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An Approach to Minimize the Use of Rts/Cts Handshaking Protocol in WLAN

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Abstract: *The rapid growth of computer network takes the concentration of researchers in the era of wireless network. There is a need of improving the performance of RTS/CTS mechanism. An increase in performance using RTS/CTS is the net result of introducing overhead .If network doesn't have any hidden nodes; the use of RTS/CTS will only increase the amount of overhead, which may reduce throughput. In this case, the additional RTS/CTS frames cost more in terms of overhead than what we gain by reducing retransmissions. Moreover, usage of RTS/CTS is helpful especially when data frame is much longer than RTS frame. In this dissertation, the focus is on the problem with RTS/CTS protocol. Here we studied that the performance of RTS/CTS handshaking mechanism degrade if system having few number of hidden node. To overcome this problem proposed methodology tends to maintain hidden table by each node of network that contain the information about hidden node of its neighbor node. The Proposed methodology reduce transmission overhead induced by optimized RTS/CTS exchange for improving throughput performance of IEEE802.11.*

Keyword: *Wireless Network, handshaking protocol, RTS/CTS.*

1. Introduction

Wireless local area network is use to perform the communication without interfering cables because it seems to be that the interference degrades the signal quality dramatically. The receiver comprises a filter circuit so that it can be adjusted to the desired local wireless network (WLAN) uses radio waves to transmit information. It transmits data without a physical connection. WLAN supports the same capabilities and the speed of a wired network. In different wireless stations can connect to an access point or can be an ad hoc network. The data transmitted in a wireless LAN is placed on a radio carrier wave. Modulation of the carrier is made to accurately demodulate the received signal. Radio waves are transmitted at different frequencies so they can be frequency while rejecting all other frequencies.

In spite of having line communication the wireless network take place all over the communication system. So Mobile Ad hoc Networks (MANETs) is in higher interest of researchers. A self configured network with wireless connectivity is known as MANETs. A Stranded protocol IEEE 802.11 is has been use in Wireless Local Area Networks (WLANs). IEEE 802.11 specifies Medium Access Control (MAC) and Physical (PHY) layers for WLANs [1]. In recent years, wireless services have been growing rapidly, in which a great deal of interest has been given to wireless networks for local communication. Wireless Local Area Networks (WLANs) have spread to a remarkable founded the IEEE 802.11, an international standard for wireless LANs, including Medium Access Control (MAC) and Physical Layer (PHY) specifications recommend. The MAC supports the operation under the control of an access point, as well as between independent stations. The key challenge for such a network is an efficient media access solution that develops, as each node in the wireless sets the channel share.

The standard defines the CSMA / CA for virtual distribution of information exchange reserves with the

Clear to Send / at (RTS / CTS) frames contain a field point (D / I) to specify when sending media communication reserving for transmitting the data frame and ACK frame real return. This gives the average reserved time stores or at the end of the acknowledgment immediately after, or in the case of sequence data fragment at the end of the next fragment

RTS / CTS mechanism is a handshake optional four ways in which DCF 802.11 adopted to reduce collisions of data frames by the hidden terminal problem. Short RTS and CTS frames exchanged before transmission of data between a pair of nodes of origin and destination. Before transmitting a packet, a RTS is sent comprising the destination address and data length information. In addition to the destination address, the RTS packet is received by all other nodes in the vicinity of the source node, so that access to the media in the source is transmitted shouting. To receive a RTS, the destination node responds with a CTS packet, which also confirms a broadcast packet, including the duration of data communication. Therefore, using the RTS / CTS mechanism, other nodes within range of the source and destination does not interfere with the desired transmission time of the acknowledgment packet to the receiving side path (ACK).

2. Wireless Local area network

The communication system requires the presence of a day high speed and a reliable network where a wire skeleton may be connected to multiple wireless networks. The category of wireless networks could be cellular networks, wireless personal area networks (WPAN), wireless LAN (WLAN) or (MANET) mobile ad hoc network. A network consisting of computers that are in the same physical area is called local area network (LAN). A network that connects computers in an organization, regardless of being in the same physical space is called Wide Area Network (WAN). A local area network that uses wireless technology to connect computers in the network is called wireless LAN (WLAN).

Wireless technology has helped to simplify networking by enabling multiple computer users to simultaneously share resources in a home or business without additional or intrusive wiring. These resources might include broadband Internet connection, network printers, data files, and even streaming audio and video. This kind of resource sharing has become more prevalent as computer users have changed their habits from using single, stand-alone computers to working on networks with multiple computers, each with potentially different operating systems and varying peripheral hardware. U.S. Robotics wireless networking products offer a variety of solutions to seamlessly integrate computers, peripherals, and data.

Challenges in Wireless Networks

- Ad hoc deployment: Most sensor nodes are deployed in areas without any infrastructure. A naturally be deployed in a forest by the sensor nodes from an airplane. In such a situation, it is up to the nodes to identify the connectivity and distribution.
- Unattended operation: In most cases, once deploy, sensor networks have no human interference Hence the nodes themselves are responsible for reconfiguration in case of any changes.
- Untethered: Sensor nodes are not connected to a power source. Not only a finite energy source, have they used to be optimally processing and communication. An interesting fact is that communication dominates the energy treatment. Therefore, to optimize the use of energy, communication must be minimize as much as possible.

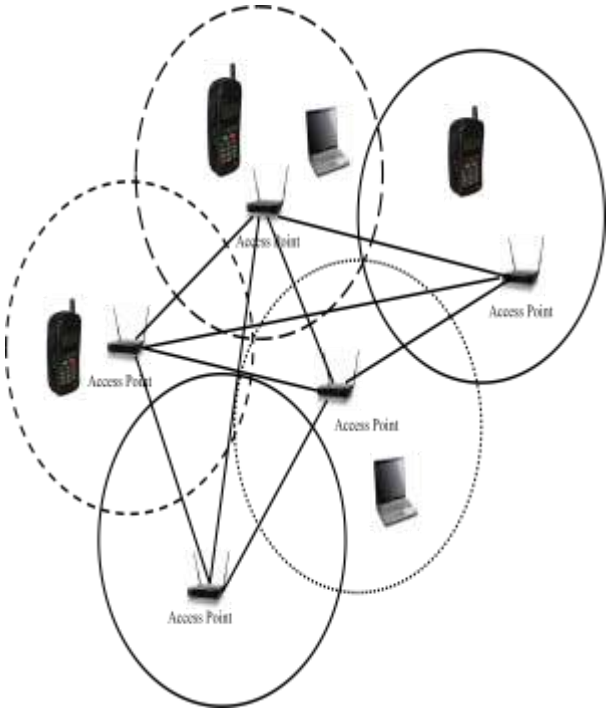

Figure 1 Wireless Networks

3. Problem Formulation

Collisions occur in wireless networks, especially if nodes cannot hear each other, probably due to the transfer distance or disability at the same time. Such nodes are called "Hidden Nodes" means. The 802.11 standard combat the hidden node problem by posting an optional handshake protocol at the MAC layer as an RTS / CTS protocol. The RTS and CTS packets are small packets exchanged before the transmission of data packets. For example, are based in the infrastructure - WLAN transmitter transmits an RTS packet to the AP, which responds with a CTS packet.

Like all basic service set (BSS) stations (STA) to hear AP, adapt their NAV (transmission delay) for continuous information contained in the RTS / CTS frames and refrain from sending. This allows the sending STA sent and received a packet without a possibility of collision. Performance of handshaking in WLAN using RTS/CTS is efficient if scenario having larger hidden nodes where as performance going to degrade if WLAN having lower degree of hidden node .Performance of WLAN depended upon degree of hidden node in WLAN. But RTS/CTS increase packet overhead so RTS/CTS helpful especially when data frame is much longer than RTS frame..The main disadvantage of the RTS / CTS protocol is the additional cost to the WLAN through the temporary reservation of the wireless channel. Therefore, it is recommended only for large packets, the large bandwidth consumed when restitution is exchanged.

4. Proposed Methodology

As per problem statement performance of WLAN depended upon degree of hidden node in WLAN. But RTS/CTS increase packet overhead so RTS/CTS helpful especially when data frame is much longer than RTS frame. Proposed methodology based on degree of hidden node and suggests using RTS/CTS handshaking technique only then when degree of hidden node is greater than threshold of hidden node otherwise performed handshaking without RTS/CTS .Whereas for determining threshold proposed methodology maintained both neighbor and hidden table with respect to each node.

5. Proposed Algorithms

As per problem statement performance of WLAN depended upon degree of hidden node in WLAN. But RTS/CTS increase packet overhead so RTS/CTS helpful especially when data frame is much longer than RTS frame. Proposed Algorithm based on degree of hidden node and suggests using RTS/CTS handshaking technique only then when degree of hidden node is greater than threshold of hidden node otherwise performed handshaking without RTS/CTS. Proposed algorithm have two different part first one for optimized RTS/CTS and second one for maintaining neighbour and hidden table.

Algorithm - 1 (Optimized RTS/CTS)

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Assumption

S_s= Source Station

N_s=Neighbour Station

H_s=Hidden Station

Optimized RTS/CTS( )

{

STEP 1:- When any source station S_s wants to establish a connection with their neighbour station N_s via handshaking.

STEP 2:- S_s unicast a prior handshaking packet to Ns

STEP 3:- Ns check whether there is any hidden node associated with S_s and reply .

STEP 4:- Ss check reply packet and check if

{

no. of hidden station >= hidden threshold>= 1 then step 5

other wise

step 6.

}

STEP 5:- Ss station used RTS/CTS change for established a connection between Ss and Ns.

STEP 6:- Ss used normal handshaking protocol for established a connection between Ss and Ns.

}

}

In Proposed method every terminal node Si keep an neighbour list knows as neighbour table, grips the terminal IDs of neighbouring terminals and The hidden terminal list knows as hidden table , grips the terminals IDs of hidden Terminals. Initially S want to

retain its both neighbour and hidden table so for that S broadcast RTS and every radio node of S that capture that broadcasted packet directly reply its terminal id to S for retain its neighbour table whether if any terminal node capture this broadcasting packet via any intermediate node but only one reply it terminal is as hidden node which is described in Algorithm2.

Algorithm 2

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Assumption

Neighbour Table [Terminal_id , Radiation]

Hidden Table [Terminal_id]

Generation Of Hidden Table & Neighbour Table( )

{

STEP 1:- Whenever any node N get route request packet from any packet S, Node N broadcast table updation control packet to their radio node .

STEP 2:- Every Radio node of Node N reply response packet having their terminal id.

STEP 3:- Node N check the response if new neighbour node appear then update neighbour table and if existing neighbour node change their radiation then make a entry of this terminal id in hidden table .

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6. Result Analysis

In this section two basic parameters has been discussed. First one is the percentage of successful transmission and another is efficiency of the system.

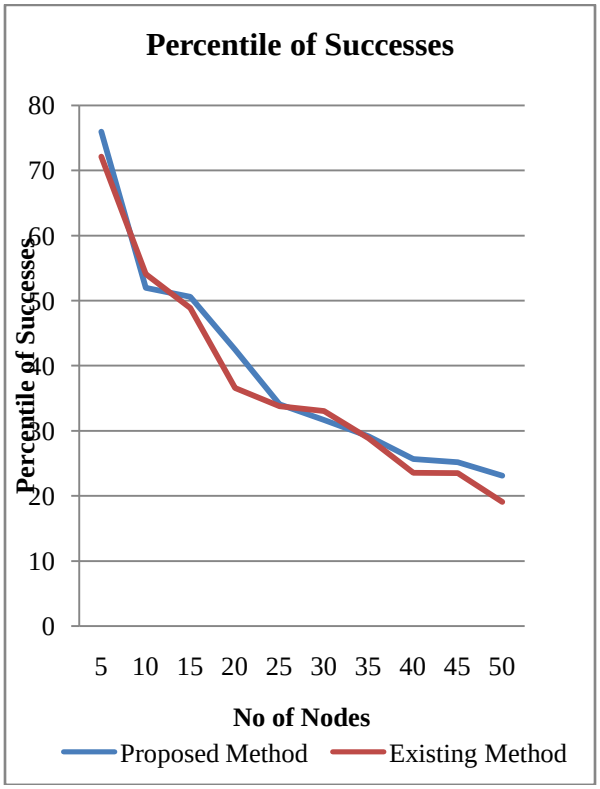

Figure 2 comparison of Success percentile

The figure 2 shows that percentile of successful transmission in the network with different network load (different No of Nodes). as shown in graph the with respect to network size the performance of overall network will get down but the proposed approach still gives the better result in the simulated scenario.

The graph shows in figure 3, that when number are nodes increased than efficiency will decreases because of increasing collision. It also shows the results are better than the existing system.

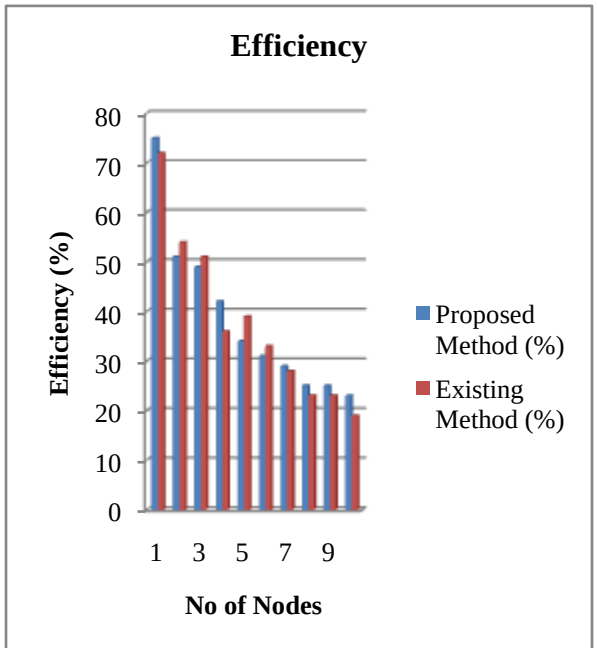

Figure 3: Comparison of efficiency

7. Conclusion

The RTS and CTS packets are exchanged small packets prior to transmission of the data packets. When the data would be transferred from the source to the destination, then it will communicate with RTS / CTS, so as to reduce the first packet collision. This communication takes time to shake hands. There is a need to improve the performance of the RTS / CTS mechanism. An increase in the performance by RTS / CTS is the result of the introduction of overhead if the network is not has hidden nodes. The use of RTS / CTS will only increase the amount of the overhead, which may reduce the flow. In this case, the additional frame RTS / CTS are more expensive in terms of resources than we gain by spreading are. This dissertation work presented an approach with the hidden nodes and tried to minimize the overhead of RTS / CTS transmission.

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