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Handoff Through AP Selection Methodology

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***Abstract* – IEEE 802.11 wireless networks are widely used. It provides more user friendly features on this. Also as the utility of wireless technology grows, wireless networks are being deployed in more widely varying conditions. In WLAN, the process of access point selection at each BS is a critical problem in order to obtain satisfactory throughputs. The data load of WLANs is often unevenly distributed among the access points (APs), which results in unfair bandwidth allocation among Mobile Users. This paper, mainly deals about the deployment of networks, and it is done by bandwidth mapping, handoff and/or handover methods. Selecting the network is initiated by selecting the access points based on many schemes like automatic AP selection, selective scanning algorithm, Graph cut algorithm etc. Also the AP selection had happened based on received signal strength, bandwidth, differentiate probe response. The APs are always decentralized controls and they never freely accept the mobile users, it may have restrictions. Some of the APs restrict foreign users in various ways. The ancient methods adopted AP selection by scanning rich AP information, and handoff from one base station to other base station. However, providing the illusion of continuous connectivity requires selecting the right moment to handoff and the right base station to transfer to. Unfortunately, 802.11-based networks only attempt a handoff when a client's service degrades to a point where connectivity is threatened. In this paper we introduces a new approach ASSAAP [Advanced Scanning Selection of Appropriate AP in wireless networks] which over comes all the problems and select the appropriate AP at right time without wasting the time and cost.**

***Keywords* – *AP* Selection, Handoff, Handover, Selective Scanning, Base Stations, ASSAAP, Bandwidth, Probe Response.**

I. Introduction

IEEE 802.11-based wireless networks, also called Wi-Fi commercially, have seen spectacular growth in recent years [8]. As 802.11 networks go large-scale and even city wide, a lot of challenges occur. One of them is service continuity in clients roaming. So far the handoff process in 802.11 networks incurs a large delay at the magnitude of several hundreds of milliseconds, which is intolerable to delay-sensitive applications like VoIP. Data Congestion is one of the main disadvantageous to the performance of large wireless networks, as it leads to missed transmission opportunities and unproductive medium utilization [10]. More importantly, increased loss may incorrectly lead clients to initiate a handoff in search of a better AP in their vicinity. As congestion increases, the rate of handoff increases, even in the absence of mobility. We show that the majority of these handoffs are unnecessary and are actually unfavorable, leading to lower client throughput.

Over all handoff procedure in the previous systems make PREQ, PRES methodology and find the nearby nodes and Base stations or the APs in the network. For Each probe request, it need probe response and then proceed. Also whenever the request and response occur it should be analyzed whether it is authorized req/res or not. The Request and the Response should be analyzed and it should be synchronized. The Time is analyzed with the formula:

Scan Delay = Num Channels - Max Beacon Interval

To reduce the delay time the transaction is effective with the Probe delay, Contention slot allocation time, Channel time with minimum value and the maximum value. Also most of the scenarios follow certain conditions given in the table.

PHASE		TIME
Scanning	=	350-500ms
Authentication	<	10ms
Association	<	10ms
Wired update	<	20ms

Background and Related Work:

The handoff in IEEE 802.11 networks takes fifties of milliseconds, with almost 75% of this delay due to the search for other APs. This is called probe delay. Voice-over-IP (VoIP) does not acceptable for probe delay. The AP selection method in the earlier system was using the Selective Scanning Method, have been recently developed to reduce the probe phase latency by scanning only legible channels. Those channels are selected from the Neighbors Graph (NG) provided by RADIUS (Remote Authentication Dial In User Service) server [17]. The NG graph defines relationships between access points. An access point AP_i has a handoff relationship with an AP_k if and only if a station can handoff from AP_i to AP_k. The NG graph captures two pieces of information: the set of channels on which neighbor APs are operating, and the set of neighbor APs on each of the channels. Using the above information, the MS can avoid probing unnecessary channels and spending time waiting for responses from non-existing APs. Other contributions proposed a fast and seamless handoff solution for IEEE 802.11 WLANs using Inter Access-Point Protocol (IAPP) [16][18]. In all these methods, selective scanning allows the MS to attempt only potential handoff targets, thus probe delay is extremely reduced for time-bounded multimedia applications. However, the problem of AP overloading persists, since the choice of the next AP among Neighbor APs (NAPs) is based only on RSSI measurement parameter during the scan/probe phase.

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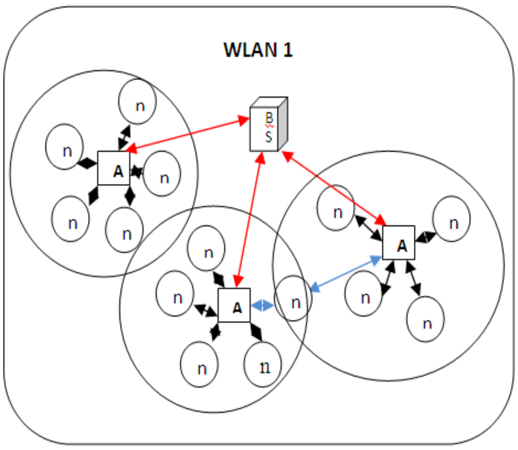
II. Problem Statement

In case of switch over form one network to another network, the bandwidth mapping is done by agreeing one network with another network for changing the frequency or the bandwidth of the current network to the next network which node is going to transfer. For this scenario the handoff should be done after finding the AP, where it will be continuously tracking the nearby base station or the AP of the next network. It was scanning all the nodes and checking it as base station or AP. It was not time consuming one and also it wastes the energy of the node. But we need to save the energy and the time due to find the AP fast and communicate with the next network nodes. In this case we rectify all the problems in the existing approaches and apply the proposed approach. The handoff is happening on top of the AP selection. Where the AP selection should be effective, cost and time consuming one and the selected AP is the relevant, nearest, RSSI based and it should transfer the bandwidth mapped data without any loss of data between networks. The ASSAAP approach take care of scanning and selecting the AP which is very nearest to the MU, registered in the network, information known by the authorized MU, channel, BS. Since the network is assumed as beacon network, all the MU, MN, AP, BS should knows their locations and ID by themselves and share their info to the others in the network also. While a MU need an AP, it will collect the info about the AP's and select the best one which very near and the signal quality is good. Using the info table from the BS it sends a request to the BS for AP and collects the AP information. From that the MU select an AP by using the ASSAAP methodology. In this approach the delay time very less because the request will be send only to the BS. Also all are beacons in the network; the information about everyone is shared between all. The performance is best one in the WLAN for AP selection. The APs in every region is known by the BS, MU of the WLAN. Whenever a new MU is getting registered the complete info about everyone in the network is stored in the info table. It is also considered success rate, loss rate of the data transfer. The complete functionality of this paper is given below in detail.

Fig1: OVERALL SCENARIO



ASSAAP Method in WLAN

A complete Handoff procedure for a mobile node needs a basic thing of AP selection, AP switch, call admission control, IP address reallocation and network re-configuration. But an important requirement for handoff procedure is AP-selection. This paper deals with AP selection by ASSAAP algorithm.

Procedure ASSAAP ()

Let G be a graph = {n_1, n_2... n_n € N all nodes with E number of edges}

//Because of the network comes under 802.11 broadcasting. Each node is assumed as Beacon nodes.

If n_i be a new node in G the id, location of each nodes are registered in BS. Where R is register info = {r_1, r_2, r_n} information about the nodes while nodes handshaking nodes information shared by the entire node.

//Since AP is also a node, AP's information will be known by every node.

//Nodes is moving nodes.

//When a node moves from one network to the other network, the distance calculated with the centre Node of each network with all the nodes.

If (dist (node (x_i,y_i) – location of AP (x_c,y_c)) > dist1

//The nodes bandwidth will be mapped due to the bandwidth (node i) < bandwidth (node j) while bandwidth mapping is happening, the node get the other nodes info and select the AP.

Repeat
Scan the APS'
Loc (n_1) -> x_1,y_1
Loc (AP) -> x_2,y_2
dis(n_1,AP) -> sqrt($(x_2-x_1)^2 + (y_2-y_1)^2$)
Select AP from n1 where
dis (n1, AP) is smallest value
Signal strength (AP) -> Good
Security (AP) -> high
Quality (AP) -> High
Until node enter into the next network.

End procedure

III. Experiments And Results

We assume all the Nodes are Beacon nodes; it knows its location by itself. Whenever a new node come and goes out the not only the base station all the other nodes can get the information about the other nodes in the network. When the Nodes get the location of the other nodes, automatically we can calculate the distance using the following formula:

dis=sqrt(((neb2[l,2]-neb2[m,2])*(neb2[l,2]-neb2[m,2]))+((neb2[l,3]-neb2[m,3])*(neb2[l,3]-neb2[m,3])))

Where neb indicates the next beacon node. Also the information about the nodes will be arranged in an order for further precedence. It will be done by the following awk script for NS2 execution.

```
If (n[x, 3]>n[y, 3] && n[x, 1] ==n[y, 1])
{
        temp1=n[x, 3]
        n[x,3]=n[y,3]
```

```
                    n[y,3]=temp1

                    temp2=n[x, 2]
                    n[x,2]=n[y,2]
                    n[y,2]=temp
}
```

Using NS2, Tcl script we make the simulation for the handoff procedure. The following figures show the node placements in a network and transferring its call to the other nodes in the other network.

There are Three Figures given below, it has four windows which show the four networks and the square indicates the region of the network. Each network has its own BS, MS, RS, and MU. Each circle shows the MU and the square shows the region and the Number shows the BS. Now the transactions and the bandwidth mapping are given below.

Fig-1: Different Networks with Different regions.

Figure1 shows, the fundamental appearance of the networks and the regions, how the nodes, BS, are connected. Every node will communicate to the other nodes repeatedly by sending the PREQ, PRES for checking the AP. It will be done by the TCL code given below. All the Nodes inside the networks are communicating with the other nodes in the same region. It will be known by the distance calculated between the centre nodes with all other nodes in the same network.

```
While {$flg } {
    set chk 1;
    set val [expr int(rand()*[expr $Nn-6])] ;
}
```

The above script is checking randomly all the nodes and check that node is within the region or not and it is an AP or BS of the network. Also the energy Model and the internal power and external power values are assigned to the nodes.

```
If {$chk==1} {set dyn($i) $val ; set flg 0 }
-rxPower 1.0 \
-txPower 1.5 \
-sleepPower 0.000015 \
 -initialEnergy 200 \
-energyModel EnergyModel
```

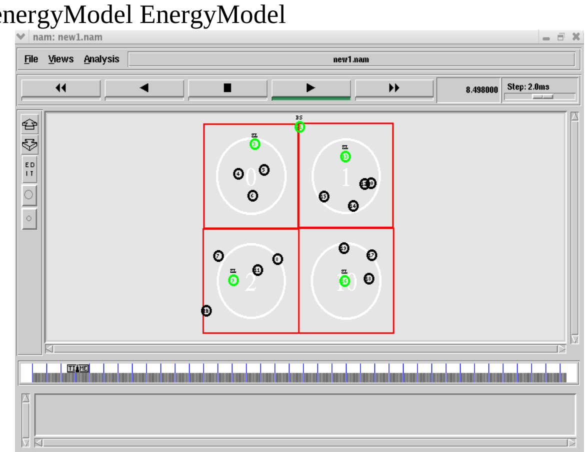


Fig.1. Within the Network Nodes Communication

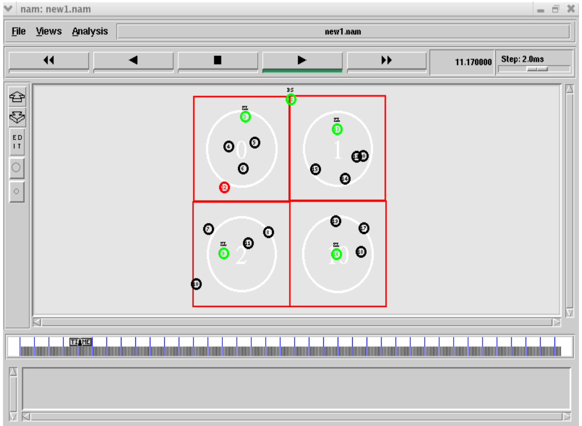


Fig .2. Nodes moving from one Network to the other network.

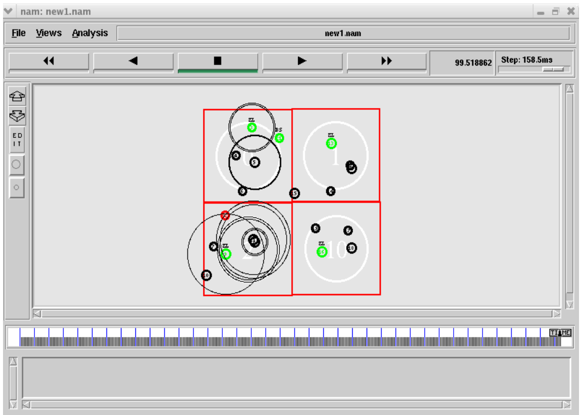
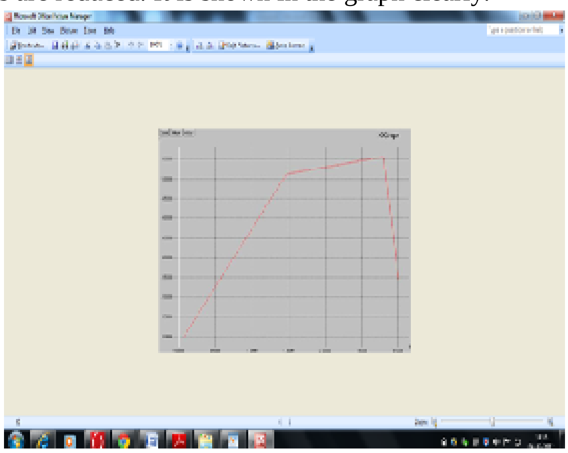


Fig.3. Nodes communicating with other networks

The Figure3 shows the nodes communicating from one network to the other network. The distance and the location can be finding in the file Distance.Cal, it is generated by the TCL script automatically. The number of AP catching between 4 networks is shown in the following Graph-I.

The graph shows the number of APs and the number of Nodes in the total number of Networks. From the initial stage the number of AP will be increased due to finding in the networks. Once all the scanning is over the number of APs are reduced. It is shown in the graph clearly.



Graph-I: Data Success Rate

Table 1: Number of Nodes and Number of AP Scanning's.

Number of Nodes	AP-Existing	AP-Proposed
10	0	2
20	1	2
30	1	2
40	2	4
50	2	4
60	2	4
70	3	4
80	3	4
90	3	7
100	4	7

From the above table and the graph, it is clear that the proposed approach ASSAAP is for better than the existing selective scanning approach and it do fast and check every node randomly and dynamically with the help of beacons.

IV. Conclusion

In this paper we have proposed using implicit time saving method to reduce the key cost of discovering new wireless access points. By getting the APs in an appropriate manner by directly getting the information about the nodes, from this announcement of beacon packets, a client can arrange to listen to other nodes with very low overhead. As a result, handoff using this ASSAAP approach is an order of scale earlier than using the conventional approach.

Even though we are using advanced methodology for finding the AP, it is also collecting the information for fast scanning only; it is bit better for scanning selection method. In the Earlier method the information about the nodes are not known by the other nodes. In this proposed method the information about the nodes are known by all the other nodes and it is also takes time to check and compare. But in the Future Enhancement, the cost, and the time should effectively reduced by applying centralized AP information Gathering and information passing method.

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