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Review on Contention Window Scheme in WSN

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ABSTRACT:
The current cellular networks are classified as the infrastructure dependent networks. The path setup between two nodes is completed through the base station. Ad hoc wireless networks are capable of operating without the support of any fixed infrastructure. The absence of any central control system makes the routing complex compared to cellular networks. The path setup between two nodes in ad hoc network is done through intermediate nodes. For the distributive system to work the mobile nodes of ad hoc network are needed to be more complex than that of cellular networks.

KEYWORDS: WSN, RTS, CSMA/CD, IEEE 802.11

I. INTRODUCTION:

Wireless network refers to any type of computer network that is wireless, and is commonly associated with a telecommunications network whose interconnections between nodes is implemented without the use of wires. Wireless telecommunications networks are generally implemented with some type of remote information transmission system that uses electromagnetic waves, such as radio waves, for the carrier and this implementation usually takes place at the physical level of the network [1]. Types of wireless networks:

- Wireless Personal Area Network (WPAN) is a type of wireless network that interconnects devices within a relatively small area, generally within reach of a person. For example, Bluetooth.
- Wireless Local Area Network (WLAN) is a wireless alternative to a computer Local
- Area Network (LAN) that uses radio instead of wires to transmit data back and forth between computers in a small area such as a home, office, or school. Wireless LANs are standardized under the IEEE 802.11 series. For example, Wi-Fi. Wireless Metropolitan area networks are a type of wireless network that connects several Wireless LANs. For example, Wi-MAX.

1.1 WIRELESS AD-HOC NETWORK:

In the last few years, there has been a big interest in Ad-Hoc Wireless Networks as they have tremendous military and commercial potential. An ad-hoc wireless network is a wireless network, comprised of mobile computing devices that use wireless transmission for communication, having no fixed infrastructure (a central administration such as base station in cellular network or an access point in wireless local network.) The mobile devices also serves as routers due to the limited range of the wireless transmission of these devices, that is, several devices may need to route or relay a packet before it reaches to its final destination. Ad hoc wireless network can be deployed quickly anywhere and anytime as they eliminate the complexity of infrastructure setup. The decentralized nature of wireless ad hoc networks makes them suitable for a variety of applications where central nodes can't be relied on, and may improve the scalability of wireless ad hoc networks compared to wireless managed networks, though theoretical and practical limits to the overall capacity of such networks have been identified. Minimal configuration and quick deployment make ad hoc networks suitable for emergency situations like natural disasters or military conflicts. The presence of a dynamic and adaptive routing protocol will enable ad hoc networks to be formed quickly. Wireless ad hoc networks can be further classified by their application:

- mobile ad hoc networks (MANETs)
- wireless mesh networks
- Wireless sensor networks

II. LITERATURE SURVEY:

In the past few years wireless network has developed much and many works has been done to increase its performance. Most of them have been done on the basis of 2-D Markov Chain model. An intuitive mathematical analysis and simple equations were presented for throughput and packet delay performance of IEEE 802.11 DCF by utilizing a Markov chain model by [5] which is presented below. Markov Chain Model Assumptions

- Packets can encounter collisions only due to simultaneous transmissions (no transmission errors)
- There are no hidden stations (all stations can hear others transmissions).
- The network consists of a finite number of contending stations.
- Saturated conditions, i.e. a station have always data ready for transmission.
- The collision probability of a transmitted packet is constant and independent of the number of retransmissions.

The authors in [2], have evaluated the dependency of the RTS/CTS scheme on network size, however, without providing any general expression for the RTS/CTS threshold. But works in [3] and [4] has pointed out that the RTS/CTS handshake does not work as well as expected in theory. Approaches to fix the value of RT can be clustered main lying two types; Dynamic and Static. Authors in [4] has performed analysis to determine RT values for maximum performance and proposed static value [RT = 0] for all nodes, considering only single hop environment. On the other hand, dynamic approaches are discussed in [3], [4], [5]. In others, such as in [6] and [7] packet delivery ratio or transmission probability is emphasized. The common practice in [8], [9], [10] is not to consider hidden node problem.

III. MOTIVATION:

IEEE 802.11 standard uses a numerous parameters for its operation. In the standard these parameters are given default values. Some parameter values can be set by the user explicitly. Work had been done by various researchers for tuning of these parameters. They had been trying to set the values adaptively on the basis of some kind of network performance matrix. The objective of setting the parameter values adaptively is to maximize the gain (maximizing throughput, minimizing delay or access time, minimizing collision, minimizing power consumption etc.) Till now most wireless networks are logically subordinate to existing wired networks. IEEE 802.11 was designed to complement existing LANs, not replace them. However, networks have a way of growing, and users have a way of becoming more demanding. Network's performance \out of the box" is probably fairly poor, even if no one notices. Changing the physical environment (by experimenting with access point placement, external antennas, etc.) may alleviate some problems, but others may best be resolved by tuning administrative parameters. Some of the parameters used in the IEEE 802.11 MAC layer are; Beacon Interval, RTSThreshold, Fragmentation-Threshold, Long Retry Limit, Short Retry Limit, Listen interval, DTIM Window, ATIM Window, Active Scan Timer, Passive Scan Timer,AuthenticationTimeout, Association Timeout. But only RTS-Threshold, Long Retry Limit, Short Retry limit, Fragmentation Threshold, and Contention Window Size are used by DCF mode of operation. In our thesis we have investigated RTS-Threshold, Retry Limits, and Contention Window Size for tuning them. We looked into the past works related to the adaptive tuning of these parameters. Finally we have chosen RTS-Threshold for our work. RTS-Threshold is an important parameter in DCF mode of operation. The value of RTS-Threshold can affect available radio capacity, throughput, and battery life. But setting the value arbitrarily can affect the throughput badly. We have found that there is much space for research on tuning of RTS-Threshold. After a long research and experiments we have finally devised a method of adaptively tuning the RTS threshold value with the help of current packet size distribution of the network. Here this distribution means the size of the packets currently owing through the network.

IV. PROBLEM IDENTIFICATION & ISSUES:

Hidden nodes in a wireless network refer to nodes that are out of range of other nodes or a collection of nodes. Take a physical star topology with an access point with many nodes surrounding it in a circular fashion: Each node is within communication range of the AP, but the nodes cannot communicate with each other, as they do not have a physical connection to each other. In a wireless network, it is likely that the node at the far edge of the access point's range, which is known as A, can see the access point, but it is unlikely that the same node can see a node on the opposite end of the access point's range, B. These nodes are known as hidden. The problem is when nodes A and B start to send packets simultaneously to the access point. Since node A and B cannot sense the carrier, Carrier sense multiple access with collision avoidance (CSMA/CA) does not work, and collisions occur, scrambling data. To overcome this problem, handshaking is implemented in conjunction with the CSMA/CA scheme. In the basic transmission scheme due to the fact that carrier sensing range is almost equal to transmission range of a node, it effectively increases the probability of collisions. The problem of a station not being able to detect a potential competitor for the medium because the competitor is too far away (based on their carrier sensing range) is called the hidden node problem.

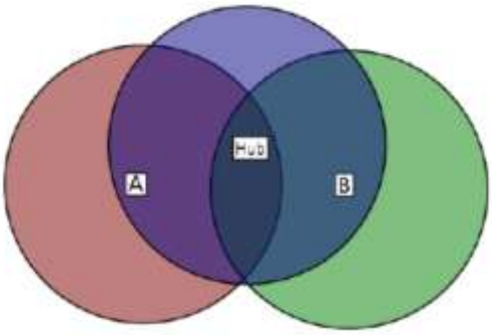

Figure 1: Hidden Terminal Problem

Figure: 2.1 currently transmitting 2.2Wish to transmit

In wireless networks, the exposed node problem occurs when a node is prevented from sending packets to other nodes due to a neighboring transmitter. Consider an example of 4 nodes labeled R1, S1, S2, and R2, where the two receivers are out of range of each other, yet the two transmitters in the middle are in range of each other. Here, if a transmission between S1 and R1 is taking place, node S2 is prevented from transmitting to R2 as it concludes after carrier sense that it will interfere with the transmission by its neighbor S1. However note that R2 could still receive the transmission of S2 without interference because it is out of range from S1

V. CONCLUSIONS:

In this paper, to alleviate hidden node problem, Karn proposed two way handshaking protocols known as the RTS/CTS handshaking mechanism. Bharghaven et al. proposed an improved protocol which is known as RTS-CTS-DATA-ACK handshaking mechanism. The advantages of this mechanism are:

- To reduce frame collisions introduced by the hidden terminal problem.
- Originally the protocol fixed the exposed terminal problem as well, but modern RTS/CTS include ACKs and do not solve the exposed terminal problem. This mechanism helps to solve this problem only if the nodes are synchronized. When a node hears an RTS from a neighboring node, but not the corresponding CTS, that node can deduce that it is an exposed node and is permitted to transmit to other neighboring nodes.

REFERENCES:

1. H. Harada and R. Prasad, 2002. Simulation & Software Radio for Mobile Communications, Artech house Publisher, London.
2. V.N. Richard and R. Prasad, 2000. OFDM for Wireless Multimedia Communication, Artech house Publisher, London.
3. Wikipedia the Free encyclopedia: http://www.wikipedia.org//
4. T. S. Rappport, 2002. Wireless Communications, principles and practice, 2nd Edition, prentice- Hall publications.
5. Chang, R.W., 1966. Synthesis of band-limited orthogonal signals for multi-channel data transmission. Bell System Tech. J., 46, 1775–1796.
6. Saltzberg, B.R., 1967. Performance of an efficient parallel data transmission system. IEEE Trans. Commun., Technol., COM-15, 805–811.
7. Weinstein, S.B., 1971. Data transmission by frequency division multiplexing using the discrete Fourier transform. IEEE Trans. Commun. Technol., COM-19(5), 628–634.
8. Cimni,L.J, 1985. Analysis & simulation of a digital mobile channel using OFDM, IEEE Trans. Commun., 33(7), 605-665.
9. Alard, M. &Lassalle,R., 1987. Principles of modulation & channel coding for digital broadcasting for mobile receivers EBU Tech Review(224), 47-69.
10. Kalet,J., 1989. The multitone channel. IEEE Trans. Commun., 37(2), 119-124.