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INCREASING BANDWIDTH ON CELL BREATHING TECHNOLOGY USING RAT ALGORITHM

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ABSTRACT

In a typical enterprise WLAN, it is difficult to identify and implement the types of network settings which cause poor performance where number of hosts may attain larger share of the available bandwidth in a access point within a limited boundary under the concept of cell breathing technique. This approach can leads to unequal load sharing and diminished system performance. Our work can be focused on the process of regulating the bandwidth so that no user can access data more than the specified limit for a particular access point and provide large bandwidth wherever needed. In this way the different users will get an efficient access over the network. We consider the RAT (Rate Access Technologies) policy which leads to better system performance. The RAT policy has been applied on home-grown centralized WLAN controller, ADWISER and reveals that the RAT policy definitely affords to be effective system performance.

KEYWORDS: WLAN, RAT, MAC Protocol, Power Control, ADWISER.

INTRODUCTION

Due to the demand in various services of WLAN, there are many users rely on many applications in the aspect of cell breathing networks. Wireless networks have high frequency of link status changes and react faster to these changes. The problems such as Low throughput, high packet loss rate, transmission delay for packets, increased retransmissions, and increased collisions loss for wireless LAN will be improved. This can be obtained by proper bandwidth sharing with cognitive networks for decision making power adjustment level. This removes dynamic congestion problem which occur suddenly. WLAN administrators deal with the problem of sporadic user congestion at certain popular spaces (hotspots) such as specific geographical location within the network. In order to determine the performance of Wireless Local Area Networks (WLANs), it is important to identify what types of network settings can cause bad performance. The factors such as Low throughput, high packet loss rate, transmission delay for packets, increased retransmissions, and increased collisions, are the main attributes to look for when analyzing poor network performance.

However, according to IEEE 802.11 standard, the access point with the highest Received Signal Strength Indicator (RSSI) have large number of users associated with it, due to which the load is increased at this access point and the nearby access points either remain idle or contain very less number of users. The overall performance of the network degrades by this activity for which load balancing schemes have been applied to distribute load among different access points.
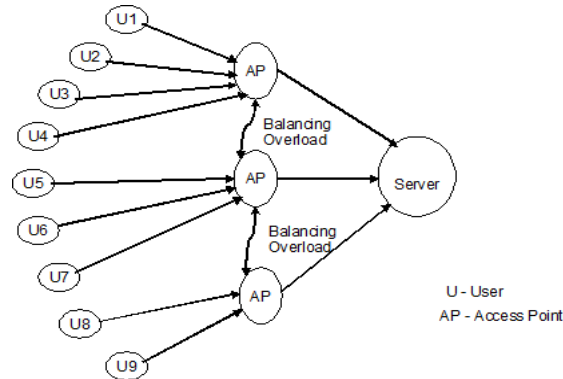
Figure.1.Load Balancing

This goal is typically achieved when the load of access points (APs) is balanced. Recent studies on operational WLANs exposed that AP load is often uneven distribution. To rectify such overload, several load balancing schemes have been proposed. These methods are commonly required proprietary software or hardware at the user side for controlling the user-AP association. In this paper we present a new load balancing method by controlling the size of WLAN cells (i.e., AP's coverage range), which is conceptually similar to cell breathing in cellular networks. This method does not require any modification to the users neither the IEEE 802.11 standard. It only requires the ability of dynamically changing the transmission power of the AP beacon messages. We develop a set of polynomial time and throughput algorithms that find the optimal beacon power settings which minimize the load of the most congested AP. We also consider the problem of network-wide min-max load balancing. Simulation results show that the performance of the proposed method is comparable with or superior to the best existing association-based method.

RELATED WORK

A station has a choice of multiple access points to associate with. The default association policy is based on metrics such as Received Signal Strength (RSS), and "link quality" to choose a particular access point among many. In this review paper, we are focused on the different technologies that are used to remove the near-distant node problem in wireless networks. Near-distant problem effects the communication in the cell or outside the cell because the single cell can't reach properly to the receiver or sender. There is different kind of method that is used to remove the distant problem. Guard zone is created in the network to overcome the near far problem. Many users observed that near far can be overcome by two ways,

    i)   The MAC protocol
    ii)   The power control of the signal.

MAC protocol is used in different ways by different users. And power control is also done in many ways like open loop, close loop, by defining the Hybrid access point for all the users in the cell. The near-far problem will be solving by adjusting dynamic output power at the transmitter end. In cell breathing, the coverage and capacity of a CDMA cell are inversely related with each other. The increase of the number of active users in a cell causes the increase of the total interference sensed at the base station. Therefore, in congested cells, users need to transmit with higher power to maintain a certain signal-to-interference ratio at the receiving base station. As the users in a congested cell augment their transmission power, they also raise their interference to the neighboring cells since all cells use the same frequency in CDMA networks. As a result, the overall network capacity may decrease.

Furthermore, since the maximal transmission power of the users is bounded, the users who are far from the base station may experience poor services. To overcome these problems, the cell breathing approach was proposed. In essence, they reduce the size of congested cells. We address the problem of regulating the bandwidth among the Access Points (AP) and minimizing the load of the congested APs. Let us call the AP with the maximal load as congested AP and its load as congestion load.

We designed two concepts based on polynomial time and throughput algorithms that find optimal solutions, first gets the complete knowledge model and the next gets the limited knowledge model. These results are intriguing, because similar load balancing problems are known to be strong NP-hard. It is particularly interesting that a polynomial time optimal algorithm exists for the limited knowledge model. Here, the AP load is defined as an ordered pair of the aggregated load contributions of its associated users and a unique AP priority. This work will organize the range of

bandwidth between APs so that the network connectivity among the cell breathing networks will be improved. Also the proposed methods results that the performance of the networks will be very much effective when compared to the existing methods and algorithms. The main factor we are focusing here is Bandwidth i.e data transfer rate. Bandwidth is the range In this way the bandwidth is shared properly with less problems. With cell breathing technique the boundary shrinks in case of large number of users and the boundary of nearby access point enlarge but there still exist a problem for example if within the same compressed area the number of users get increased, as it can only shrink boundary but cannot stop users to enter in that shrink area so this leads a problem of congestion. There are several workstations which entered into the same shrink boundary which leads of frequencies used for transmitting a signal. In this approach, we have different access points in which, many users were trying to access network. The performance of the network is enhanced by providing bandwidth limitation on each and every user so that it may not access more than the specified bandwidth, in this way large number of users can participate in the network, there will be no interference of other users, and the data transfer will be accurate and there will be very less chance of congestion in the network. The user with the more bandwidth requirement will not be allowed to get access over it, in case if the access point is having no more bandwidth to distribute to congestion, so to avoid this problem of congestion we have set bandwidth limitation to users. Our work will normalize that no user can access data more than the specified limit for a particular access point and provide large bandwidth wherever needed. In this proposed method, different users will get an efficient access over the network.

METHODS
MAC Protocol
Ad hoc network most required to give the high throughput at low power consuming. The MAC protocol compete with distributed coordination function (DCF) mode of the IEEE 802.11 standards. MAC protocol achieve at target .In 802.11 only one transmission can take place at one time. Code reuses are done in the large network but all the neighbors are used the different code in CDMA. This protocol area can be used as receiver based approach which has its own disadvantage uncast of massages that are received in broadcasting. Primary collisions are also in transmission. Protocol is used transmitter based collision are not possible. In that case the receiver side is very complex and expensive.
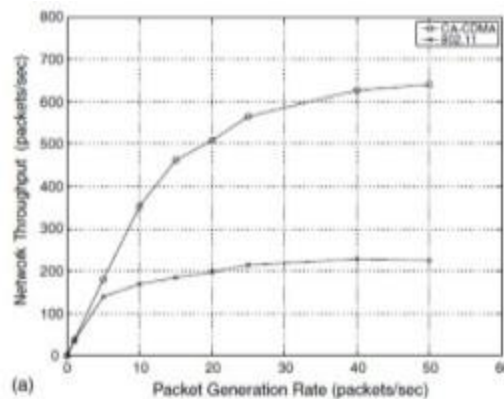

Figure.2. Packet generation in 802.11 and CA-CDMA

In the 802.11 the throughput of the network are less than the CA-CDMA. But the energy required to generate the packet is required much more high in 802.11 than the CA-CDMA.
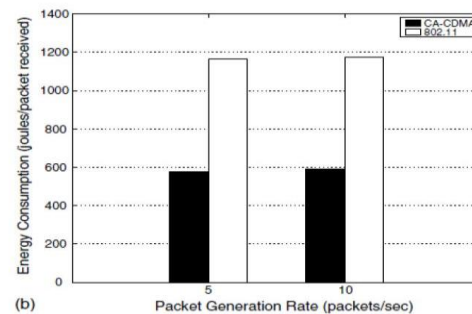

Figure.3. Graph of power versus packet generation

RAT Algorithm
RAT uses both rate and throughput parameters to calculate the metric that is used to decide the best AP for a station to associate with. The formula used by RAT to calculate the metric is

$$g(i) = \alpha T(i) + \beta r(i) \qquad\qquad (1)$$

where α and β are non-negative constants. T(i) is the throughput received by the particular STA from the AP i and r(i) is the rate at which the particular STA is associated with AP i. For each available AP, the station computes g(i) and associates with that AP for which g(i) is the highest. The throughput T(i) is given as

$$T(i) = \frac{1}{\frac{N_{i1}}{r_1} + \frac{N_{i2}}{r_2} + \cdots + \frac{N_{iL}}{r_L}} \qquad\qquad (2)$$

where N_{i1} is the number of stations associated with AP i at a rate r_1, and similarly for N_{i2},..., N_{iL} and L denotes the number of possible physical rates. For the default SNR based policy, the values are α=0 and β=1. For the selfish policy, the values are α=1 and β=0. In our implementation of the RAT algorithm we have considered α=1 and β=0.2

Power Control
Capacity limitation of the analog cellule stared in the 1987.when the power are no control two problem are mainly facing that are signal to noise ration and bit error rate after power control both are decrease. There are two main objective of power control one is to send the signal to all users with same capacity and second one is the receiver signal strength is not depended not the fading and shadow effect of the transmitted signal . Power control can be done with help of the open loop power control and closed loop power control. Power in open loop is adjust at the transmission end because they are not any feedback are required. After signal sending it response very quick and in analog nature of signal it dynamic range is 80db.The receiver and sender both are in depend with each other in power control.
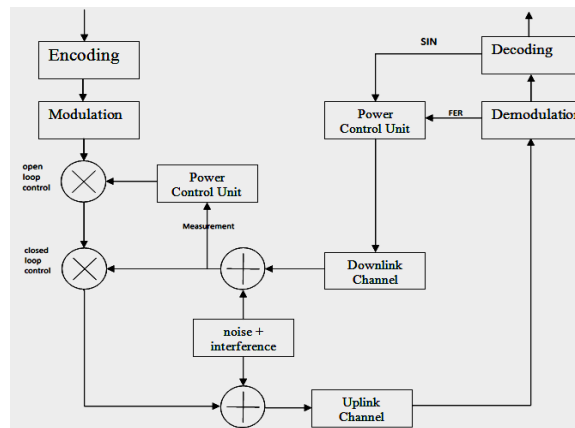

Figure.4.Open and Close Loop

Close loop power control feedback must require. It is sort of fine tuning on the open loop. Close loop work with fast fading. Reverse link power control is using the same power for the entire mobile or to reduce the interaction between the channels and achieve the high performance at low power consuming. CLPC can be compute with the help of open loop or close loop.

Forward link power control is used to control the interface outside the cell. It minimized the power consuming for better performance. It finds the frame error rate.

Associate Link Estimation
When extra White Gaussian Noise are added in the signal the performance are measure on the bases of the Mean Square Error (MSE) and Symbol Error Rate (SER). Channel Estimation based on the time domain and in slow fading the general models are used. These can be done with the help of the two methods. LS (Least Square estimator) and MMSE (Minimum Mean Square Error estimator).These methods are working in the asynchronous DS-CDMA.

Michael Meyer takes the risk and compares the various result of the simulation for channel estimation. There are some problem facing in the channel estimation due to the high and low frequency level of the different users. Moving average (MA) FIR filter is the Channel Estimation Filter (CEF) used for the channel estimation. LS are very simple because it done not required correlation function calculation and matrix inversion. But MMSE required the both for calculation that by it complex.

Cell Breathing
In a single cell, there will be a single access point which provides the frequency to the entire users in a cell. The same thing applies on the other cell but there are near distant problem in the communication. When the frequency of the different cells are overlap to each other that are create the problem of interfacing between cells. We define the frequency range of the cells.
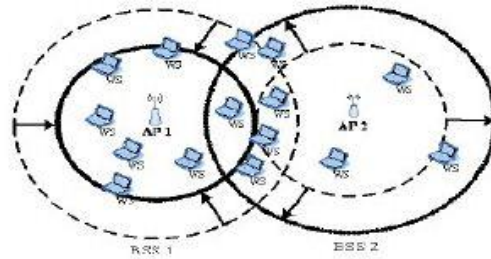

Figure.5. Cell Breathing Technique

According to the need of the user the cell is shrank and spread. The solid boundary of the AP1 show the shrinking of the cell and in AP2 it shoes the spreading of the cell. But it doesn't solve the near far problem properly. How many no of users in the cell it don't depend on the breathing of the cell. In the small cell large no of user are available and in a large cell some no of user are available. So those create the problem.
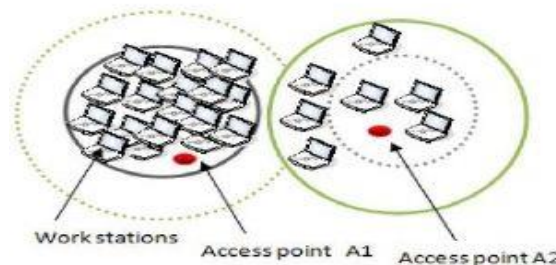

Figure.6. Present of the user in the shrink area of cell

Large no of users are available in the small area and in large area small no of user area available. It means high no user are sharing the small frequency and small no of user are sharing the high frequency. So there are no of problem that are high packet loss rate, low throughput, broadcast delay for packets, increased retransmissions, increased conflict loss. To overcome these problem we must required the frequency reuse and frequency sharing. And the frequency adjustment can be done properly and in effective manners.

IMPLEMENTATION
Call admission control is a mechanism by which the network decides whether the new call request or any handoff call request to be admitted or not. Call admission control algorithm not only provide connection to the new user or existing user but also determines the limit of accommodating the number of calls. There are many parameters which determine the effectiveness of any call admission control algorithms. Any call admission control algorithm is developed keeping in mind that it should results in the effective use of network resources and should satisfy the various quality of service requirement.

The RAT algorithm has been implemented in AD-WISER. The software architecture of the implementation is shown in Figure.1 The newly associated STA will send the scanned results containing the list of APs and the corresponding signal strengths to ADWISER. One scheme is more efficient than other scheme if its network resource utilization is higher than that of other scheme for the same QOS parameters and network configuration. So efficiency refers to the achieved utilization level of network capacity given a specific set of QOS requirements. Based on this information, ADWISER selects the AP with the highest metric as computed in Eq. (1) and is communicated to the STA for re-association
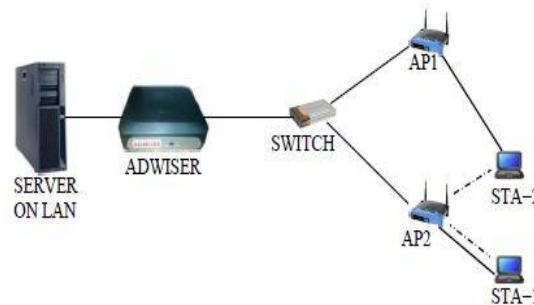

Figure.7. Demo Setup

CONCLUSION AND FUTURE ENHANCEMENTS

This paper presents a cell breathing technique with additional bandwidth limitation concept in cellular WLAN that performs load balancing with the aim to find an optimal solution for congestion control, limited connectivity and delay. The problems such as Low throughput, high packet loss rate, transmission delay for packets, increased retransmissions, and increased collisions loss, for wireless LAN is improved. This can be done by regulating the bandwidth of the APs respectively. Effect of power transmitted by mobile station in cell breathing networks on call admission control taking these three methods is studied at frequency of 900 MHz, 1900 MHz and 2000 MHz the measure of performance is how much no. of call is accepted by call admission control algorithm at some specific frequencies. The call admission control method used here is based on the concept of cell breathing in wideband code division multiple access (W-CDMA) system.

We have highlighted concerns and opportunities for performance enhancement with bandwidth limitation used in WLAN. Future work will aim to perform more on cell breathing technique with another factors or parameter considerations according to the user requirements which can enhance network performance.

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