International Journal of Recent Technology and Engineering (IJRTE)
ISSN: 2277-3878 (Online), Volume-8 Issue-2, July 2019

Reduce The Handoff Failure By Implementing Two WLAN In Handoff Region

Debabrata Sarddar, Noor Hassan, Pinaki Das, Rajat Pandit

***Abstract:** The problem of wireless communication is the handoff. That problem mainly shows in the urban area because limited number of Access Point (AP) and the Base Station (BS). Main problem occur when the Mobile Node (MN) are goes to out of the coverage area the MN need to make handoff because the current or old Base Station(BS) does not gives the supports. Effect of this problem is call disconnection or data loss. IEEE802.11 based wireless local area network (WLAN) are widely use to give the supports of personal or commercial basis. In the proposed work the WLAN are placed on the two adjacent cell and they are crossly connected to the BS. This WLAN are used as an AP and that AP are enhanced the signal strength of the region of handoff and increased the area of BS. This WLAN gives the services for the time of degradation until fond the new channel in the new BS or the inside of WLAN area. For this cause the failure of handoff are minimized.*

***Index Terms:** WLAN, IEEE 802.11, Handoff, Degradation Delay.*

I. INTRODUCTION

Now a days the various wireless technique like GSM, GPRS, UMTS, CDMA2000 or wireless area network (like IEEE 802.11a/b/g, HiperLAN) are used in the world. That is the basically in heterogeneous network and used various type of radio signal and communication protocol [1]. The real pattern is to coordinate integral remote advancements with covering inclusion to give the normal omnipresent inclusion and to accomplish the Always Best Connected (ABC) idea [2]. The IEEE 802.11b based WLAN device is the very cheap, popular and user friendly. But this device has same as the problem of coverage area [3].

WLAN: Two or more devices are connected with the help of WLAN and using of spread spectrum. The benefit of this interconnected WLAN is the mobility power of MN under the local signal coverage area [4]. Basically the WLAN are propagating the radio signal in certain area and boost up the signal strength for the better communication of the MN.

Revised Manuscript Received on 30 July 2019.

* Correspondence Author

Dr. Debabrata Sarddar*, Assistant Professor in Department of Computer Science and Engineering, University of Kalyani, Kalyani, West Bengal, India.

Mr. Noor Hassan, BCA Department of Computer Science and Engineering, West Bengal University of Technology, India.

Mr. Pinaki Das Ph.D. Department of Computer Science and Engineering, University of Kalyani. India.

Mr. Rajat Pandit, Assistant Professor Department of Computer Science, West Bengal State University, West Bengal, India.

The WLAN are the signal enhancer of the BS and the typical BS are connected with the wired Ethernet. Basically the clients or MNs are identified by the medium access control (MAC) and the MNs or clients are connected with AP by wireless. **Distribution of Channel:** In IEEE 802.11b and IEEE 802.11g are operate in the frequency 2.4 Ghz and use the 11 out of 14 channel because the same frequency channel [5].

The channel spacing is 5MHz and the bandwidth is 22MHz and 11MHZ under and upper of the channel. The width of the guard band is 1MHz. then the transmitter sends the frequency from 2.401GHz to 2.423 GHz and so on. The figure 1 shows the distribution.

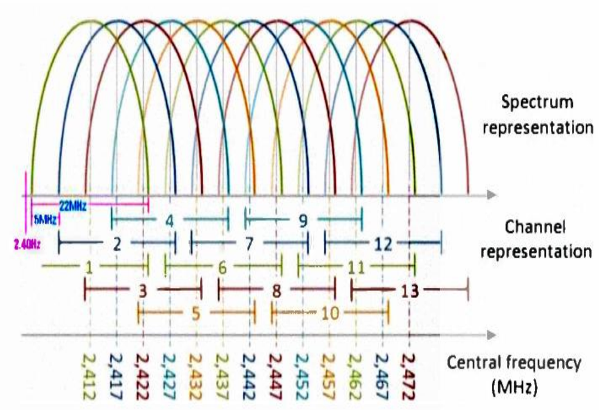

Figure 1: Distribution of Channel

Maximum AP are operate the channel no 1,6 and 11 because that channel are not overlapped.

A.Handoff and there types: The MN are moved from a BS and goes toward the new BS the MN find the Ping-Pong position and after that, MN try to make the new connection on the new BS using the handoff process. The time delay of this handoff is known as handoff latency. The handoff is basically two types.

1) **Hard Handoff:** The term is known “Break Before Make”, in hard handoff the connection between old BS and MN are break then MN find the new available channel or connection from new BS, if channel is free the new BS allocate this channel to the MN as drawback of this handoff is the large handoff delay time and loss of packet of data and if the delay time is very large then call can be dropped [6]. Hard handoff is shows in Figure2.

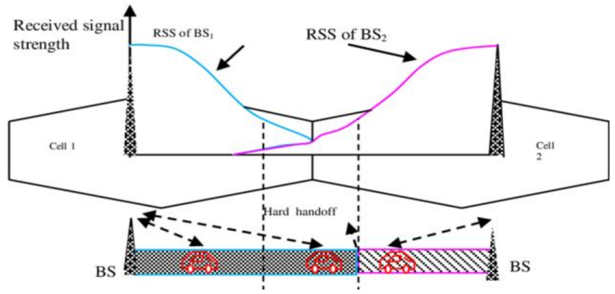

Figure 2: Hard Handoff

2) **Soft Handoff:** soft handoff is the "Make Before Break", in soft handoff the old BS and MS connection are continued. When a MN moves from old BS to new BS, the MNs are reached the Ping-Pong pint the MNs are requested to create new connection from new BS. If the new connection is created then the old connection is destroyed [7]. Soft handoff is shown is figure 3.

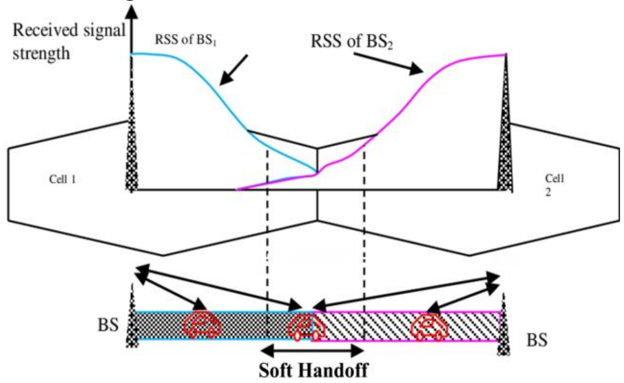

Figure 3: Soft Handoff

II. PROPOSED METHODOLOGY

A.BLOCK DIAGRAM

In this paper we proposed to minimize the handoff failure probability using of two WLAN in the handoff region. In very high population of MN area, the probabilities of handoff failure are increased. So in this method we introduced two WLAN with cellular network (CN) for partially reduce the failure of call connection.

The idle cellular cell area is circular but that shape is represented by the hexagon. The two cellular cells are overlapped in practically. Here every cell are used the same frequency being out of their covered region. Now consider the two cells which are adjacent. When a MNs are goes a particular threshold signal power of a cell the MN are initiated to make the handoff. Now we place two WLAN routers just before and after the point of threshold power level. If we consider the hexagon, implement the WLAN both side of the middle line as shown in the figure 4.

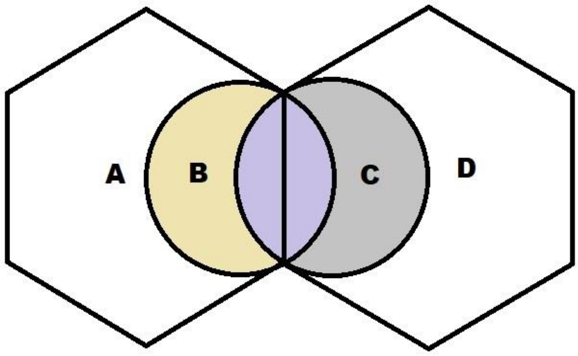

Figure 4: The position of WLAN in the handoff region

In the figure 'A' Denotes Old BS, 'B' denotes first WLAN, 'C' denotes the second WLAN, and 'D' denotes the New BS. Here 'B' is connected with the 'D' and 'C' connected with the 'A'.

B. Receiving signal strength (RSS) Measurement of Every WLAN: IEEE 802.11b WLAN provides the bit rate of 11Mbit/s and frequency channel 11 used out of 14.

The path loss of the WLAN (PL) is shown below

PL=$L + 10 * \gamma * log(d) + s$ (1)

L=Constant power loss

γ=Path loss exponent, the values lies between 2 to 4

d= Distance between WLAN AP and Mobile node.

S= Shadow fading

The Receiving Signal Strength (RSS) in dBm.

RSS_{WLAN}=PT-PL (2)

PT= Transmission of Power

IEEE 802.11 b receiving signal strength (RSS) and path loss from equation 2, the result is shown by the table 1.

Range	Receiving Signal Strength
50	-59.67
100	-68.70
150	-73.98
200	-77.73

Now we draw the two circles, whose radios are the signal strength of the WLAN AP and the WLAN are place in the centre of the circle as shown in figure 8. The MN are moves from BS(A) to BS(D), when MN are goes to new BS, the MN finds the available channel in new BS and that moment WLAN are gives the supports of signal strength for minimized the call failure.

C.Base station and WLAN Structure: In Figure 5 shows the structure of Cell and WLAN.

Where 'A' is the Old BTS
'B' is the WLAN
'C' is the another WLAN
'D' is the New BTS
'C1' is the junction point of 'C', 'B' and 'A'
'B1' is the junction point of 'B', 'C' and 'D'

Retrieval Number: B2002078219/19©BEIESP
DOI: 10.35940/ijrte.B2002.078219
Journal Website: www.ijrte.org

Published By:
Blue Eyes Intelligence Engineering
& Sciences Publication

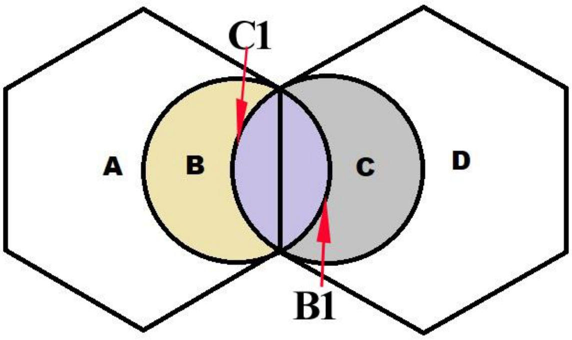

Figure 5: Proposed Cellular Structure Details.

D.Base Station and WLAN Connectivity: The old BTS (A) emits the signal with new modified channel [13] in his region and the BTS is connected with the 'C' WLAN which is appearing inside the new BTS (D). Also the BTS 'D' emits the signal in his region with new no of channel and connected with the 'B' WLAN which is appear inside the old BTS 'A' and connected with new BTS 'D'. in this structure Ping-Pong point are covered by the four signal one is signal of 'A', second is signal of 'B', third is signal of 'C' and forth is signal of 'D'.

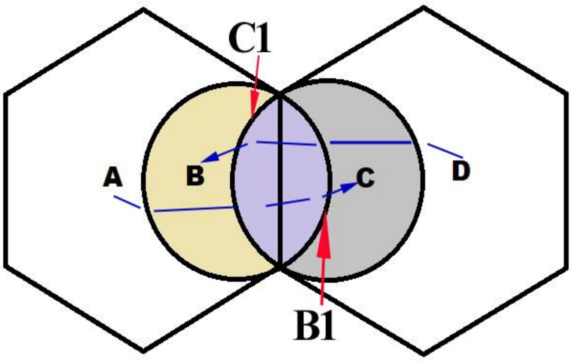

Figure 6: Cell Connectivity Structure.

E. Working Principal of WLAN and BS: The MN is moved from 'A' to 'D'. The MN when in 'A', the old BTS 'A' gives the service. The MN is moved toward the 'D', when cross the C1 point MN entered the 'C' WLAN coverage area. The 'C' also connected to the old BTS 'A'. Then the power level of 'A' is decreased and MN moved toward the Ping-Pong position and uses the channel of 'A' tower.

In that moment 'C' gives the service of signal which is equivalent of 'A'. MN cross the Ping-Pong point the MN send the request for channel from new BTS 'D' and scanned for the new channel. If the MN cross the B1 point signal of 'A' is completely removed but the agent of 'A' is WLAN 'C' gives the services and call does not break.

On other hand the MN check or searching for the new channel. In the time of degradation delay the WLAN 'C' gives full supports for no disconnection of call.

After the delay if channel is available then make the handoff, if the channel is not available then 'C' gives the service if the MN are belongs inside of 'C' then also searching the new channel repeatedly by MN.

F. Allocation the Channel of WLAN and new BS: When the MN is moved and goes toward the Ping-Pong position the WLAN 'B' or 'C' are gives the services if the signal strength are poor.

When MN are takes the services of 'B' or 'C' and cross the Ping-Pong point and send the request for the channel in new BS. Now we can create two channel pull one is central pull and another is foreigner pull.

When a MN moved from 'A' to 'D' then 'C' gives the complete channel supports for uninterrupted services. That moment the BS 'D' allocates the channel from foreigner channel pull. If the entire channel is already allocated then the WLAN 'C' gives the supports.

G. Advancement of proposed handoff: The proposed two WLAN methods are more efficient than the normal handoff. Because the MN directly connected to the BS or WLAN AP, when the MN finds threshold value of signal for handoff the WLAN provides the corresponding signal power level, for secure the call connection before established the new BS connection.

In normal handoff the scanning process is time taking for high congestion cell. If the degradation delay is very much higher than the time of move of MN in overlap signal area, the MN cross this area and entered in the new BTS then the old connection is failure. The result of this movement is handoff failure.

In proposed model the WLANs are gives the supports for minimized the handoff failure in free channel scanning time delay.

Handoff Delay=Authentication Delay+ Re-Association Delay

H. Using of WLAN reduce the traffic delay: In this handoff mechanism user are allow to use the free channel under the coverage of WLAN area. This method decreases the traffic density of handoff using WLAN AP.

Total Traffic (E)=λh

P_b is the blocking probability

m is the number of resource.

$P_b=B(E,m)=(E^m/m)/(\sum_{i=0}^{m}(E^i/i!))$

The average arrival rate (λ) are divided into λ_{CN} and λ_{WLAN}

$\lambda = \lambda_{CN} + \lambda_{WLAN}$

where $E_{CN} < E$

The blocking probability $< P_B$

I. Allocation the WLAN channel to the Mobile Node: We are design an algorithm that finds the MN, who wants the channel of WLAN. This filtration done by GPS technology.

Assume that the (X,Y) is the coordinate of Old BTS and the (X_m,Y_m) is the coordinate of MN. The radial distance (r) of MN from Old BTS is

r=$\sqrt{(X-\mathrm{Xm})^2+(Y-\mathrm{Ym})^2}$

We are defined R is the signal range of an antenna and diametric range of WLAN is D_{WLAN}. $\dot{r}$ is the changes of r respect of time. T is the time delay to make the connection with WLAN.

J. ALGORITHM

Step1: While connectivity of Base station is not changed.

Step2: if ($r < (R-D_{WLAN})$) then

The MN is not takes the handoff

Step3: Else

$\dot{r}=\frac{\Delta r}{\Delta t}$

Step3.1: if ($\dot{r}$*2T) < (R-r) then

MNs are no connected with WLAN and wait for next loop.

Step3.2: Else

MNs are check for connection with WLAN and connected with WLAN in order of ($\dot{r}$ * 2T) value.

[End of Step3 if statement]

[End of Step2 if statement]

[End of Step1 loop]

K. FLOW CHART

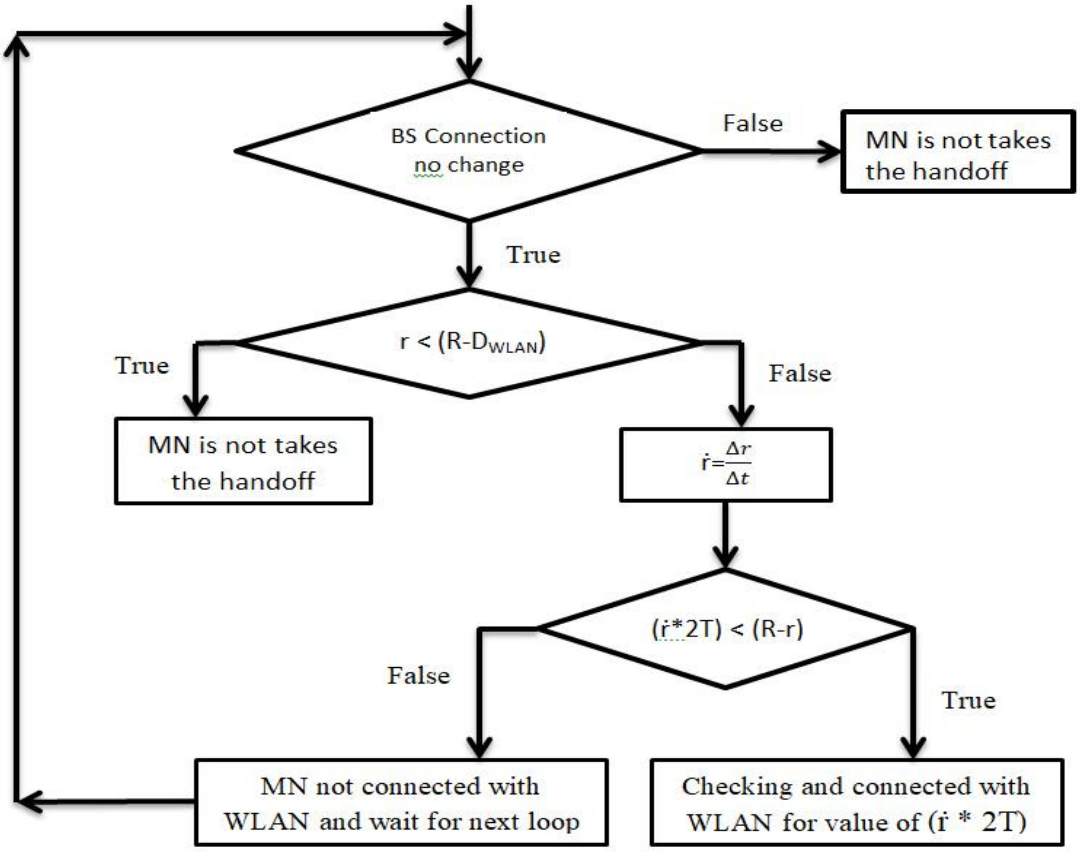

Figure 7: Flow chart for WLAN allocation system.

III. RESULT ANALYSIS

We are used this method and make the graph with the data, where handoff request probability and handoff failure probability are used. We find that when the number of channel are increased and degradation delay are fixed for minimum scanning time the curve are degraded and tense to zero with the increasing of the hand of request.

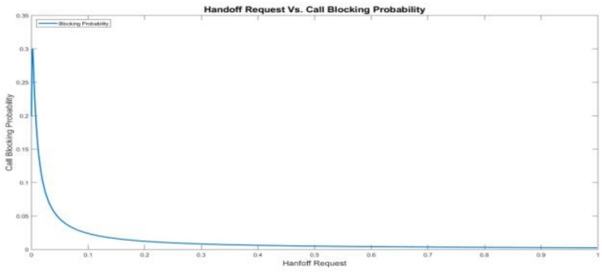

Figure 8: Handoff request vs. Handoff Failure Probability.

Handoff request are increased with the increased of channel number. So we can say if the number of channel are increased then the handoff failure probability are minimized.

Retrieval Number: B2002078219/19©BEIESP
DOI: 10.35940/ijrte.B2002.078219
Journal Website: www.ijrte.org

Published By:
Blue Eyes Intelligence Engineering & Sciences Publication

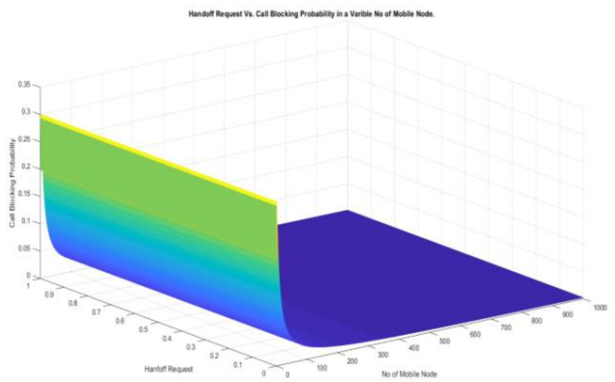

Figure 9: Handoff request vs. Handoff Failure Probability in maximum no of mobile node.

In above figure the maximum MN are make the maximum handoff request the two WLAN makes the maximum supports for the handoff and minimized the failure rate.

IV. CONCLUSION

We say that the number of channel are increased and give the supports for scanning the channel delay time the handoff failure probability are decreased. In our method the WLAN are increased the number of channel in the handoff region and give the maximum time for scanning the free channel in new BS then the probability of handoff failure are minimized.

FUTURE WORK

In future work we can reduce the handoff failure by increasing the no of channel or coverage areas.

REFERENCES

1. Akyildiz, I., Xie, J. and Mohanty, S.: "A Survey of Mobility Management in Next-Generation All-IP-Based Wireless Systems", IEEE Wireless Communications, vol.11, pp. 16-28, (2004).
2. Gustaffson, E. and Jonsson, A.:" Always Best Connected", IEEE Wireless Communications, vol. 10, pp. 49-55, (2003).
3. D. Sarddar et all, " Minimization of Handoff Latency by Angular Displacement Method Using GPS Based Map ", IJCSI International Journal of Computer Science Issues, Vol.7, Issue 3, No 7, May 2010.
4. http://en.wikipedia.org/wiki/Wireless_LAN_Wikipedia,free encyclopaedia.
5. Wei Yuan, Xiangyu Wang, Jean-Paul M. G. Linnartz, Ignas G. M. M. Niemegeers, "Coexistence Performance of IEEE 802.15.4 Wireless Sensor Networks Under IEEE 802.11b/g Interference", Wireless Personal Communications, Volume 68, Issue 2, pp 281–302, January 2013.
6. R. Prakash ; V.V. Veeravalli, "Adaptive hard handoff algorithms", IEEE Journal on Selected Areas in Communications, Volume: 18 , Issue: 11 , Nov. 2000, pp.: 2456 – 2464.
7. Szu-Lin Su ; Jen-Yeu Chen ; Jane-Hwa Huang, "Performance analysis of soft handoff in CDMA cellular networks", IEEE Journal on Selected Areas in Communications, Volume: 14 , Issue: 9 , Dec 1996 , **Page(s):** 1762 – 1769.
8. AKYILDIZ, I. F., XIE, J., and MOHANTY, S., "A survey on mobility management in next generation all-IP based wireless systems," IEEE Wireless Communications, vol. 11, no. 4, pp. 16-28, 2004.
9. STEMM, M. and KATZ, R. H., "Vertical handoffs in wireless overlay networks," ACM/Springer Journal of Mobile Networks and Applications(MONET), vol. 3, no. 4, pp. 335-350, 1998.
10. Enrique Stevens-Navarro, Ulises Pineda-Rico and Jesus Acosta-Elias," Vertical Handover in beyond Third Generation (B3G) Wireless Networks ", International Journal of Future Generation Communication and Networking, pp.51-58
11. J. Pesola and S. Pokanen, "Location-aided Handover in Heterogeneous Wireless Networks" in Proceedings of Mobile Location Workshop, May 2003
12. Debabrata Sarddar, Shubhajeet chatterjee, Ramesh Jana, Shaik Sahil Babu, Prabir Kr Naskar, Utpal Biswas and M.K. Naskar, "Minimization of Handoff Failure by Introducing a New Cell Coverage Area in the Handoff Region", IJCSI International Journal of Computer Science Issues, Vol. 8, Issue 3, No. 2, May 2011, pp. 577-583.
13. Dr. Debabrata Sarddar, Utpal Ghosh, Rajat Pandit, "Increasing The Number of Channel of cell by reducing Bandwidth of Guard Band", Journal of Emerging Technologies and Innovative Research (JETIR) www.jetir.org, volume-6, issue- 3, pp. 801-812, ISSN NO: 2349-5162, March 2019.

AUTHORS PROFILE

Dr. Debabrata Sarddar received his B.Tech degree from NIT Durgapur West Bengal, India in 2001 and M.Tech degree in DAVV Indore, Madhya Pradesh, India in 2006. He is awarded Ph.D. from Jadavpur University, India. Currently he is Assistant Professor in Department of Computer Science and Engineering, University of Kalyani, Kalyani, West Bengal, India. His published journal paper no is 200, books is 3, patent is 1 and the book chapter is 12. His research interests include mobile communication, satellite communication Email: dsarddar1@gmail.com.

Mr. Noor Hassan received his BCA degree from West Bengal University of Technology in 2010 and MCA, M.TECH degree from University of Kalyani in 2015 and 2017 respectively. His interested research field is Mobile Computing.

Mr. Pinaki Das is currently pursuing his Ph.D. at University of Kalyani. He completed his M.Tech in Mobile Communication and Networking Technology from W.B.U.T (MAKAUT), West Bengal, India in 2015, M.Sc at Vidyasagar University, West Bengal, India in 2010 and B.Sc. at University of Kalyani, West Bengal, India in 2008. His research interest includes wireless and mobile communication.
Email: daspinaki1985@gmail.com.

Mr. Rajat Pandit is an assistant professor in the Department of Computer Science, West Bengal State University, West Bengal, India. He has completed his M.Tech (IT) from West Bengal ,University of Technology, West Bengal, India in 2009. He has completed his MCA from Jadavpur University, West Bengal, India in 2001. His research interest includes Mobile Computing, Wireless Sensor Network and Cloud Computing.
Email: rajatpandit123@gmail.com