data traffic has been growing at a much faster rate than the telephone traffic. Meanwhile, there has been an exponential growth in the wireless field. The emergence of wireless communications and the increasing demand for mobility, distributed coordination and the ad-hoc infrastructure brought in the foreground for ad-hoc networks.

This paper is organized as follows: Section II gives the related background of Mobile Ad-Hoc Networks in the evolution of wireless technologies, Section III describes the concepts of MANET, Section IV having features, Section V consist of Applications of MANET, Section VI having conclusion and Section VII consists of the References.

II. RELATED BACKGROUND

Ad hoc networking capabilities can become essential in delivering overall next-generation wireless network functionalities.

EVOLUTION OF MANETs:

- ❖ In 1970, Norman Abramson and his fellow researchers at the University of Hawaii invented ALOHA net.
- ❖ In 1972, early ad-hoc networking applications can be traced back to DARPA Packet Radio Network (PR-Net) project [10], which was primarily inspired by the efficiency of the packet switching technology.
- ❖ In 1980, Survivable Radio Networks (SURAN) was developed by DARPA to address the main issues in PR-Net, in the areas of network scalability, security, processing capability, and energy management. [11]

- ❖ During 1983, with the emergence of Internet Engineering Task Force (IETF) formed the mobile ad hoc networking group.
- ❖ In 1994, to leverage the global information infrastructure into the mobile wireless environment. Department of Defense (DoD) initiated DARPA Global Mobile (GloMo).

III. CONCEPTS OF MANET

Mobile Ad-hoc network is a gathering of remote nodes that can be set up anywhere and anytime without the intervention of existing network. [12] As we definitely know, portable framework is free to move and often act as routers as well as hosts connected by wireless links. A mobile Ad-hoc network forms the communication that is cost-effective among many mobile hosts. [13] Ad-hoc networks are highly effective in numerous situations such as emergency and rescue situations where team's members need to be communicated while others are not allowed to intervene. Further, using mobile ad-hoc networking in convention centers, online conferences, and classrooms without routing them to the available infrastructure and provide cost-effective and cheaper communication to share information. [13] Mobile hosting traffic in infrastructure less mobile ad hoc networking is different from those in infrastructure wireless networks, including:

Peer-to-Peer

Communication is between two nodes within one hop as shown in the figure below and it results in good connectivity. (Refer Fig-2)

(Refer Figure-2: Peer-to-Peer Communication)

Remote-to-Remote

Communication maintains a stable route between two nodes beyond single hop. This may be the outcome of many nodes in communication range with each other. [12]

(Refer Figure-3: Remote-to-Remote Communication)

Dynamic Traffic

Communication does not maintain stable route between nodes and routes may be reconstructed and it results in poor connectivity [12]. Nodes are constantly moving around and dynamic in nature.

The figure of infrastructure based wireless network is shown below:

(Refer Figure-4: Infrastructure Wireless Network)

IV. FEATURES OF MANET

Autonomous Terminal

Nodes in MANET can serve the function of the host as well as perform functions as router [14].

Distributed Operation

As there exists no central control system in the background, the control and management operation of networks are distributed among terminals only. All nodes are collaborated and work themselves and each node acts as needed. [12]

Multi-hop Routing

Single hop and multi-hop are the basic types of ad hoc routing algorithms. If we talking about the structure and implementation then single-hop MANET simpler than multi-hop. Delivering packets in multi-hop are transmitted through more than one node to the destination [14].

Dynamic Network Topology

The Network topology may change rapidly and unpredictably as nodes are mobile. Nodes that lie within each other's range can impart straightforwardly and are in charge of progressively finding each other. [12]

Self-Creation, Self-Organization and Self Administration

Mobile Ad hoc Network can be rapidly deployed as there is no need for the detailed plane of installation or wiring. [14]

Self-directed terminal

Each mobile node in the ad-hoc networks behaves both host and router. It means that

VI. CONCLUSION

The advancement in the field of mobile computing is driving another option route for mobile communication, in which mobile devices form a self-making, self-arranging and self-managing wireless network, called a mobile ad-hoc network. MANETs are generally more powerless against physical security dangers than settled or hardwired systems. This paper throws a light on different concepts of MANETS including features and applications, its intrinsic flexibility, lack of infrastructure, ease of deployment, auto-configuration, low cost and potential applications make it an

nodes are sending the packet and also forward the packet or route the packet. [15]

Malleability of link capacity

Portable specially appointed systems every one of the three sort steering, for example, unicast, multicast and communicate are utilized. At the point when a source hub needs to send a bundle to another hub that has no quick association with source hub. Than source hub communicates the RREQ message to the MANET frameworks. At the point when the hub gets the course ask for a message, it built up against turn around way to the source and goal to re-communicate the bundle. At the point when the bundle came to goal hub than goal hub unicast the course answer message to the source. [15]

V. APPLICATIONS OF MANET

Refer Table-1: Some of Applications for Mobile Ad-Hoc Network [2,4,5,6,7,8,9]

essential part of future pervasive computing environments. As the contribution goes on, particularly the need for dense deployments such as battlefield and sensor networks, the nodes in ad-hoc networks will be smaller, cheaper, more capable, and come in all forms. On the whole, inspite of the widespread deployment of ad- hoc networks is as yet the year away, the examination in this field will keep being exceptionally dynamic and innovative.

VII. REFERENCES

- [1] M. Frodigh, P. Johansson, and P. Larsson, "Wireless ad-hoc networking: the art of networking without a network," *Ericsson Review*, Volume 4, pp. 248-263, 2000.
- [2] I. Chlamta, M. Conti, and J.J. Liu, "Mobile ad-hoc networking: imperatives and challenges" *Ad Hoc Networks*, volume 1, Issue 1, pp. 13-64, 2003.
- [3] Mr. L Raja, Capt. Dr. S Santhosh Baboo, "An Overview of MANET: Applications, Attacks and Challenges", *International Journal of Computer Science and Mobile Computing*, Vol. 3, No. 1, pp. 408-417, January 2014.
- [4] IEEE Computer Society, LAN MAN Standards Committee, "Wireless LAN medium access control (MAC) and physical layer (PHY) specifications", IEEE standard 802.11, 1997.
- [5] IEEE Computer Society, "IEEE standard for information technology – telecommunications and information exchange between systems – local and metropolitan networks – specific requirements – part 11: Wireless LAN medium access control (MAC) and physical layer (PHY) specifications: Higher speed physical layer (PHY) extension in the 2.4 GHz band", 1999.
- [6] IEEE Computer Society, "IEEE standard for telecommunications and information exchange between systems – LAN/MAN specific requirements – part 11: Wireless medium access control (MAC) and physical layer (PHY) specifications: High speed physical layer in the 5 GHz band", 2000.
- [7] B.Crow, I. Widjaja, J.Kim, and P. Sakai, "Investigation of the IEEE 802.11 medium access control (MAC) sublayer functions", in *Proceedings of the IEEE INFOCOM*, pp. 6643, April 1997.
- [8] Bluetooth SIG, "Specification of the Bluetooth system, Core, v1.1. Bluetooth SIG", February 2001.
- [9] Charles E. Perkins, "An Introduction of Ad Hoc Networking", *Ad-Hoc Networking*, ISBN: 0-201-30976-9, Publisher: Addison Wesley Professional, 2001.
- [10] James A. Freebersyser, Barry Leiner, "A DoD perspective on mobile ad hoc networks", *Ad Hoc Networking*, Addison Wesley, Reading, MA, pp. 29 – 51, 2001.
- [11] W. Fifer, F. Bruno, "The low – cost packet radio", in *Proceedings of the IEEE*, Volume 75, No. 1, pp. 33 – 42, 2002.
- [12] M. Frodigh, P. Johansson, and P. Larsson, "Wireless ad-hoc networking: the art of networking without a Network", *Ericsson Review*, No.4, 2000.
- [13] Ash Mohammad Abbas and Øivind Kure, "Quality of Service in Mobile Ad-hoc Networks: a survey", *Int. J. Ad Hoc and Ubiquitous Computing*, No.10, pp.1-24, 2008.
- [14] S. Basagni, M. Conti, S. Giordano, and I. Stojmenovic, "Ad-Hoc Networking", IEEE Press Wiley, New York, 2003.
- [15] Gajendra Kumar Ahirwar, Sonu Shrivastava, Mahendra Kumar Ahirwar, "An Overview of Mobile Ad-hoc Network (MANET): Features & Challenges", in *International Journal for Scientific Research & Development*, Volume 5, Issue 05, ISSN (online): 2321-0613, 2017.

LIST OF FIGURES

Figure-1 Communication via MANETs

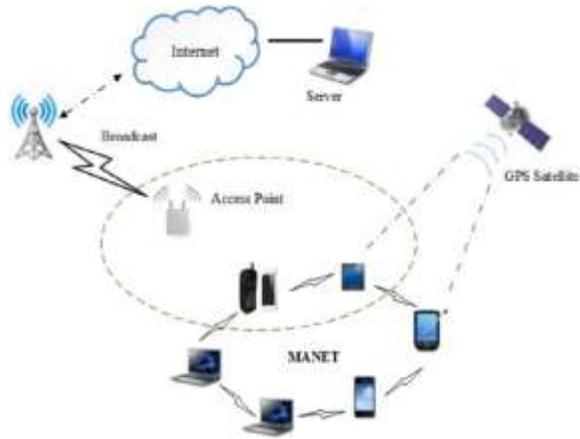


Figure-2 Peer-to-Peer Communication



Figure-3 Remote-to-Remote Communication

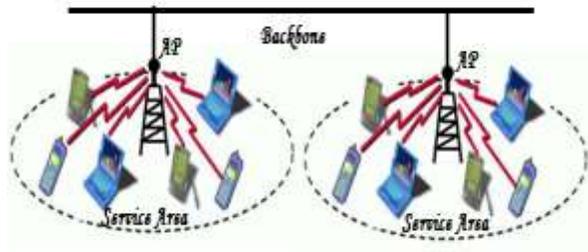
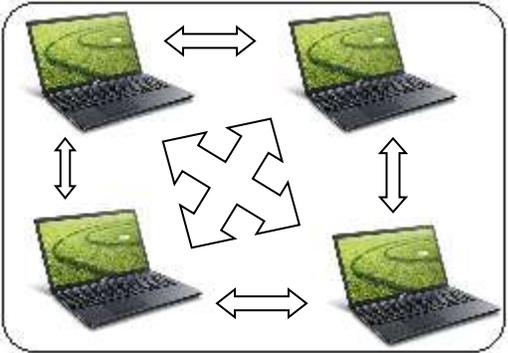


Figure-4 Infrastructure Wireless Network



LIST OF TABLES

(Table No-1: : Some of Applications for Mobile Ad-Hoc Network)

Applications	The Possible Service of Ad Hoc Networks
Tactical networks	<ul style="list-style-type: none"> <input type="checkbox"/> Military communication. <input type="checkbox"/> Military operations. <input type="checkbox"/> Battlefields.
Emergency services	<ul style="list-style-type: none"> <input type="checkbox"/> Search and rescue operations in the desert and in the mountain and so on. <input type="checkbox"/> Replacement of fixed infrastructure in case of environmental disasters <input type="checkbox"/> Policing <input type="checkbox"/> fire fighting <input type="checkbox"/> Supporting doctors and nurses in hospitals
Coverage extension	<ul style="list-style-type: none"> <input type="checkbox"/> Extending cellular network access <input type="checkbox"/> Linking up with the Internet, intranets, and so on.
Sensor networks	<ul style="list-style-type: none"> <input type="checkbox"/> Inside the home: smart sensors and actuators embedded in consumer electronics. <input type="checkbox"/> Body area networks (BAN) <input type="checkbox"/> Data tracking of environmental conditions, animal movements, chemical/biological detection
Education	<ul style="list-style-type: none"> <input type="checkbox"/> Universities and campus settings <input type="checkbox"/> Classrooms <input type="checkbox"/> Ad hoc Network when they make a meetings or lectures
Education	<ul style="list-style-type: none"> <input type="checkbox"/> Multi-user games <input type="checkbox"/> Wireless P2P networking <input type="checkbox"/> Outdoor Internet access <input type="checkbox"/> Robotic pets <input type="checkbox"/> Theme parks
Home and enterprise	<ul style="list-style-type: none"> <input type="checkbox"/> Using the wireless networking in Home or office. Conferences <input type="checkbox"/> meeting rooms
networks	<ul style="list-style-type: none"> <input type="checkbox"/> Personal area networks

Context aware services	<ul style="list-style-type: none"><input type="checkbox"/> Follow-on services: call-forwarding, mobile workspace<input type="checkbox"/> Information services: location specific services, time dependent services<input type="checkbox"/> Infotainment services: touristic information
Commercial and civilian environments	<ul style="list-style-type: none"><input type="checkbox"/> E-commerce: electronic payments anytime and anywhere<input type="checkbox"/> Vehicular services: road or accident guidance, transmission of road and weather conditions, taxi cab network, inter-vehicle networks, sports stadiums, trade fairs, shopping malls and so on.<input type="checkbox"/> Networks of visitors inside the airports.