
Review of Medium Access Control protocol for MANET

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Abstract

The mobile Adhoc network is deployed in the environment where traditional wired network cannot be established due to its required features and their limitation. In MANETs the omnidirectional and directional antennas have been used for performance optimization. In this paper extensive survey of various protocols at MAC layer has been done and comparative analysis has been done, which will help in optimization of network performance and intern throughput.

Keywords

AODV, MANET, Transmission Power, CBR

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Introduction

MANET is collections of thousand of self configure nodes, which are communicated to each other without any centralized authority. In current scenario the uses of wireless communication are increases rapidly such as cellular communication, Mobile adhoc network etc. Wireless network are those, transmit information in a form of electromagnetic wave through the air. In mobile adhoc networks, the absent of centralized authority make worse the issues of Medium access control protocols. In recent years, several MAC schemes have been proposed in literature that adapts the IEEE 802.11 as underlying protocol and it is designed for wireless local area networks and wireless adhoc networks with omni-directional antennas.

Mobile adhoc network is an infrastructure less network. Two types of communications are possible in MANET first is direct communication (node can communicate with the node that are in direct radio range of node as shown in Fig 1, and other one is multi hop communication (node can communicate with the node that are not in direct radio range of node in such case communication is possible through the nodes that are in direct radio range as shown in Fig 2).

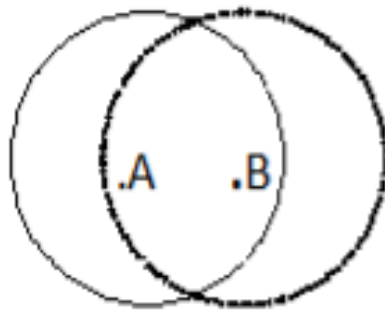


Figure 1. Direct communication

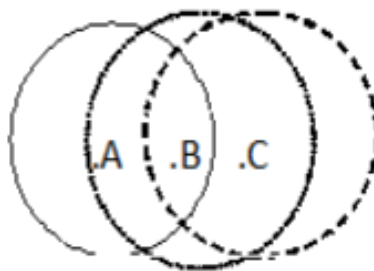


Figure 2. Multi hope communication

IEEE 802.11 DCF is a random access protocol which uses a CSMA/CA as a carrier sensing protocol^[1]. In^[2] node who have data to transmit sense the channel if channel is idle it transmit the RTS packet (Ready

to send), all the neighboring nodes (nodes in similar radio range) receive this RTS packet, on receiving this RTS packet intended receiver can response with the CTS (Clear to send) packet, similarly all the neighboring nodes of intended receiver (node in similar radio range) receive this CTS packet, and differ their transmission. Once the sender receives the CTS packet without any error, it starts transmitting the data packet and after successful reception of data intended receiver can response with ACK. So this scheme can transmit RTS/CTS/DATA/ACK^[2]. In fig3 node A want to send a data to node B, node A transmit RTS packet after receiving this RTS packet node B can response with CTS packet, this CTS packet is listen by the node C who is the neighbor of node B, now node C can differ their transmission, node A transmit DATA packet and node B response with ACK packet. The Timing/Delay diagram of control signal is shown in Fig 3 with its delay parameters for various request and data packets.

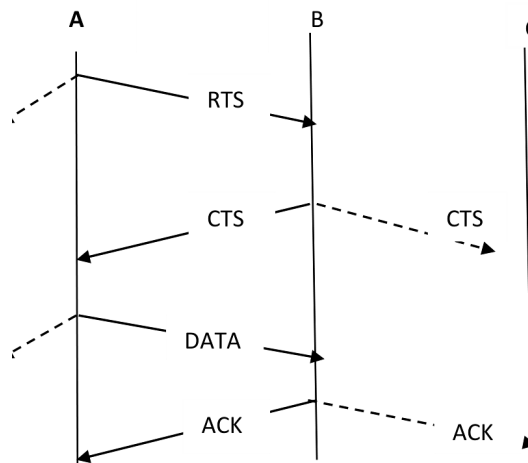


Figure 3. Timing Diagram of Control Signals

Classification of MAC

MAC Protocol can be broadly classified into two categories random access and reservation based access. Random access protocols allow the stations to access the shared medium randomly through contention with each other. Synchronized access protocols allow the stations to access the medium based on a predetermined schedule which can be achieved through local and/or global synchronization.

Random Access Protocol

Random Access Protocol in MANET based on the CSMA/CA protocol. Whenever node want to access the wireless medium first performing the carrier sensing, if medium is free station can transmit, if medium is busy node differ their transmission according to random period of time. Further divide the random Access protocol in a “Tone Based Protocol” and “Non Tone Based protocol”.

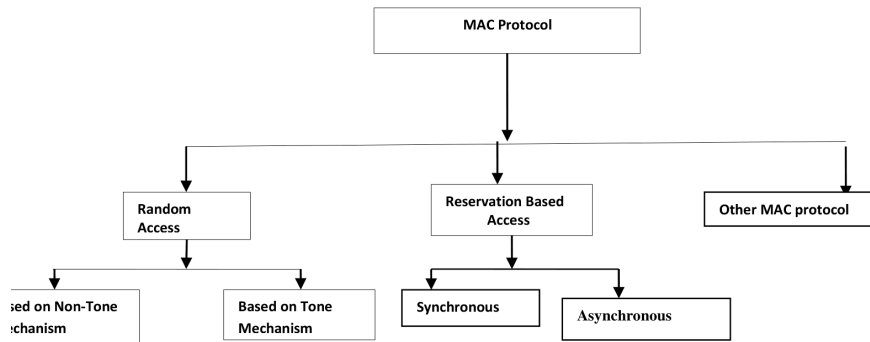


Figure 4. Classification of MAC protocol

(i) Tone Based Protocol

There are so many Non Tone based protocols defined in literature^[3–8]. These protocols purely rely on the RTS-CTS mechanism based on IEEE DCF^[1,2]. To improve the overall performance of network DATA and ACK is transmitted after small RTS-CTS exchange. However, there are several variations in literature, how RTS/ CTS packets are transmitted in order to deal with the challenges associated with this.

(ii) Non Tone Based Protocol

Here we review the DMAC protocols that use the tone in their transmission. A tone is a pure sinusoidal wave, it is an unmodulated signal with a particular frequency. Tone not containing any information so there is no need of decoding but only detection to be needed. In tone based Protocol, Tone are typically transmitted by the busy node to inform the neighbor about the ongoing transmission however to protect from the collision.

Reservation Based

These protocols use the mechanism to reserve the bandwidth in prior manner, such protocols can provide QoS support to time sensitive traffic session. These protocols can be further classified into two types “Synchronous Protocols” and “Asynchronous Protocols”.

(i) Synchronous Protocols

Synchronous protocols require time synchronization among all nodes in the network and all neighbor all the reservation in prior manner.

(ii) Asynchronous Protocols

These protocols are not required any of global time synchronization among all the nodes in the network.

MAC Protocol with Directional antenna

MAC protocol that uses directional antennas for transmissions have several advantage over those that use omnidirectional transmissions. Directional antenna improve the spatial reuse, can provide longer transmission range even in the presence of lower transmission power^[6–8].

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