

Energy Consumption on Mobile Adhoc Networks: A review

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Abstract: In the Today's scenario Energy consumption is one of the major issue as allocated power to particular node is limited and to increase the time limit of power, researchers have to work on different constraint related to the Adhoc Network . In this paper focuses on various aspects related to energy consumption and precaution made in Mobile Adhoc Networks. This paper describe various issues with energy consumption and the routing techniques which can be useful to overcome problem lying with energy consumption in MANET.

Keywords : MANET, energy consumption , energy efficient routing protocols

1. Introduction

Since their appearance in the year 1970 in the form of ALOANET, wireless packet radio network have come an extended way in term of several application number, as well as the feature set, among several other things. The two major attractions of wireless communication have been ease of deployment as well as mobility – arranging cable are not only time consuming and laborious, nevertheless their maintenance is likewise troublesome. Wireless communication nowadays surrounds us in numerous forms, each one of them with its distinctive coverage, range of applications and frequency band. It has developed to a great extent, as well as standard have been developed for Local Area Network, Broadband Wireless Access as well as Personal Area Network.

MANET is a self-organised structure of mobile devices which are attached by wireless link . this is infrastructure less temporary design. Mobility of each device is high and independent and therefore link to other devices change frequently. In Network, every mobile device is independent in nature. Wireless medium is shared in between nodes and topology changes dynamically. In MANET, as nodes are free to move to anywhere, communication link breaks frequent. [1].

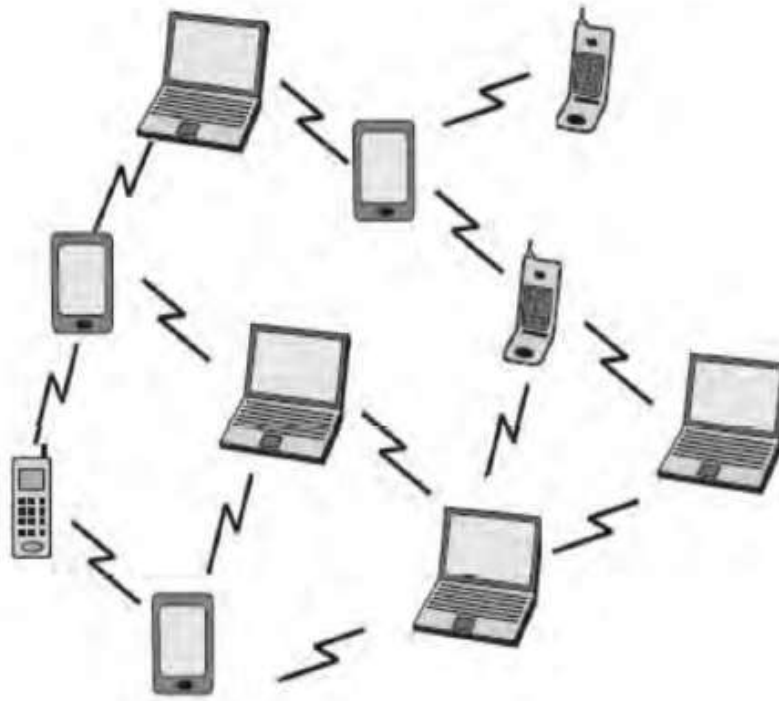


Figure 4 Basic MANET

Over a past year there is excessive increase in popularity of Mobile Devices and wireless network and due to this MANET has become a vibrant and active field of communication. Interconnected mobile network is another term that is frequently used for MANET. For research and development of wireless network it's a promising field[2].



Figure 5 MANET Structure

1.3.1 MANET ARCHITECTURE

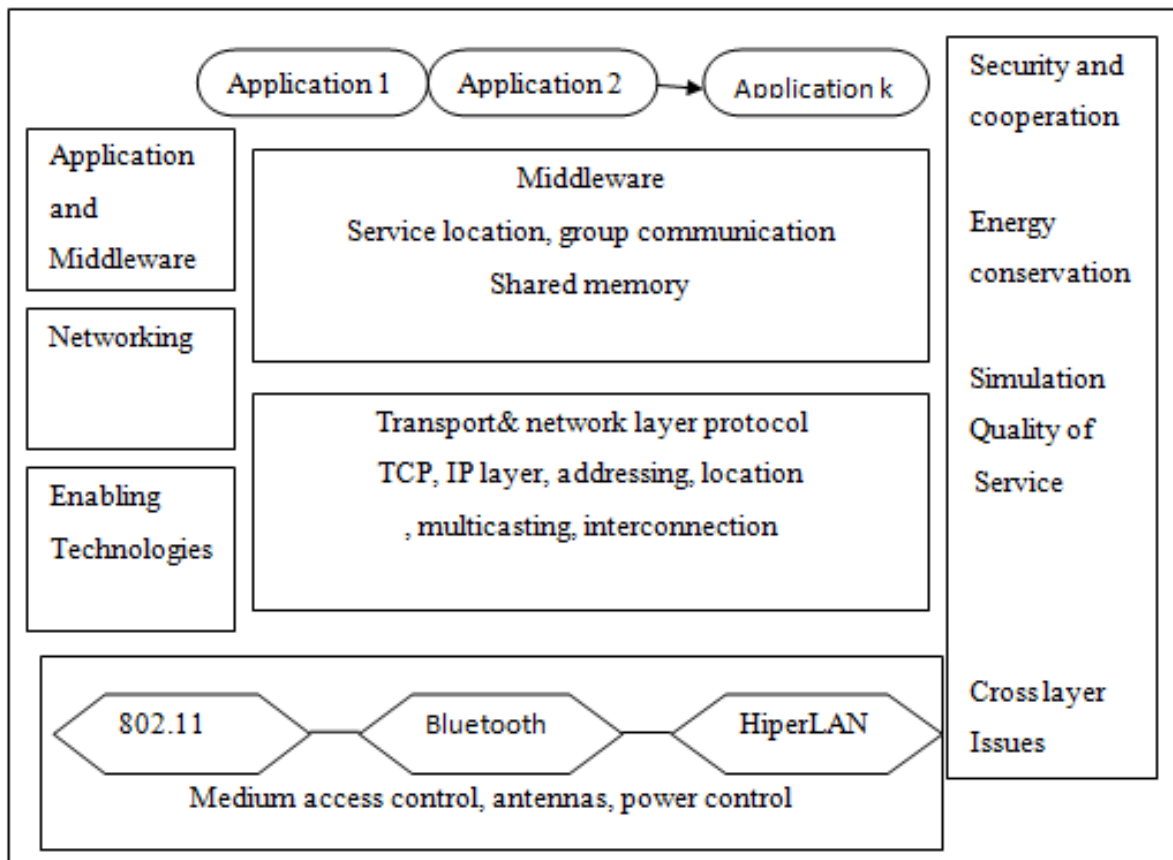


Figure 6 MANET Architecture

The architecture is grouped into 3 main classifications:-

1. Enabling part
2. Middleware & Application.
3. Networking

1.5.1 Energy Consumption In Manet

For energy consumption in MANET, there are 3 steps:-

- 1st, transmission of individual packet → energy consumed
- 2nd, that packet forwarded → energy consumed
- 3rd and finally, not transmitting or forwarding or idle nodes → energy consumed

1.5.2 Type of communication done

1. Point to point communication-
 - a. Direct communication between 2 nodes/ elements without any other node/ element in between.
 - b. Basically layer 2 link communication with 2 devices only on it
 - c. energy consumed for contention resolution includes the transmission and reception of the messages

2. End to End communication-
 - a. Communication between 2 nodes via multiple nodes in between.
 - b. Indicate communication happening between two applications

1.5.3 Energy consumption related some issues and challenges in MANET are as follows:-

Overhead – A flexible configuration is offered in Wireless network. Wireless medium is used to comprise nodes. Due to high mobility factor, connection or link may break and result is path failure and route discovery. Overhead can't be ignored. An effective and fundamental data dissemination technique of route discovery is broadcasting. But due to again and again blindly rebroadcasting of packets broadcast storm problem generates which is the main reason of overhead issue. Also sometime due to encryption decryption of packet overhead increases and energy consumption increases. So, Neighbor coverage based probabilistic rebroadcast protocol is used, to overcome and reduce the routing overhead in MANET[3].

Packet Loss- when a packet fails to reach at destination during communication packet loss problem occurs. Because wireless links are subjected to transmission error and dynamic change in topology, packet loss problem is much more complicated. A packet may loss due to

- Transmission error
- No route to destination
- Broken link
- congestion

Packet loss is a serious problem in wireless ad hoc networks. There are several classifications for packet dropping and packet dropping detection techniques.

Major classifications for packet dropping include

- legitimate packet drop-ping
- stealthy packet dropping
- Malicious packet dropping.

Packet dropping detection techniques are mainly classified into

- watch dog technique
- side channel monitoring
- monitoring agent techniques
- TwoAck and PathRater

Energy Consumption- Energy consumption is one of the most concerned point in MANET.

- Limited battery resources are used to operate mobile nodes.
- As network is non wired rate of energy consumption is high
- Energy is consumed
 1. When node is transmitting
 2. When node is receiving
 3. Idle node
 4. Sleep mode
- Ad hoc network also means there is a shared environment and neighborhood communication also consumes some energy. So battery is not used only by sending packet but also by just overhearing packet from other nodes. While forwarding packets for other nodes energy is also spent, because of multi-hop communication process in MANET[4-5].

Network Link Failure- MANET is one of the most promising wireless network architecture. It is a wireless network of mobile device which are configures itself. The major issue created due to nodes mobility is link failure. factors like

- Dynamic topology due to nodes mobility
- Interface traffic congestion
- Link stability
- Incorrect serial bandwidth setting
- Route flags
- Unidirectional traffic flow
- Router interface down
- Fault, error or discard in network
- Power outage
- Security attacks
- Partitions in between network, leads to interruption in communication, and also to Network link Failure.

Routing techniques help in path establishment for transmission. Overhead suffering routing protocol losses energy and may lead to link failure. As we have to establish the link again as again energy consumption increases.

Collision-A number of nodes are present in MANET. When a node wants to send a packet firstly it checks the signal level of line to find is it free or taken. If the route is free it sends the packet but sometime 2 nodes send the

packet at exact same time with leads to collision. And due to this both nodes needs to wait again for their turn to transmit and the result is energy loss and loss of quality in communication[6-8].

Network Failure- Due to all the above mentioned problems network failure may cause.

1.5.4 ENERGY CONSERVATION ROUTING APPROACHES

- Power aware routing proto.
- Efficient power & lifetime aware proto.
- AODV sleep
- Max. Energy level Ad-Hoc distance vector
- Mobility based minimum n/w coding
- Triangular energy saving cache scheme
- Energy enhanced AODV routing
- Max. Lifetime ad-hoc routing
- E-AOMDV energy based multipath
- Predictive energy effi. Multicast algo.
- Location based power scheme

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