Global Journals LaTeX JournalKaleidoscope™

Artificial Intelligence formulated this projection for compatibility purposes from the original article published at Global Journals. However, this technology is currently in beta. *Therefore, kindly ignore odd layouts, missed formulae, text, tables, or figures.*

Improving IEEE 802.11 Wlan Handoff Latency by Access Pointbased Modification

Nidhi Sanghavi[1] and Rajesh S. Bansode[2]

[1] Mumbai University

Received: 6 February 2015 Accepted: 28 February 2015 Published: 15 March 2015

Abstract

IEEE 802.11 WLAN provides multimedia services like live telecast, video streaming, video conferencing, Voice over IP (VoIP) to its users. For deployment of these fast real time services, it needs stringent Quality of service (QoS) requirement such as delay time less than 150ms for VoIP, and packet loss rate of 1

Index terms— IEEE 802.11 wlan, handoff latency, delay, access point, mish, seamless handoff, ns2.

1 Introduction

he IEEE 802.11 WLAN is widely used for its simple deployment and low cost. There are two operating modes in this network namely, ad-hoc and infrastructure mode. In ad-hoc mode, two or more mobile stations (STA) establish and interact via peer-topeer communication whereas in infrastructure mode, there is a fixed entity called Access Point (AP). The AP bridges data between the mobile stations (STA) associated to it. The Mobile stations and the associated AP together form a Basic Service set (BSS), also collection of APs extends BSS into Extended Service Set (ESS).

Within IEEE 802.11 wireless Local Area Networks (WLANs), a handoff occurs when a mobile station (STA) moves beyond the radio range of associated AP, and enters another BSS at the MAC layer. Mobile station moves its association from one Access Point to another. Thus, when mobile station changes its APs, it starts a process called as handoff. Now, during this handoff process, the client station is unable to send or receive any data packets. This is called as handoff latency which can exceed the duration of 200 milliseconds. For applications like VoIP, it is required that a delay of less than 150 milliseconds and packet loss less than 3% should persist [1]. Thus there is a need to provide fast handoff solutions to support VoIP services and other multimedia traffic without disruptions to mobile users .

This paper is organized as follows: in Section II, overview of the basic handoff process and related work done is described. In Section III, there is briefing of methodology used. In Section IV, simulation set-up and results are discussed. Finally, paper is concluded in the section V.

2 II.

3 Background & Related Work a) Basic Handoff Procedure

The basic handoff procedure is explained in the Fig 1, where a station is connecting to an access point. The probe request, probe response, authentication and re-association messages are communicated between the station and Access Point (AP).

Station AP A handoff occurs when a mobile station moves beyond the radio range of one AP, and enters another BSS at the MAC layer. In this process, there are three entities participating namely moving station, a prior-AP, a posterior-AP [2]. The AP to which station has connectivity prior to handoff process is prior-AP and the new AP to which it associates after handoff process is Phase 1: Discovery process can be active or passive scanning of the neighboring APs which the mobile station can be associated with. Active scanning mobile station sends probe request to APs and waits for probe responses, whereas passive scanning includes waiting for beacon messages sent periodically by AP. Phase 2: Re-Authentication process, it entails Authentication and Re-association to new AP. There authentication involves transfer of credentials from old-AP to new-AP. Thus, handoff latency is blend of Scandelay during Discovery phase, and Authentication delay and re-association delay during Re-authentication phase.

4 b) Related work

The related work is broken into two distinct categories: 1. Modifications inculcated on stations (mobile-nodes) configuration to improve handoff latency. 2. AP-based modification to reduce handoff interruption and duration time and thus improve handoff latency.

To reduce handoff latency many approaches such as, [4]- [6] have been proposed which involve modifications at mobile node. In [4], the author has introduced a concept called as neighbor graph (NG). With help of NG, mobile node has to scan only the current AP's neighbor. In this algorithm, cache size is to be considered while storing the NG on it. Reference [5], a new approach called Synscan is proposed, where clients passively scan all the channels by switching its current channel. There is time synchronization for beacon messages, thus it eliminates the need of AP discovery in handoff procedure. In paper [6], author has used two radios in mobile node, where one radio scans all APs and other keeps communicating with current AP.

Other category, where algorithms propose modification at AP -side are described in references [7]- [9]. In the paper [7] by authors F.Rousseau and Y.Grunenberger proposes the concept of virtual access points to manage mobile station in infrastructure networks. In this scheme, stations are not aware that they move, and all the complexity is pushed back inside the network. It is then possible to control mobility from a global point of view, to optimize network resources for mobile stations, hence providing a better quality of composed of two phases : 1.Channel selection phase 2. AP search phase in order to accelerate AP-finding process. In this paper, two algorithms are developed to improve scanning latency i:e near best-fit and first-fit algorithm. Near best-fit algorithm helps the scanning station to find AP providing the highest data rate among neighboring APs. First-fit algorithm enables scanning station stop its scanning when it discovers an AP that satisfies its requirements.

In this paper [9], a novel scanning scheme for IEEE 802.11 by equipping Access Points (APs) with multiple Wireless Network Interface Cards (Multi-WNICs) is proposed, where one is set to operate in an exclusively reserved channel for the scanning purpose. In this environment, a Station (STA) can easily search neighboring APs by scanning the reserved channel. In this paper [8], the authors S.Jin, M.Choi, S.Choi and L.Wang define a scanning scheme service.

Step 8 : Station sends TPC-Response Frame to Channel 6(Associated APy), now this TPC-Response Frame is also received by APx and APz because their 1WNIC is listening on channel 6.

5 Step 9 & 10 : By receiving TCP-Response Frame from Station, neighboring APs i:e APx & APz measures RSS of packet received from the Station

Step 11 & 12 : Neighboring APs i:e APx and APy send a MEASURE-Report Frame to associated AP (APy)

Step 13 : After receiving Measure-Report Frame from neighboring APs, Associated AP chooses the best next AP (according to the value of RSS) ASSUME APy CHOSE APx

Step 14 : Old AP(APy) sends a STA-Assign Frame to new chosen AP(APx)

Step 15 : New chosen AP (APx) sends STA-assign Response Frame to old AP (APy)

Step 16 : Finally. Old AP(APy) sends a ACTION-frame to the station IV.

6 Simulation Set-up & Results

A simulation model using ns2 has been developed to evaluate the methodology mentioned in previous section.

The simulations were performed using Network Simulator 2 (NS-2.34). The traffic sources are Constant Bit Rate (CBR). The source destination pairs are spread randomly over the network. The mobility model uses 'random waypoint model' in a rectangular field of 1000m x 1000m with 100 nodes.

The various simulation parameters and the values used are described in the table below The design of simulation includes Grid topology, there are 16 APs(Access Points) and 4 MN(Mobile Nodes) in the simulation area that has been considered.

7 Conclusion

The mobility management is an important factor IEEE 802.11 provides to the users. For seamless services like video conferencing, VoIP, there is stringent requirement of less than 150ms handoff delay. The legacy handoff protocol provides handoff delay for more than 200ms. Thus there is a need for Seamless handoff protocol that would provide continuous services without interruption to clients in IEEE 802.11 WLAN. Thus the MISH protocol have been successful in meeting this Qos requirements since handoff delay is 36.6024 ms. [1] [2]

1

Figure 1: Figure 1 :

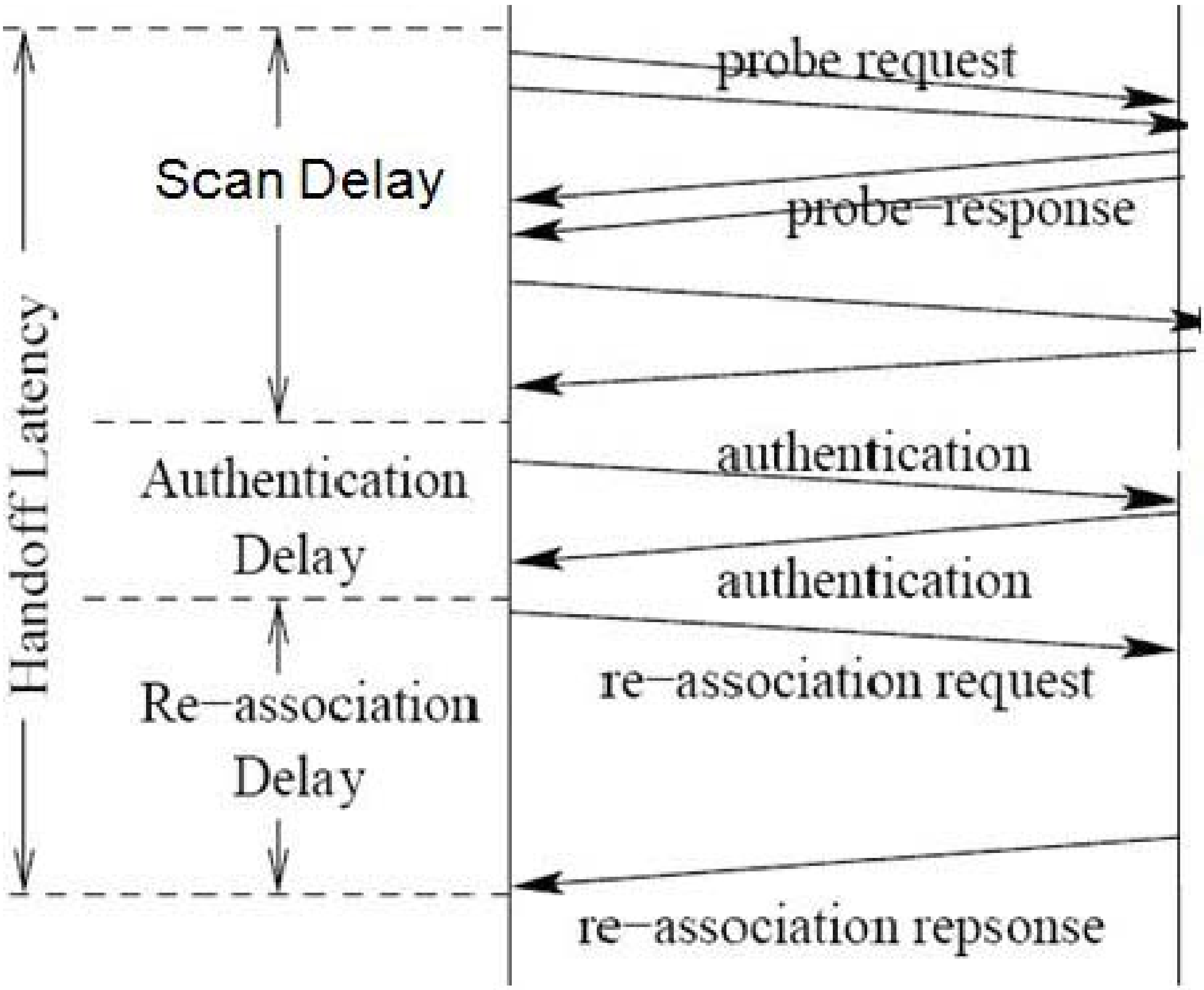
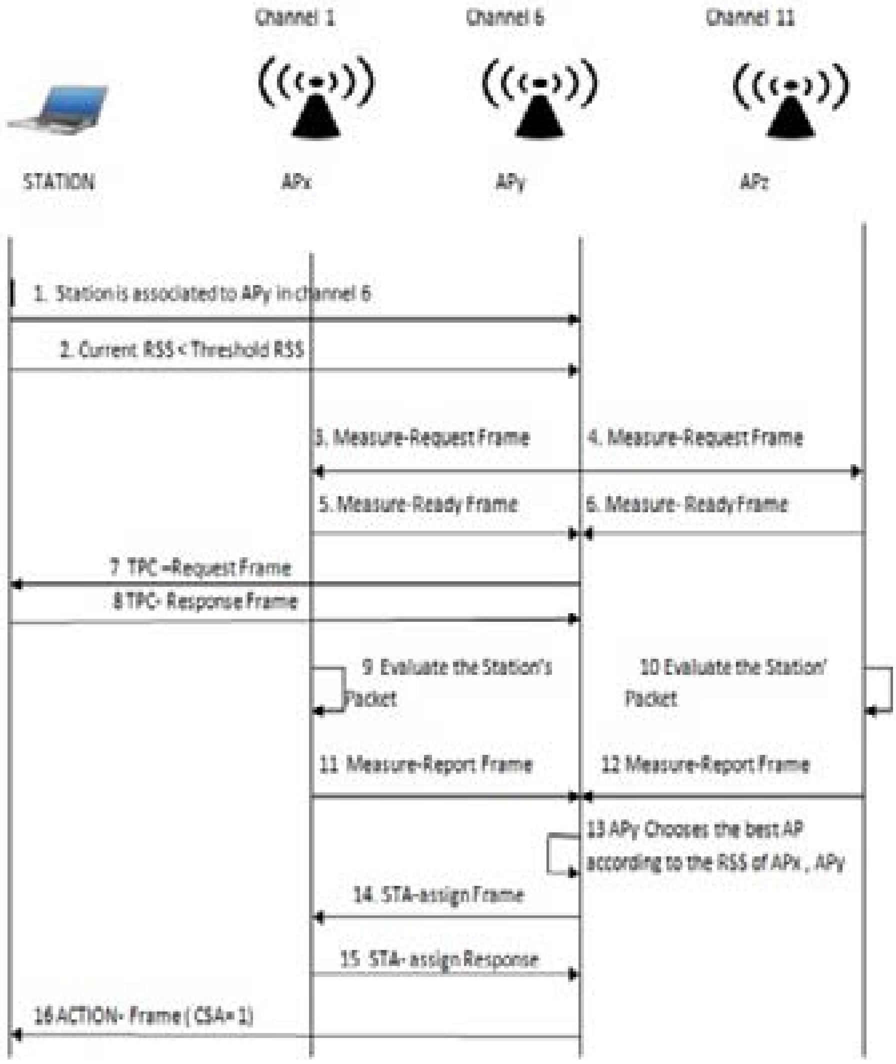

probe request
Scan Delay
probe−response
Handoff Latency
authentication
Authentication
Delay
authentication
re−association request
Re−association
Delay
re−association repsonse

Figure 2:



2

Figure 3: Figure 2 :

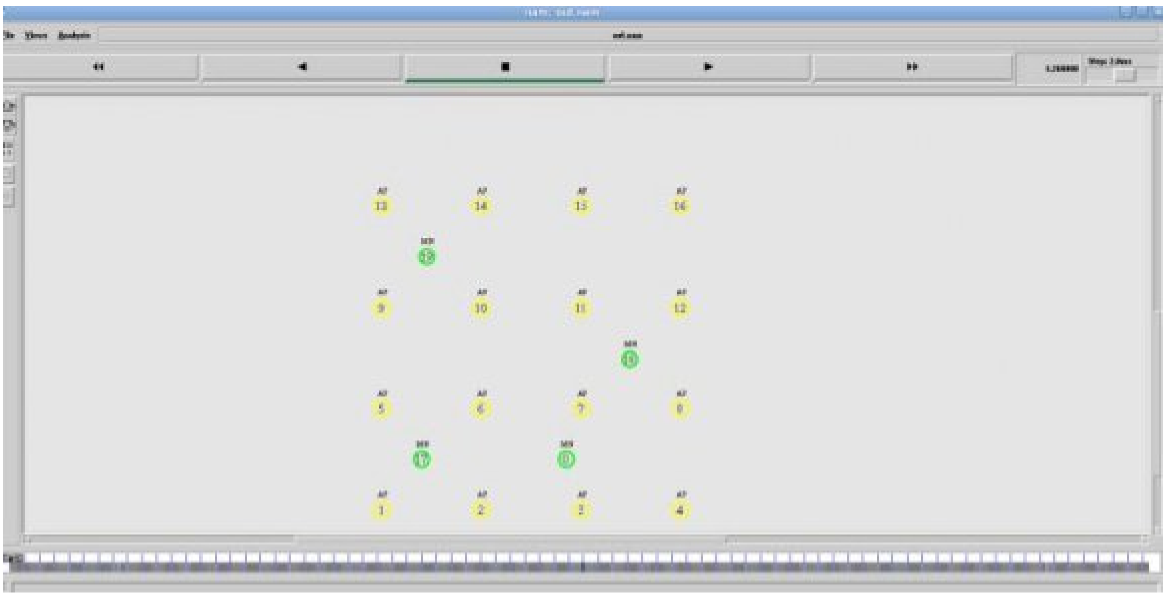


Figure 4:

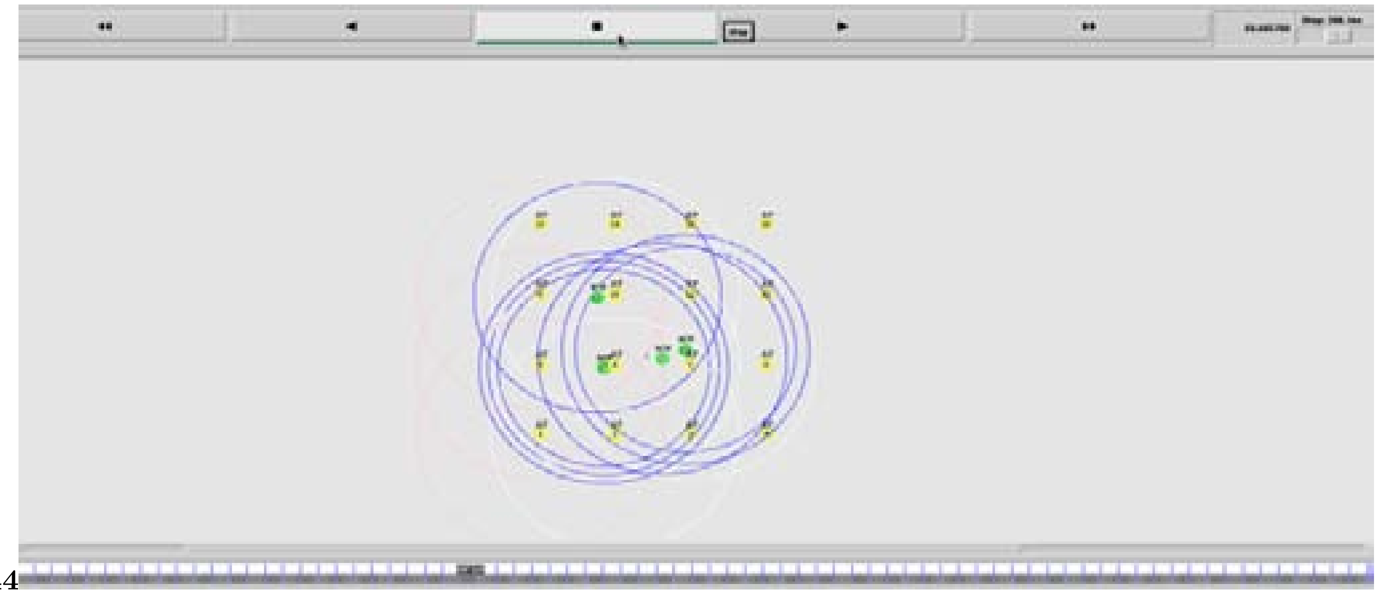
44 

Figure 5: Fig 4 Figure 4 :

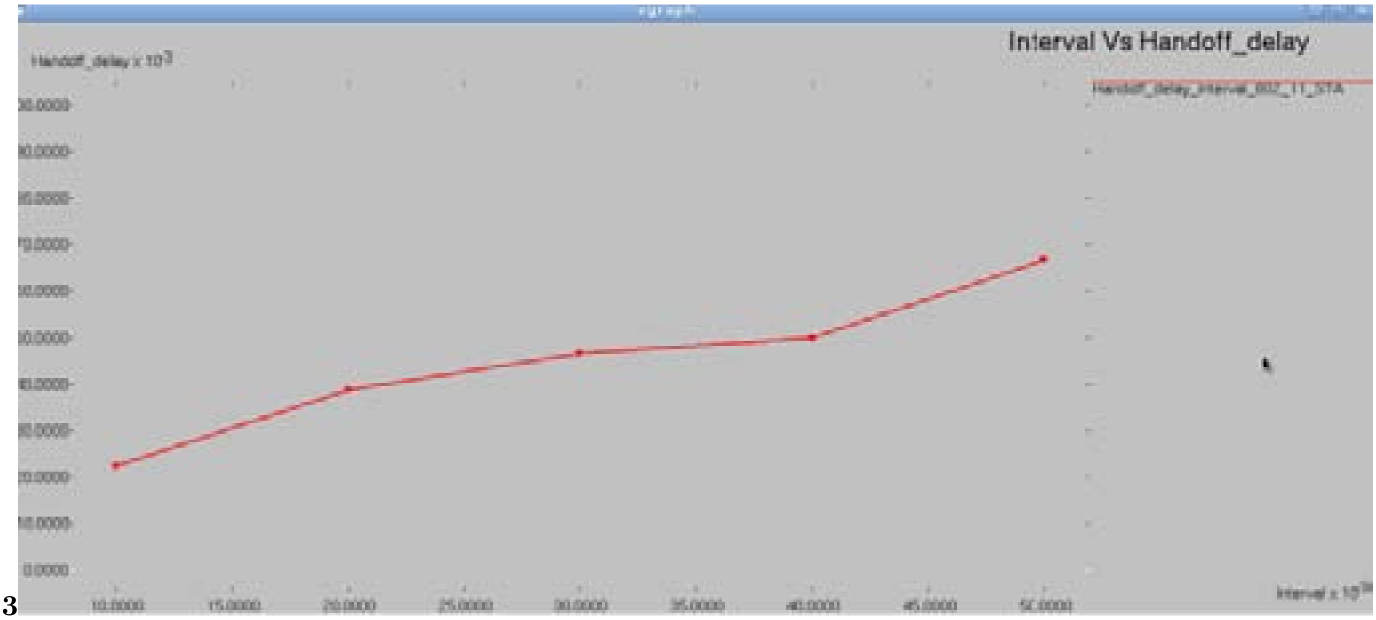
3 

Figure 6: Figure 3 :

5

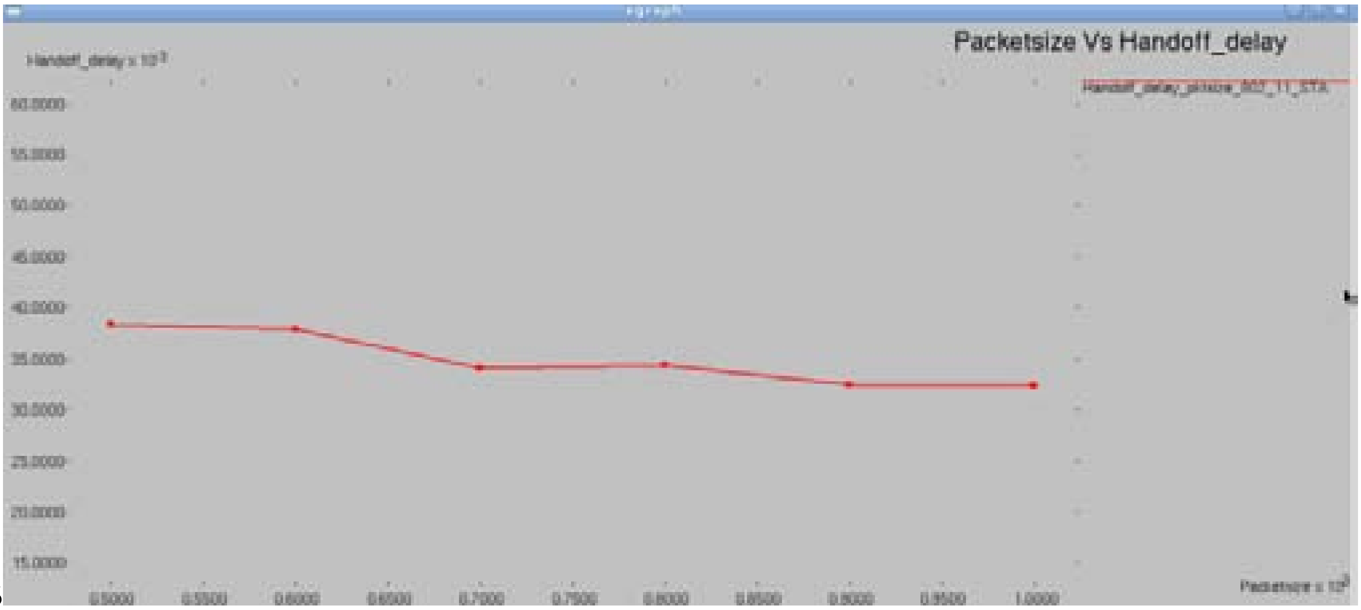


Figure 7: Figure 5 :

1

Simulator	NS2
Simulation area	1000*1000m
MAC Protocol	Modified 802.11(802_11_STA)
Packet size	512 bytes
Simulation Time	200 secs
Traffic Sources	Udp (CBR)
Interval(Pause between movements)	0.05
Radio range	250m
ChannelSwitchDelay	200ms
MaxChannelTime	40ms
MinChannelTime	20ms

Figure 8: Table 1 :

[Wlans (2009)] , Wlans . *IEEE Communication Letters* Oct. 2009. 13 (10) p. .

[Mishra et al. ()] 'An empirical analysis of the IEEE 802.11 MAC layer handoff process'. A Mishra , M Shin , W Arbaugh . *SIGCOMM Comput. Commun. Rev* 2003. 33 (2) p. .

[Mishra et al. (2005)] 'Eliminating handoff latencies in 802.11 WLANS using multiple radios: Applications, experience, and evaluation'. A Mishra , V Brik , S Banerjee . *ACM IMC*, Oct. 2005.

[Jin et al. (2011)] 'Fast scanning schemes for IEEE 802.11 WLANs in virtual AP environments'. S Jin , M Choi , L Wang , S Choi . *Computer Networks* July 2011. 55 p. .

[Zhai et al. (2005)] 'How well can the IEEE 802.11 wireless LAN support quality of service?'. Hongqiang Zhai , Xiang Chen , Yuguang Fang . *IEEE Trans. Wireless Communications* Dec. 2005. 4 p. .

[Pawar and Apte ()] 'Improving the IEEE 802.11 MAC Layer Handoff Latency to Support Multimedia Traffic'. Y Pawar , V Apte . *IEEE Conference on Wireless Communication and Networking Conference*, 2009. p. .

[Shin et al. ()] 'Improving the latency of 802.11 handoffs using neighbor graphs'. Minho Shin , Arunesh Mishra , William A Arbaugh . *Proc. MobiSys '04: Proceedings of the 2nd international conference on Mobile systems, applications, and services*, (MobiSys '04: eedings of the 2nd international conference on Mobile systems, applications, and servicesNew York) 2004. ACM. p. .

[Jin et al.] *Multiple WNIC-based handoff in*, S Jin , M Choi , S Choi . IEEE 802.11.

[Ramani and Savage ()] 'Syncscan: Practical fast handoff for 802.11 infrastructure networks'. S Ramani , I Savage . *INFOCOM 2005. 24 th Annual Joint conference of the IEEE computer & communication societies, Proc. IEEE 1*, 2005. 1 p. .

[Chan and Lin] *The Design of an AP-Based Handoff Scheme for*, Yi-Cheng Chan , Dai-Jiong Lin . IEEE 802.11.

[Grunenberger and Rousseau (2010)] 'Virtual access points for transparent mobility in wireless LANs'. Y Grunenberger , F Rousseau . *Proc. IEEE Wireless Communications and Networking Conference*, (IEEE Wireless Communications and Networking Conference) April 2010. p. .

[Wlans (2014)] Wlans . *J.e-Education, e-Business, e-Management and e-Learning*, Feb. 2014. 4.