_____

Ideas on Ad hoc Networks and Power Aware Networks

Dr.Sahil Verma (1st)
School of Computer Science and Engineering
Lovely Professional University
Phagwara, India
sahilkv4010@yahoo.co.in

Kavita (2nd)
School of Computer Science and Engineering
Lovely Professional University
Phagwara, India
dhullkavita@yahoo.in

Vishal Gupta (3rd)
Dept. Of Computer Science and Engineering
M. M. University
Mullana, India
sahara.vishal@gmail.com

Anup Lal Yadav (4th)
Dept. Of Computer Science and Engineering
SRMIET
Ambala, India
anupsaran@gmail.com

Abstract: Mobile Ad Hoc Network (MANET) is a collection of two or more devices or nodes or terminals with wireless communications and networking capability that communicate with each other without the aid of any centralized administrator also the wireless nodes that can dynamically form a network to exchange information without using any existing fixed network infrastructure. The distinct characteristics of traditional wired networks, including network configuration may change at any time , there is no direction or limit the movement and so on, and thus needed a new optional path Agreement (Routing Protocol) to identify nodes for these actions communicate with each other path, An ideal choice way the agreement should not only be able to find the right path, and the Ad Hoc Network must be able to adapt to changing network of this type at any time.

KEYWORDS: *Wireless Ad Hoc Networks, Mobility, Wireless Mobile Approaches, MANET, mobile ad-hoc sensor network.*

_____*****_____

1.   INTRODUCTION

Adhoc networks are wireless multi-hop packet networks without any fixed infrastructure. An Adhoc networks net-work is formed solely by its terminals so that each terminal connected to the network provides also relaying service for others, i.e. acts as a router. Advantages of such system are rapid deployment, robustness, flexibility and inherent support for mobility. Adhoc networks can work as a stand-alone autonomous network providing internal connections for a group. Demand for such networks could arise in the contexts of shared desktop meeting, disaster recovery, or in various military applications. However, no commercial "killer applications" are known for this technology yet. In the future, ad hoc networks probably form the outermost region of the internetwork, where a wired back- bone connects both the fixed local area networks and the mobile (both the fixed infrastructure and the ad hoc) networks. Whereas the base stations of a fixed infrastructure networks are directly connected to the core, an Adhoc networks is typically connected through a satellite link or a terrestrial switch (fixed wired connection point, or mobile radio link). This vision, however, requires still some further developments in ad hoc networking.
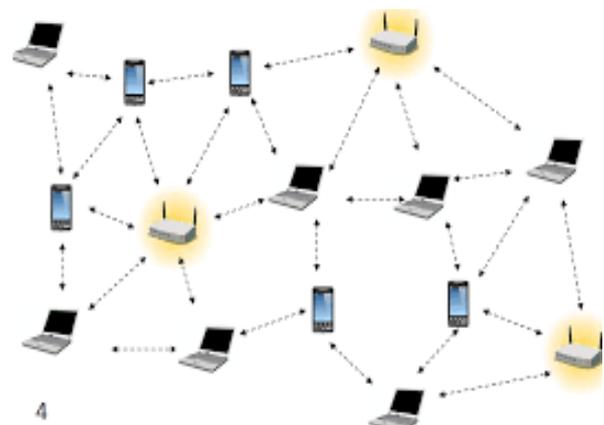
Basic research and potential applications of ad hoc networks are evolving together, spurring each other into further achievements. The need for an application can give directions for the research and, on the other hand, the research enables new applications to be created. Although this network concept has been originally considered in the context of packet radio networks [2] earlier, it has become very popular again during the past few years. The work
is going on within the IETF's MANET working group [3] for standards and the research is very active throughout the world. such as:

1.   Dynamic network topology and structure
     –Nodes may join or leave the network
     –Some or all nodes may be mobile
2.   Limited bandwidth

_____

_____

3. Constrained power
4. Broadcast nature of transmission

2. Mobile ad hoc networks

Ad hoc networking capabilities can become essential in delivering overall next generation wireless network functionalities. Next, we will look at mobile ad hoc network applications from an historical perspective, and then we will focus on challenges in the MANET research activities. Historically, mobile ad hoc networks have primarily been used for tactical network related applications to improve battlefield communications survivability. The dynamic nature of military operations means that military cannot rely on access to a fixed pre-placed communication infrastructure in battlefield. Pure wireless communication also has limitation in that radio signals are subject to interference and radio frequency higher than 100 MHz rarely propagate beyond line of sight (LOS). Mobile ad hoc network creates a suitable framework to address these issues by providing a multi-hop wireless network without pre-placed infrastructure and connectivity beyond LOS. Early ad hoc networking applications can be traced back to the DARPA Packet Radio Network (PRNet) project in 1972 , which was primarily inspired by the efficiency of the packet switching technology, such as bandwidth sharing and store - and-forward routing, and its possible application in mobile wireless environment. PRNet features a distributed architecture consisting of network of broadcast radios with minimal central control; a combination of Aloha and CSMA channel access protocols are used to support the dynamic sharing of the broadcast radio channel. In addition, by using multi-hop store-and-forward routing techniques, the radio coverage limitation is removed, which effectively enables multi-user communication within a very large geographic area.

Ad-hoc Networks

• Infrastructurless (ad-hoc) network or MANET (Mobile Ad-hoc NETwork)
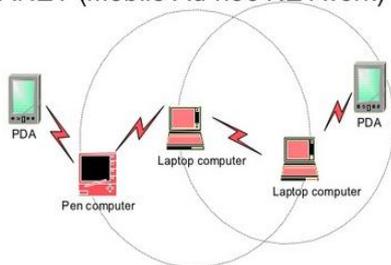
3. Ad hoc networking issues

In general, mobile ad hoc networks are formed dynamically by an autonomous system of mobile nodes that are connected via wireless links without using the existing network infrastructure or centralized administration. The nodes are free to move randomly and organize themselves arbitrarily; thus, the networks wireless topology may change rapidly and unpredictably. Such a network may operate in a standalone fashion, or may be connected to the larger Internet. Mobile ad hoc networks are infrastructure-less networks since they do not require any fixed infrastructure,

such as a base station, for their operation. In general, routes between nodes in an ad hoc network may include multiple hops, and hence it is appropriate to call such networks as ''multi-hop wireless ad hoc networks''.
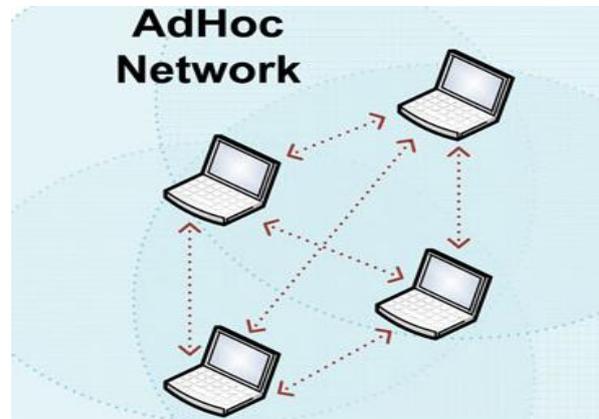
Each node will be able to communicate directly with any other node that resides within its transmission range. For communicating with nodes that reside beyond this range.

4.Power control

Power-aware networks are currently being extremely popular within the ad hoc networking research. The motivation for power-aware thinking for wireless communications is obvious, as summarized in [9]:

• Functional utility – New features and functionality usually costs additional energy. By increasing energy efficiency, devices may meet new user demands without reduced useful lifetime.
• Size and weight – Increased power efficiency can allow smaller and lighter power source.
• Maintenance – Power sources will always need to be replaced or recharged at some point, and the cost for this can vary from inconvenient to prohibitive.
• Environmental – Battery designs contain acids and heavy metals, which must be disposed of properly.

There are two research topics which are partially similar: the maximization of lifetime of a single battery and the maximization of the lifetime of the whole network. The former is related to commercial applications and node cooperation issues whereas the latter is especially of military etc. interest, where the node cooperation is already assumed. The goals can be achieved either by developing better batteries, or by making the network terminals' operation more power efficient. The first approach is likely to give a 40% increase in battery life in near future (with Li-Polymer batteries) [12]. As to the device power consumption, the primary aspect are achieving energy savings is through the low power hardware development using techniques such as variable clock speed CPUs, flash memory, and disk spin down [13]. However, from the networking point of view our interest naturally focuses on the device's network interface, which is often the single largest consumer of power. Energy

50

_____

_____

efficiency at the network interface can be improved by developing transmission/reception technologies on the physical layer and by sensing inactivity on the application layer, but especially with certain networking algorithms; MAC, routing and handling of end-to-end connections. In all these approaches, savings are based on intelligently turning off the interface when it is not needed.

5. Application in Ad hoc Networks

There are a lot of potential applications applied on the Ad hoc networks and to support the Ad hoc Network Model to create a simple Ad Hoc Network, and that application such as the Network are very important area in this time and very useful for the military (battlefield) and for the disasters (flood, fire and earthquake and so on),meetings or conventions in which people wish to quickly share information [8].and then use it in the emergency search-and-rescue operations, recovery, home networking ,as we will discuss that in the next table. Nowadays, Ad Hoc Network became so important in our circle life, because can be applied anywhere where there is little or without communication infrastructure or may be the existing infrastructure is expensive to use. Also the Ad Hoc Networking allows to nodes or devices to

keep the connections to the network for as long as it's easy to add and to remove to the end of the network. And there are a lot of varieties of applications for the Mobile Ad hoc Networks, ranging large scale such as Dynamic Network and Mobile and small fixed-constrained energy

sources. As well as legacy applications that move from the traditional environment to the Ad Hoc infrastructure environments, a great deal of new services can and will be generated for the new environment, finally as the result the mobile Ad Hoc Network is the important technique for the future and to became for the fourth generation (4G), and the main goals for that to provide propagation the computer environments, that support the users to achieved the tasks to get the information and communicate at anytime, anyplace and from any nodes or devices[15]. And now we will present some of these practical applications as been arranged in table 5, and then we will discuss some of these application.

CONCLUSIONS

In this paper we distinct the characteristics of traditional wired networks, wireless ad hoc networks, wireless mobile approaches and types of ad hoc network as well as all the existing ad hoc protocols In all, although the widespread

deployment of ad hoc networks is still years away, the research in this field will continue being very active and imaginative. MANET proposes a view of mobile ad hoc networks as an evolution of the Internet. This mainly implies an IP-centric view of the network, and the use of a layered architecture. Current research points out though that this choice may limit developing efficient solutions for MANET.

References

[1]. Charles E. Perkins (Ed.).Ad Hoc Networking Addison-Wesley, December 2013.

[2]. John Jubin and Janet D. Tornow. The DARPA packet radio network protocol.Proc. of IEEE, 75(1):21–32, 2014.

[3]. IETF.Mobile ad hoc networks working group. http://www.ietf.org/html.charters/manet-charter.html.

[4]. C.-K. Toh. Ad Hoc Mobile Wireless Networks: Protocols and Systems Prentice Hall, December 2011.

[5]. Magnus Frodigh, Stefan Parkvall, Christian Roobol, Per Johansson, and Peter Larsson. Future-generation wireless networks. IEEE Personal Communications,pages 10–17, October 2013.

[6]. Wireless World Research Forum. The book of visions 2001. http://www.wireless-world-research.org/, December 2014.

[7]. IEEE. IEEE electronic library. http://ieeexplore.ieee.org.

[8]. G. Anastasi, M. Conti, W. Lapenna, A power saving network architecture for accessing the internet from mobile computers: design, implementation and measure- ments, The Computer Journal 46 (1) (2014) 3–15.

[9]. E. Anceaume, A.K. Datta, M. Gradinariu, G. Simon, Publish/subscribe scheme for mobile networks, in: Proceedings of the ACM Workshop on Principles of Mobile Computing 2013, pp. 74–81.

[10]. A. Acharya, A. Misra, S. Bensal, A label-switching packet forwarding architecture for multi-hop wireless LANs, in: M. Conti, D. Raychaudhuri (Eds.), Proceedings of the ACM Workshop on Mobile Multimedia , Atlanta, GA.

[11]. APE: Ad hoc Protocol Evaluation testbed, Department of Computer Systems at Uppsala, Sweden. Available from <http://apetestbed.sourceforge.net.

[12]. I.F. Akyildiz, W. Su, Y. Sankarasubramaniam, E. Cay- irci, Wireless sensor networks: a survey, Computer Networks 38 ,393–422.

[13]. S. Basagni, Distributed and mobility-adaptive clustering for multimedia support in multi-hop wireless networks, in: Proceedings of the IEEE Vehicular Technology Conference (VTC) 1999, Amsterdam, The Netherlands, September 19–22.

[14]. C. Bettstetter, Smooth is better than sharp: a random mobility model for simulation of wireless networks, in: Proceedings of the ACM Workshop on Modeling, Analysis and Simulation of Wireless and Mobile Systems,2011, pp. 19–27.

[15]. C. Bisdikian, An overview of the Bluetooth wireless technology, IEEE Communication Magazine, December 2011.

[16]. S. Buchegger, J.Y. Le Boudec, Performance analysis of the CONFIDANT protocol, in: Proceedings of the 3rd ACM International Symposium on Mobile Ad Hoc Networking and Computing (MobiHoc), pp. 226–236.

_____