Broadcasting Traffic Load Performance Analysis of 802.11 MAC in Mobile Ad hoc Networks (MANET) Using Random Waypoint Model (RWM)

Jogendra Kumar
G.B.Pant Engineering Collage Pauri Garhwal Uttarakhand, INDIA

Article Info	ABSTRACT
	Wireless networks are playing a major role in the area of wireless communication. Ad hoc network is a collection of wireless nodes that are communicate from one node to other nodes without using any existing infrasturacture , access point, and centralized network. The wireless communication devices are transmitters, receivers and smart antennas. These antennas can be of any kind and nodes can be fixed or mobile. The term node referred to as, which are free to move arbitrarily in every direction. In this article showing the pefromance of 802.11 MAC on basis of broadcasting traffic load using random waypoint model In wireless mobile ad hoc network (MANET) . this article main aim showing effitive performance of constant bit rate based on broadcasting data from one network to other network. Mainly this article focus on the performance metric such as 80.11 MAC Broadcast packet sent to channel, Packet from network layar, Broadcast packets received, 802.11 MAC Unicast packet sent to channel,Unicast packets received clearly.

Corresponding Author:

G.B.Pant Engineering Collage Pauri Garhwal Uttarakhand, INDIA
Email: jogendra.1986@gmail.com

1.   INTRODUCTION

All networks were however based on fixed infrastructures. Most common infrastructure based wireless networks are cordless telephone, cellular networks, Wi-Fi, Microwave communication, Wi-MAX, Satellite communication and RADAR. MANET stands for Mobile Ad hoc Network. In MANET [5], nodes can move randomly thus, each node function as a router and forward packet to each other device. Due to high node mobility network topology changes frequently. Therefore, routing in ad-hoc network becomes a Challenging task. QualNet 802.11 MAC [3] model is based on the IEEE Standard 802.11. It is acollection of MAC and PHY specefication for wireless lan or 802.11 IEEE standard. The original standard was establised in 1997. 802.11 IEEE wireless LAN Standard both the MAC and physical layers to support various features such as higher bandwidth, QoS, security, and so on in mobile ad hoc wireless network (MANET).Distributed Coordination Function (DCF)is a distributed channel access based on Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA) [3] with method of the IEEE 802.11 MAC is DCF. The DCF shall be implemented in all STAs, for use within

---

Journal homepage: *http://iaesjournal.com/online/index.php/ IJINS*

both ad hoc and infrastructure network configurations. Form STA1 to transmit to RTS, it shall sense the medium to determine, if another STA2 is transmitting. If the medium is not determined to be busy, then the transmission may proceed and send CTS frame . If the medium is determined to be busy, the STA1 shall defer until the end of the current transmission. The CSMA/CA distributed algorithm mandates that a gap of a minimum specified duration exist between contiguous frame sequences. A transmitting STA2 shall ensure that the medium is idle for this required duration before attempting to transmit again. After deferral to an ongoing transmission, or prior to attempting to transmit again immediately after a successful transmission, the STA2 shall select a random backoff interval and shall decrement the backoff interval counter while the medium is idle. A refinement of the method may be used under various circumstances to further minimize collisions. Here, the transmitting and receiving STA exchange short control frames (Request-To-Send (RTS) and Clear-To-Send (CTS) frames) after determining that the medium is idle and after any deferrals or backoffs, prior to data transmission.

A. 802.11 MAC PROTOCOL

- **IEEE 802.11-1997 is a wireless LAN media access protocol**: The Distributed Coordination Function (DCF), implemented in QualNet, is a carrier-sensing protocol with acknowledgements, and provides optional channel reservation capability using Request- to-Send (RTS) / Clear-to-Send Packets, (CTS) and fragmentation. To select IEEE 802.11 DCF as the MAC protocol in default.config, place the following entry in default.config in nodes placement scenarios.
- **Carrier Sense Multiple Access (CSMA) is a generic carrier-sensing protocol:** When a radio wishes to send data, it senses the channel. If the channel is busy, it backs off for a random time period before sensing the channel again. If the channel is free, the radio transmits the packet.
- **Switched Ethernet is an abstract store and forward single switch-based 802.3 LAN with fixed bandwidth and propagation delay**: The model considers the switching fabric to be equivalent to a set of point-to-point links connecting all sources and receivers, except that when multiple sources attempt to send to a single receiver, their transmissions are serialized without additional buffering overhead.

2. SIMULATION PARAMETER SETUP

Table 1 Simulation Parameter for 802.11 MAC

Parameters Name	Values
Number of nodes	20
Area	700m*700m
Protocol Layer	802.11 MAC
Fading Model	Rayleigh
Shadowing Model	Constant
Energy Model	MicaZ model
Battery Model	Simple linear model
Node Placement	Random waypoint model
Simulation time	900 sec
Channel frequency	2.4Ghz
Traffic load	Constant Bit Rate with speed min=0 m/sec , max=20 m/s
Pathloss Model	Two Ray Model
PHY802.11	2 Mbps
Antenna Model	Omnidiectional Model

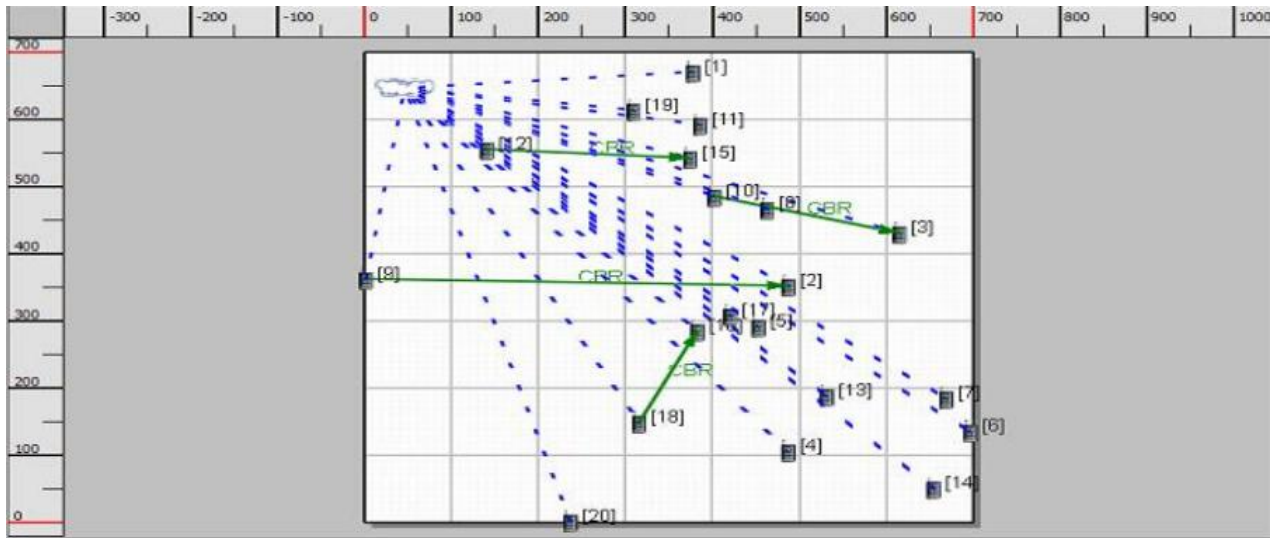## 3.　NODES PLACEMENT SCENARIOS

Figure 1 Nodes Placement Scenarios of 802.11 MAC
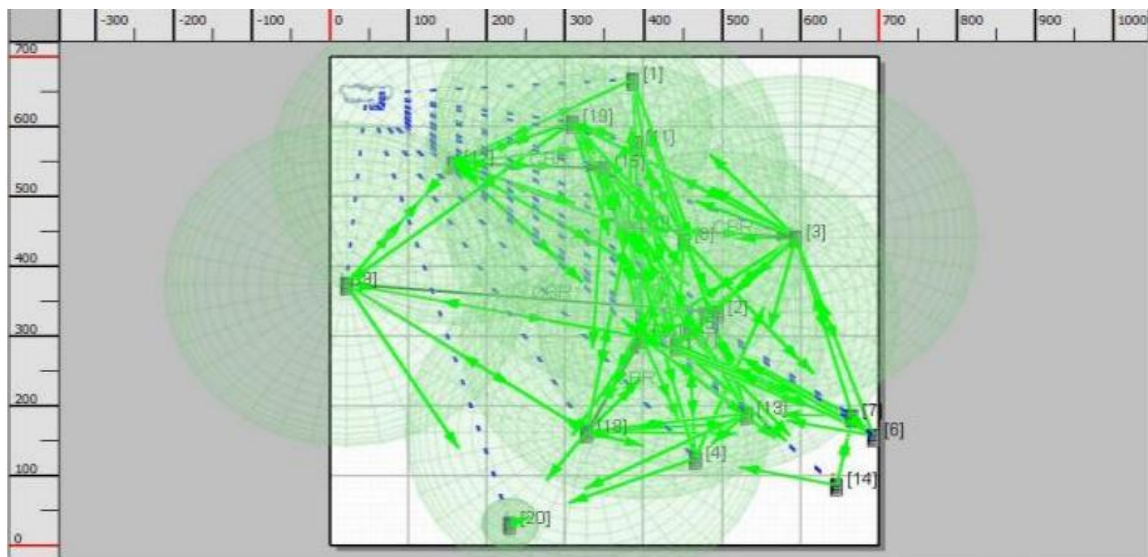
4.　ANIMATION VIEW OF SIMULATION SCENARIOS

Figure 2 Animation View of Simulation Scenarios for 802.11 MAC

5.　SIMULATION PERFORMANCE RESULT OF 802.11 MAC

A.　PERFORMANCE METRICS

Random Waypoint mobility model: We simulate three scenarios each scenario was run for 900 sec (simulation time). All the simulations show the required results. We get multiple graphs from simulations like first we get for delay, sec is for the network load, and third one is for the throughput. Main goal of our simulation was to model the behavior of the routing protocols. We collected DES (global discrete event statistics) on each protocol and Wireless LAN. We examined average statistics of the delay, network load and throughput for the MANET. A campus network

was modeled within an area of 700m x700m. The mobile nodes were spread within the area. We take the CBR traffic to analyze the effects on routing protocols. We configured the profile with CBR application. The nodes were wireless LAN mobile nodes with data rate of 11Mbps. Random waypoint mobility model was used in this simulation. The mobility model used is simple and it show more good mobility behavior [5,6]. Mobile nodes move at a constant speed of 100 m/s, and when reaches the destination, the pause time is 10 sec and after that it choose a new random destination .To evaluate the performance of routing protocols of 80.11 MAC Broadcast packet sent to channel,packet from network and Broadcast packets received and Result 802.11 MAC Unicast packet sent to channel,Unicast packets received clearly and Packet from network.

Constant Bit Rate (CBR): Constant Bit Rate (CBR) is a traffic generator. This UDP-based client-server application sends data from a client to a server at a constant bit rate. Random Waypoint mobility model in random waypoint mobility model, the nodes randomly selects a position, moves towards it in a straight line at a constant speed that is randomly selected from a range, and pauses at that destination. The node repeats this, throughout the simulation. In the simulation, Constant Bit-Rate (CBR) traffic flows are used with 4 packets/second and a packet size of 512 bytes [6].

- **80.11 MAC Broadcast packet sent to channel:** Packets broadcast to all radios within transmission Range
- **Packet from network layar:** Packets received from Network Layer Protocol, ie IP
- **Broadcast packets received:** Packets destined for all radios and successfully received by this radio
- **802.11 MAC Unicast packet sent to channel:** Packets with a specific destination address transmitted on the channel
- **Unicast packets received clearly: Packets** destined for this specific radio and successfully received

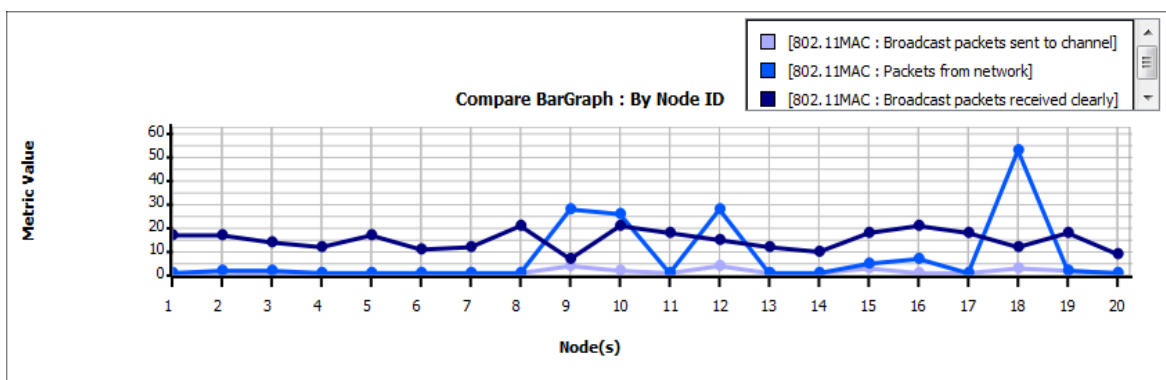B. **SIMULATION RESULT OF 802.11 MAC PROTOCOLS**

Figure 3 Showing Simulation result 80.11 MAC: Broadcast packet sent to channel,packet from network and Broadcast packets received clearly Vs Nodes (s)
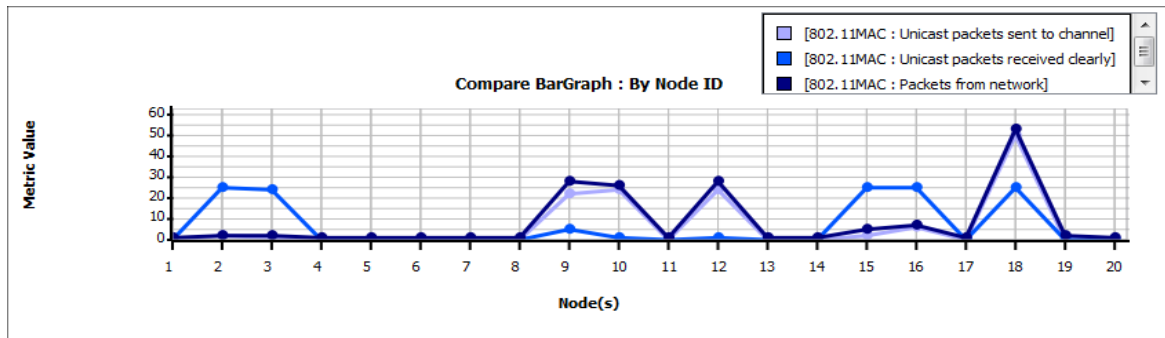
Figure 4 Showing Simulation Result 802.11 MAC: Unicast packet sent to channel,Unicast packets received clearly and Packet from network Vs Nodes (s)

ACKNOWLEDGEMENTS

CONCLUSION

This article gives the effective performance of 802.11 MAC protocol on constant bit rate and using random waypoint model and showing the comparative performance of performance metrics such as performance performance metric such as 80.11 MAC Broadcast packet sent to channel, Packet from network layar, Broadcast packets received, 802.11 MAC Unicast packet sent to channel,Unicast packets received clearly. In future you can implement 802.11 MAC, different routing protocols; energy consumed in different mode and also takes more traffic sources.

REFERENCES

[1] Dinesh Singh, Ashish K. Maurya, Anil K. Sarje,"Comparative Performance Analysis of LANMAR, LAR1, DYMO and ZRP Routing Protocols in MANET using Random Waypoint Mobility Model" PP 62-66, 2011 IEEE.

[2] Parma Nand, Dr. S. C. Sharma," Routing Load Analysis of Broadcast based Reactive Routing Protocols AODV, DSR and DYMO for MANET" International journal of grid and distributed computing vol.4, No.1, PP 81-92, March 2011

[3] Legacy/"native" format 1x1 degree information is available at:U.S. Geological Survey. http://edcftp.cr.usgs.gov/pub/data/DEM/250/

[4] The government standard is available at: Digital Elevation Model Standards." U.S. Geological Survey. 1998. http://rockyweb.cr.usgs.gov/nmpstds/demstds.html

[5] C.Siva Rammurty and B.S. Manoj , "Ad hoc wireless networks architectures and protocols" ISBN 978-81-317-0688-6, 2011.

[6] The Qualnet 5.0.2 simulator tools online available www.scalable-networks.com

BIOGRAPHY OF AUTHORS

Jogendra Kumar received his B.E. degree in Computer Science & Engineering from H.N.B Garhwal University Srinagar   Uttarakhand (India) in G.B. Pant Engineering College Pauri   Garhwal, Uttarakhand, (India) 2008 and he is currently doing M.Tech (CSE) degree from UTU University Dehradun Uttarakhand (India) in G.B. Pant Engineering College Pauri Garhwal, Uttarakhand, (India) with Registration ID No CSE1053545 and I am Member of International Association of Engineers (IAENG) (USA) ,Member ID:121623, Internet Society (USA), Member ID: 77364 , International Association of Computer Science and Information Technology (IACSIT), Member ID : 80344753 His research interest includes mobile ad hoc networks and wireless sensor networks systems and also published various research papers in leading international journal & conferences.