International Journal of Engineering and Advanced Technology (IJEAT)
ISSN: 2249-8958 (Online), Volume-8 Issue-6, August 2019

To Minimized the Handoff of Next Generation Mobile System by using Predictive Method.

Debabrata Sarddar, Pinaki Das, Roni Bhattacharyya, Rajat Pandit

Abstract**: *In the next generation cellular system or Next-Generation Wireless Systems a main drawback is the handoff. In time of hand off some time the connected are goes to wait state or call are disconnected. We are trying to minimize the handoff in this paper. In time of handoff, the new BTS cannot give faster service or allocate a channel in proper time duration. In IP base mobile communication, another problem are face, that is the issuing the IP. So we find the handoff probability in current service area and ensuring the new BTS to ready for allocating the signal and also IP to continue the call.***

Keywords: Handoff, Next-Generation Wireless Systems (NGWS), BTS, Signaling Delay, Handoff Probability.

I. INTRODUCTION

In the mobile communication system the handoff is the power to moves from any geographical area to another geographical area that means any cell or area of Base Transceiver Station (BTS) to another cell or BTS [1]. The idle structure of BTS id hexagon but in the practical it is not the hexagon, it is the polygon shape. Each cell or regions of BTS are overlapped. In that overlapped section, when the mobile Node [MN] is belonging in that region the BTS are decided to give the services.

When a MN is moved from one BTS region to another BTS region then the two types of handoff are occurred.

Hard Handoff

When a MN is cross the Ping-Pong point then this hard handoff occurred. In hard handoff at first break the connected using link from old BTS and then create the new link with the new BTS. So we tell this method "Break Before Make" [2].

Revised Manuscript Received on August 30, 2019.

* Correspondence Author

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

Mr. Pinaki Das, pursuing his Ph.D. at University of Kalyani completed 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

Miss. Roni Bhattacharyya, pursuing his M.Tech. at University of Kalyani completed his MCA in Computer science from Vidyasagar University, West Bengal, India in 2018, B.Sc at Burdwan University, West Bengal, India

Mr. Rajat Pandit, assistant professor in the Department of Computer Science, West Bengal State University, West Bengal, India.

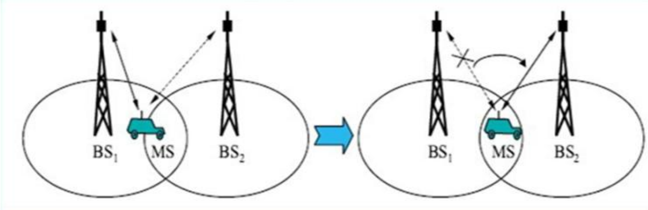

Fig. 1. Hard handoff

A. Soft Handoff

In soft handoff the MN is moved to another BTS region, the MN is requesting the new BTS to issue a link for continuation the services. After connection with the new link, the MN is break the old connection or link. So this type of action is known as "Make Before Break" [2].

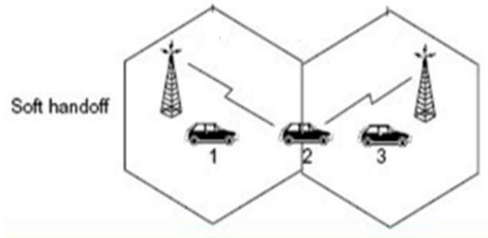

Fig. 2. Soft Handoff

II. REVIEW CRITERIA

In the previous work the handoff are manage by the various protocols like. In practically the signal level are below the threshold level, but every time the protocol cannot perform the proper work and make the handoff failure because the handoff region are overlapped region. Then a MN are comes to this region they find the new channel and want to make the handoff. In that moment the BTS does not give the proper services because the overlapped region is very narrow [3][4].

III. PROPOSED WORK

In the idle case the two cells are overlapped and that circles are considered as hexagon. The common side of the hexagon are generally shows the Ping-Pong position because the common side are nearly centre of two overlapped region.

When a MN are moved and goes to the boundary region then the MN find the new signal of new BTS. In that manner the MN wants to make handoff and we are increasing the area of the service are to reduce the failure probability in overlapped region, as shown in Fig. 3.

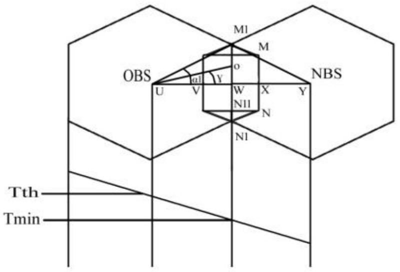

Fig. 3. Exploration of the handoff process

- Tth : Handoff initialized threshold value, the MN makes handover for new BTS.
- Tmin: The minimum value of RSS to communicate between MN and BTS.
- OBS: The old BS.
- NBS: The new BS.
- r: BTS covered region.
- U: This is the point of overlapped region.
- m : Distance between U and boundary..
- α: The motion direction of MT from point 'U' to handoff to NBS.
- k: Distance between side of hexagon and common cord of two hexagons.
- ɣ: in t time the direction ofMN.

VW=K

UV=m

From the fig, we get

MN = b = radius of the circle = New hexagon side length.

$OV = \frac{8b+\sqrt{2}b}{10}$

UV = m = OU – OV

$= b - \frac{8b+\sqrt{2}b}{10}$

$= \frac{2b-\sqrt{2}b}{10}$

VW = K (assume)

When MN goes to M'N' then handoff occurred.

UW = UV + VW

= m + K

$= \frac{2b-\sqrt{2}b}{10}+K$

$= \frac{2b-\sqrt{2}b+10K}{10}$

M'M" = K tan15°

$= \frac{\sqrt{2}}{5}K$

M'W = M'M"+ M"W

$= \frac{\sqrt{2}}{5}K + \frac{b}{2}$

$= \frac{2\sqrt{2}K+5b}{10}$

$o = (\frac{2b-\sqrt{2}b+10K}{10}\sec ɣ)/2$

$t = (\frac{2b-\sqrt{2}b+10K}{10}\sec ɣ)/2v$

$$f(t)=\sum \frac{f(ɣi)}{|g'(ɣi)|} \quad (6)$$

Where 'v' is the velocity of MT.

tanα1=M'W/UW

$$= \frac{2\sqrt{2}K+5b}{2b-\sqrt{2}b+10K} \quad (1)$$

When a MN are takes the services from Old BTS, and the MN are oves with the velocity 'V' and that is equally divided in V_{min}, and V_{max} so the probability density function is shows the direction at point 'P' in equal probability.

i.e., the MN direction α is find by Probability density function.

$$f(\alpha) = \frac{1}{2\pi};\ \pi>\alpha>-\pi \quad (2)$$

MN motion direction from P in the range [α∈(−α1,α1)] where,

$\alpha 1= \tan^{-1}\frac{2\sqrt{2}K+5b}{2b-\sqrt{2}b+10K}$ else handoff initiation is failed. Another equation (2), false handoff probability is

$U_r=1-\int_{-\alpha}^{\alpha} f(\alpha)d\alpha$

$=1-\frac{\alpha 1}{\pi}$

$$=1-\frac{1}{\pi}\tan^{-1}\frac{2\sqrt{2}K+5b}{2b-\sqrt{2}b+10K} \quad (3)$$

'd' is handoff independent and L is dependent on 'L'. so we assume K = 0, then

$Ur=1-\frac{1}{\pi}\tan^{-1}\frac{2\sqrt{2}*0+5b}{2b-\sqrt{2}b+10*0}$

$=1-\frac{1}{\pi}\tan^{-1}\frac{5b}{2b-\sqrt{2}b}$

$=1-\frac{1}{\pi}\tan^{-1}\frac{5}{2-\sqrt{2}}$

$=1-(\frac{1}{\pi}\times\frac{4\pi}{12})$

$=1-\frac{4}{12}$

$=\frac{8}{12}$

$=\frac{2}{3}$

= constant

MN to 'U', the motion direction ɣ∈[(−α1,α1)], then the time to cross the old BTS is,

$$t = (\frac{2b-\sqrt{2}b+10K}{10}\sec ɣ)/2v \quad (4)$$

We know that the pdf of ɣ is given by

$$f(ɣ)= \begin{cases} \frac{1}{2\alpha 1}; & where\ -\alpha 1 < ɣ < \alpha 1 \\ 0, otherwise \end{cases} \quad (5)$$

From (4), 't' is a function of ɣ ,

i.e., t = g(ɣ),

Where $g(ɣ)=\frac{2b-\sqrt{2}b+10K}{10\times 2V}\sec ɣ$

ɣi =Roots of the equation

t=g (ɣ) in [-α1,α1] . The eqn. *t = g*(ɣ) the interval [-α1,α1] and for each of these roots, $f(ɣi) = \frac{1}{2\alpha 1}$, for i=1 and 2.Therefore 6 becomes

Retrieval Number F8704088619/2019©BEIESP
DOI: 10.35940/ijeat.F8704.088619
Journal Website: www.ijeat.org

Published By:
Blue Eyes Intelligence Engineering
& Sciences Publication

$$f(t)=\sum \frac{1}{\alpha 1|g'(\gamma i)|} \quad (7)$$

Where $g'(\gamma)$ is the derivative of $g(\gamma)$ given by

$$g'(\gamma)=\frac{2b-\sqrt{2}b+10K}{10\times 2V} sec\,\gamma\, tan\,\gamma$$
$$=t\tan\gamma$$
$$=t\sqrt{sec^2\gamma-1}$$
$$=t\sqrt{[(\frac{10\times 2V\times t}{2b-\sqrt{2}b+10K})^2-1]} \quad (8)$$

From above equation 7 and 8 we get, the probability distribution function of t is given by

$$f(t)=\begin{cases}\frac{2b-\sqrt{2}b+10K}{\alpha 1t\sqrt{\left[(10\times 2V\times t)^2-\left(2b-\sqrt{2}b+10K\right)^2\right]}}, where < t < \frac{\sqrt{\left(\frac{2b-\sqrt{2}b+10K}{10}\right)^2+\left(\frac{2\sqrt{2}b+5b}{10}\right)^2}}{V} \\ 0, otherwise\end{cases} \quad (9)$$

The handoff failure is given by

$$Pf=\begin{cases} 1; where\ \tau > \frac{\sqrt{[\left(\frac{2b-\sqrt{2}b+10K}{10}\right)^2+\left(\frac{2\sqrt{2}b+5b}{10}\right)^2]}}{V} \\ P(t<\tau); where, \frac{2b-\sqrt{2}b+10K}{10\times 2V} < \tau < \frac{\sqrt{[\left(\frac{2b-\sqrt{2}b+10K}{10}\right)^2+\left(\frac{2\sqrt{2}b+5b}{10}\right)^2]}}{V} \\ 0; where\ \tau \le \frac{2b-\sqrt{2}b+10K}{10\times 2V} \end{cases} \quad (10)$$

Where the handoff signalling delay (t) and *P* (*t* <t) is the probability that *t* <τ.

$$\frac{2b-\sqrt{2}b+10K}{10\times 2V} < \tau < \frac{\sqrt{[\left(\frac{2b-\sqrt{2}b+10K}{10}\right)^2+\left(\frac{2\sqrt{2}b+5b}{10}\right)^2]}}{V}$$

Using eq. 9 we have

$$P(t<\tau)=\int_0^\tau f(t)dt$$

$$=\int_{\frac{2b-\sqrt{2}b+10K}{10\times 2V}}^{\tau}\left[\frac{2b-\sqrt{2}b+10K}{\pi t\sqrt{\left[(10\times 2V\times t)^2-\left(2b-\sqrt{2}b+10K\right)^2\right]}}\right]$$

$$=\frac{1}{\alpha 1}\cos^{-1}\left[\frac{2b-\sqrt{2}b}{10\times 2V\tau}\right] \quad (11)$$

Now using 10 and 11 we have

$$Pf=\begin{cases} 1; where\ \tau > \frac{\sqrt{[\left(\frac{2b-\sqrt{2}b+10K}{10}\right)^2+\left(\frac{2\sqrt{2}b+5b}{10}\right)^2]}}{V} \\ \frac{1}{\alpha 1}\cos^{-1}\left[\frac{2b-\sqrt{2}b}{10\times 2V\tau}\right]; where, \frac{2b-\sqrt{2}b+10K}{10\times 2V} < \tau < \frac{\sqrt{[\left(\frac{2b-\sqrt{2}b+10K}{10}\right)^2+\left(\frac{2\sqrt{2}b+5b}{10}\right)^2]}}{V} \\ 0; where\ \tau \le \frac{2b-\sqrt{2}b+10K}{10\times 2V} \end{cases} \quad (12)$$

IV. RESULT AND DISCUSSION

- **RELATIONSHIP BETWEEN HANDOFF FAILURE PROBABILITY AND SPEED**

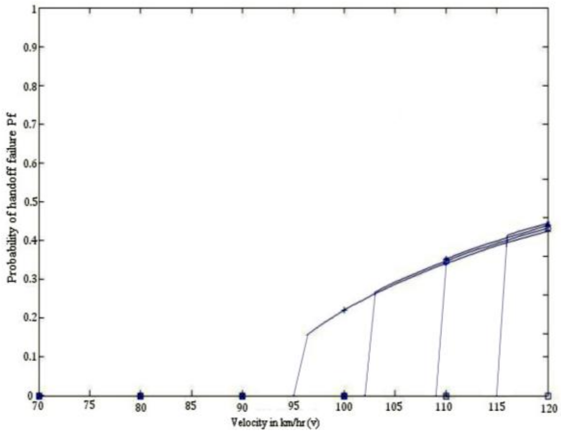

Fig. 4. Handoff failure probability and speed When the speed is increased for a MN the handoff failure probability are increased after certain speed.

- **RELATIONSHIP BETWEEN HANDOFF FAILURE PROBABILITY AND HANDOFF SIGNALING DELAY**

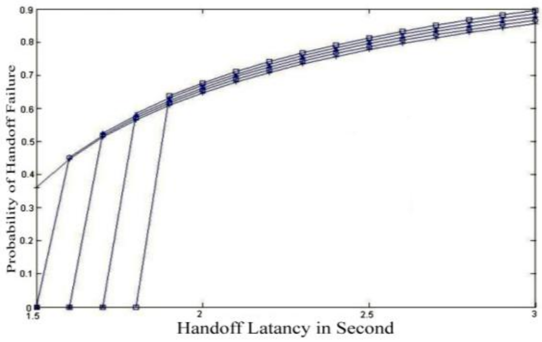

Fig. 5. Handoff failure probability and handoff signaling delay

When the MNs are moves from one base station to new base station, the new BTS are take some times to allocate the signal for continuation of connection.

V. CONCLUSION

In this work we discuss the various type of handoff for MN in wireless system. If we increase the channel or make the proper probability for handoff then the handoff failure rate are decreased. If the mobility power are very high then the rate of failure of handoff are increased, but in this paper we are to minimize this error rate.

REFERENCES

1. M. Shim, H. Kim, and S. Lee. "A fast handover mechanism for IPv6 based WiBro system". IEEE International Conference on Advanced Communication Technology, February 2006.
2. Stevens-Navarro E., Wong V.W.S, "Comparison between Vertical Handoff Decision Algorithms for Heterogeneous Wireless Networks," IEEE vehicular technology conference, vol. 2, pp. 947 – 951, 2006.
3. H.-J. Jang, J.-H. Jee, Y.-H. Han, and J. Cha. "Mobile IPv6 Fast Handovers over IEEE 802.16e Networks". Internet Engineering Task Force (IETF), Internet-draft, January 2007." Draft IEEE Standard for Local and Metropolitan Area Networks: Media Independent Handover Services". IEEE P802.21/D03.00, December 2006.
4. Chen Jie Liao Chulin Li Shaoqian, "Cross-layer handoff management scheme in heterogeneous networks" IEEE, Jan2007.
5. Debabrata Sarddar, Tapas Jana, Souvik Kumar Saha, Joydeep Banerjee, Utpal Biswas, M.K. Naskar, "Minimization of Handoff Failure Probability for Next-Generation Wireless Systems", International Journal of Next-Generation Networks (IJNGN) Vol.2, No.2, June 2010, pp. 36 – 51.

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. 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, Wes Bengal, India in 2008. His research interest includes wireless and mobile communication.
Email: daspinaki1985@gmail.com.

Miss. Roni Bhattacharyya is currently pursuing his M.Tech. at University of Kalyani. He completed his MCA in Computer science from Vidyasagar University, West Bengal, India in 2018, B.Sc at Burdwan University, West Bengal, India in 2015. His research interest includes wireless and mobile communication.
Email: ronibhattacharyya1@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