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Effect of Mobile Terminal Speed on QoS Parameters during Handoff Process in Wireless ATM Network

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Abstract
In this research the effect of the mobile terminal speed on the handoff call dropping probability (HCDP) and new call blocking probability (NCBP) in wireless Asynchronous Transfer Mode (WATM) network is investigated. As a mobile terminal moves from one radio cell to another, a handoff process is needed to change its point of attachment on the network and the mobile speed affects these QoS parameters. In this study, a cell of 500 m radius was assumed and the mean call duration fixed at 180 seconds. The simulation numerical results show that the HCDP and NCBP exhibit error margins between decisions reached without the consideration of the mobile terminal speed. At a moderately low traffic intensity of 2018 erlangs, the error margins in HCDP at the mobile speed of 25, 50, 75, 100 and 125 km/hr are respectively 4.01E-22, 1.91E-17, 7.54E-15, 6.83E-13 and 6.42E-12. The NCBP error margins at these speeds are respectively 5.56E-11, 2.50E-06, 9.57E-4, 8.54E-2 and 7.94E-1. This clearly shows that the error margin increases with increase in mobile terminal speed and the effect is more pronounced on NCBP.

Keywords: Handoff Dropping probability, New Call Blocking Probability, Wireless ATM network, Markov Chain

1. Introduction

The two noteworthy drivers in the telecommunications industry presently are broadband and wireless communications (Pooja, Banja, & Sandhu, 2011). The deployment of these two technologies has signaled a new era in telecommunications industry. The past three decades has seen a gigantic development of cellular radio communications. As the interest for higher transmission speed and portability expands, the Asynchronous Transfer Mode (ATM) is presently being viewed as the most reasonable transport technique for the broadband integrated services digital network (B-ISDN) due to its ability to flexibly support a wide range of services with guaranteed quality-of-service (QoS). This suggests that the utilization of additional network facilities like routers and gateways to interconnect systems will not be essential and consequently decreases the cost of system provision. This rising innovation will be required for two major reasons; first, to enable different wireless technologies to interwork seamlessly with existing wired networks and secondly, to meet the diverse traffic demands such as voice, video, data, graphics, and text required by wireless network users.

The merging of ATM in the wired network and the wireless technology has been seen as a powerful and effective platform in accomplishing the above goals. However, in adopting the ATM technology for future backbone of telecommunications, mobility management is an important issue. If wireless extension is added to ATM, efficient mobility management is needed to provide the necessary QoS constraints required in the network. Mobility management functions are grouped into location management and handoff management functions (Onyishi, 2015), (Bouras, 2010), (Guizani, 2014), (Sun & Sauvola), (Jun-Zhao & Sauvola), (Singh, Asthama, Balyan, & Gupta, 2012) (Sarder, et al., 2010) (Chen & Hsieh, 2007). Location management helps to track and locate the mobile terminal for successful information delivery while handoff management on the other hand is the mechanism by which a mobile terminal keeps its connection active when it migrates from one network cell area to another in a cellular based wireless network. Handoff in wireless network takes place as a result of so many network conditions. It could be triggered when the signal strength received by the mobile terminal goes below a threshold value as the mobile terminal moves from one cell area to another or it could be due to unbearable interference which causes reduction in signal-to-noise ratio (SNR). Handoff could also result from high bit-error-rate (BER) which is the percentage of bits that have errors relative to the number of bits received in a network. Co-channel and adjacent channel interference can also be responsible for handoff initiation in wireless cellular based network (Kahabka, 2016). Also, in order to increase system capacity and accommodate more wireless network users, techniques such as cell splitting and sectoring may be used to increase system capacity. The resulting small sized cells result in more frequent handoff attempts. Speed of the mobile terminal which is the subject of investigation in this work also affects the rate of handoff in wireless cellular network which directly affects the QoS presented by such network. A terminal moving at a high speed traverses a cell in shorter time thereby resulting increased handoff as the mobile terminal moves from one cell to another.

1.1 Previous Works

A good number of researchers have proposed various handoff schemes. These can broadly be classified as non-priority schemes and priority handoff schemes. The wireless network is usually divided into small areas called cells. Each cell is served by a base station equipped with communication channels. In non-priority handoff schemes, radio channels are normally shared by both originating and handoff request calls with equal probability. The base station handles a handoff request exactly in the same way as an originating call in this type of handoff scheme. Both kinds of requests are blocked if no free channel is available. In priority handoff schemes, priority is usually accorded handoff request calls. Various techniques are used to give priority handoff request calls in a base station in this mode. The most popular of these handoff schemes are guard channel based.

In (Ojesami & Famutimi, 2009), an adaptive channel allocation scheme was developed. The channels resources in base station are divided into parts; one for handoff calls and the other for new calls. Priority is given to handoff calls over new calls by allowing a handoff call to preempt a new call when it meets all channels occupied on arrival. The interrupted new call goes into a buffer waiting space until a channel is available in the new call service channels. This mechanism helped to protect new calls and increases network utilization. However, in the quantification of the QoS parameters presented by this scheme, the effect of mobile terminal speed was not factored. Another new preemptive handoff scheme in integrated mobile communication environment is presented in (Kumar & Tripathi, 2009). The scheme divides the cell into two regions namely; the usable region and the handoff region. The position of the mobile user on the cell site depends on the power associated with it with reference to the power transmitted by the BTS. The right of preemption has been given to incoming handoff real-time (voice) calls over data calls. Simulation result showed that increasing the size of the usable and the handoff region lowers the both the NCBP and

HCDP. This therefore captured the effect of cell size on these Qos parameters but was silent on the effect of speed of the mobile terminal. (Inyang, Okpara, & Akpan, 2014) modified an already existing hybrid of mobile assisted handoff scheme (MAHO) and the guard channel scheme (GC) usually called M+G scheme by integrating a buffer waiting space for handoff calls only in this scheme. The essence of introduction of a buffer to M+G scheme is to reduce loss of handoff calls that meet all channel resources busy in a wireless network. The scheme also considered the effect of signal strength and channel availability for handoff decision. The authors only studied the effect of the number of reserved channels on the handoff failure probability. Simulation result showed that increasing the number of reserved channels decreased the handoff failure probability and vice versa. This handoff scheme also failed to capture the mobile terminal speed in the analysis of the QoS parameters. Using a pure analytical approach, (Akpan, Kalu, & Inyang, 2014) developed a prioritized handoff scheme for cellular base wireless network. Analytical modelling approach was used to determine handoff failure rate probability (P_{HF}). In order to maximize the priority given to handoff calls, the mobility concept that considers the direction and speed of the mobile terminal was used in this scheme alongside the guard channels. In the analysis of this scheme, the mobility factor was captured in the analysis of the HCDP. However, mobility factor assumed a range of values of between 0 and 1in the analysis. Of all the handoff schemes discussed above, only the last model captured the concept of mobility in the evaluation of the QoS parameters. The actual speed of the mobile terminal was captured. In this investigation, the direct effect of the speed of the mobile terminal on the HCDP and NCBP in wireless ATM network was studied.

2.0 Methodology

2.1 System Analytical Model

The system analytical model is the model presented in Onyishi, 2015, Onyishi, 2017) and it is shown in figure 1. The system state transition diagram is shown in figure 2. In the analysis carried out the mobility factor β, is assumed to vary between 0.1 and 1.5. However, in this investigation, β has been modified to be a function of the mobile terminal speed, WATM service area and mean call duration.

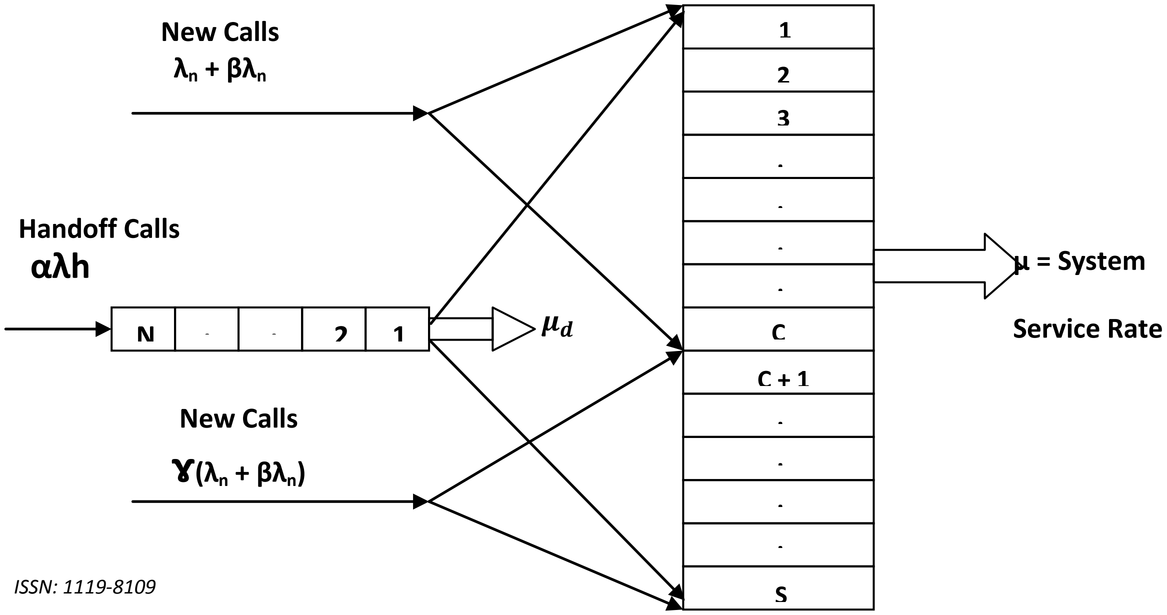
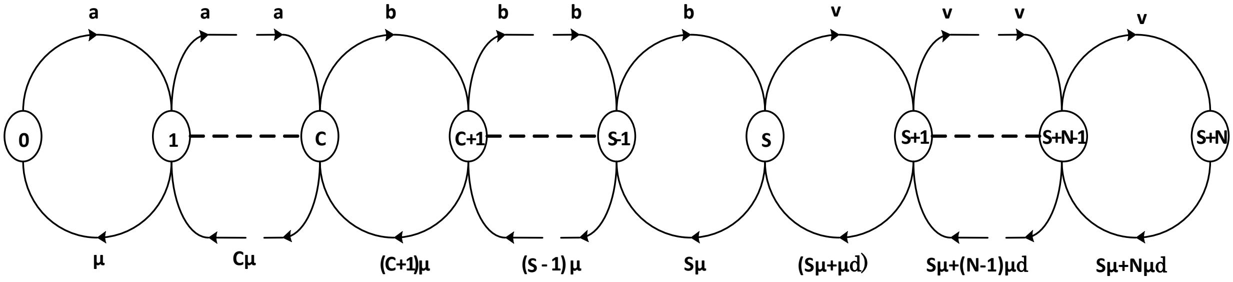


Fig.1: System Analytical Model



a=λn + βλn; b= ɤλn + βɤλn +αλh; v = αλh

Fig. 2: System state transition diagram

The traffic request types considered are three. The fresh calls are of two types: fresh callswithout mobility factor (λ_n) which are expected to be completed within the source cell and theothers are new calls with mobility factor (βλ_n) which will eventually be handed off to the target cell. The third type of traffic is the handoff calls (λ_h) that are already in the target cell. The number of channels in a cell is assumed to be fixed at a value S. The cell has two partitions. The first segment has a capacity of C channels and it is referred to as the common channel because all classes of traffic can access these channels unconditionally if a channel is available on request. The second segment (S-C) admits new call with a probability based on network traffic condition so as to balance the handoff dropping probability and new call blocking probability for optimum network facilities (channels) utilization. A buffer waiting space of size N is put in place. Only handoff calls are queued in first-in-first-out (FIFO) queuing principle if it meets the whole channels occupied in the cell.

The scheme works as follows: Handoff call arrival first checks whether there is a channel available in the common channels C. If there is, the call is served. If the common channels are all occupied, it checks if there is a channel available in the reserved portion, S-C. But if there is no channel in C and S-C, the handoff call is queued in the buffer waiting space. If a channel is released in the cell, handoff calls are served in FIFO scheduling policy. A new call on arrival will first check if there is a free channel in the common channel region, C. If a channel is free, the new call will be served. If on the other hand there is no free channel within C, a check on free channel within S-C segment is conducted. If channel is free, the new call is admitted with a probability Υ to reduce the blocking of new calls. The value of Υ depends on the concurrent number of handoff calls in this region.

The following other assumptions were made in the system model:

(a) Fixed channel assignment is assumed in a homogenous cell and the study is done on only one cell.

(b) The new call and handoff arrival rates in the cell with mean values of λ_n and λ_h respectively are assumed to follow a Poisson process.

(c) The service pattern of the new call and handoff are exponential with equal mean rate µ.

(d) The acceptability factor depends on the traffic situation (number of handoff calls) in the cell the value is assumed to lie between 0 and 1.

(e) The signal strength factor depends on the relative position of the mobile terminal to the base station. As the mobile terminal moves away from the base station, the signal strength factor decreases and it assumed to lie between 0 and 1 and this factor is associated with the handoff calls only.

(f) Only primary handoff is considered and secondary handoff is neglected.

(g) The effect of faulty equipment which usually behaves like a “killer” service facility is also neglected.

To determine the effect of mobility on the model’s QoS parameters, the user mobility is accounted for under the following assumptions defined in the work presented in (Sivaradge & Dananjayyan, 2004):

(i) Mobile user travels a distance uniformly distributed between 0 and 2R, where R is the radius of the cell when transiting a cell.

(ii) Mobile user transit cells at a constant velocity W, uniformly distributed between 0 and W_{max}.

(iii) All the neighboring cells have equal probabilities of being the user destination cell.

In order to characterize this user mobility, the parameter Ω is defined and given by

$$\Omega = \frac{2R}{WT_m} \qquad (1)$$

where, R= radius of the cell, W = velocity of the mobile terminal, T_m= mean call duration

The mobility factor applied to the proposed model by definition is given by $\beta = \frac{1}{\Omega} = \frac{WT_m}{2R}$

From the state transition diagram, the expressions for HCDP and NCBP are obtained as shown.

State Transition Probability

[0]: $aP_0 = \mu P_1; \qquad P_1 = \left[\frac{a}{\mu}\right] P_0$ 2

[1]: $aP_0 + 2\mu P_2 = [a + \mu]P_1$

$$aP_0 + 2\mu P_2 = \left[\frac{a^2}{\mu}\right] P_0 + aP_0$$

$$P_2 = \left[\frac{a}{\mu}\right]^2 \frac{P_0}{2} \qquad 3$$

By mathematical induction,

$$P_f = \left[\frac{a}{\mu}\right]^f \frac{P_0}{f!} \qquad 1 \le f \le C \qquad 4$$

Now considering the second segment (C to S:

Let $\gamma\lambda_n + \beta\gamma\lambda_n + \alpha\lambda_h = b$ where γ = acceptability factor.

[C]: $aP_{C-1} \quad +(C+1)\mu P_{C+1} = [b + C\mu]P_C$

$$P_{C+1} = \frac{b}{(C+1)\mu} \left[\frac{a}{\mu}\right]^C \frac{P_0}{C!} \qquad 5$$

By mathematical induction;

$$P_S = \frac{1}{\prod_{j=1}^{S} C+j} \left[\frac{b}{\mu}\right]^S \left[\frac{a}{\mu}\right]^C \frac{P_0}{C!} \qquad C+1 \le j \le S \qquad 6$$

Considering the third segment (S+1) to (S+N); let $\alpha\lambda_h = v$

$$P_{S+N} = \left[\frac{V^N}{\prod_{i=1}^{N}(S\mu + i\mu_d)}\right] \frac{1}{\prod_{j=1}^{S} C+j} \left[\frac{b}{\mu}\right]^S \left[\frac{a}{\mu}\right]^C \frac{P_0}{C!}: \quad \text{S+1} \leq j \leq S+N \qquad 7$$

The steady state transition probability of the model is summarized in equation 8.

$$P_j = \begin{cases} \sum_{j=1}^{C} \left[\frac{\lambda_n + \beta\lambda_n + \alpha\lambda_h}{\mu}\right]^j \frac{P_0}{j!} & 1 \leq \mathrm{j} \leq \mathrm{C} \\ \sum_{j=C+1}^{S} \frac{1}{\prod_{i=1}^{S} C+1} \left[\frac{\gamma\lambda_n + \beta\gamma\lambda_n + \alpha\lambda_h}{\mu}\right]^S \left[\frac{\lambda_n + \beta\lambda_n + \alpha\lambda_h}{\mu}\right]^C \frac{P_0}{C!} & C+1 \leq j \leq S \\ \left[\frac{(\alpha\lambda_h)^N}{\prod_{i=1}^{N}(S\mu + i\mu_d)}\right] \frac{1}{\prod_{j=1}^{S} C+j} \left[\frac{\gamma\lambda_n + \beta\gamma\lambda_n + \alpha\lambda_h}{\mu}\right]^S \left[\frac{\lambda_n + \beta\lambda_n + \alpha\lambda_h}{\mu}\right]^C \frac{P_0}{C!} & \mathrm{S} + 1 \leq \mathrm{j} \leq \mathrm{N} \end{cases} \qquad 8$$

The sum of global probability given in equation (3.17) is unity i.e. $\sum P_j = 1$ 9

From equation 9, P_0 becomes

$$P_0 = \left[\begin{array}{c} 1 + \sum_{j=1}^{C} \left[\frac{\lambda_n + \beta\lambda_n + \alpha\lambda_h}{\mu}\right]^j \frac{1}{j!} + \\ \sum_{j=C+1}^{S} \frac{1}{\prod_{i=1}^{S} C+i} \left[\frac{\gamma\lambda_n + \beta\gamma\lambda_n + \alpha\lambda_h}{\mu}\right]^S \left[\frac{\lambda_n + \beta\lambda_n + \alpha\lambda_h}{\mu}\right]^C \frac{1}{C!} + \\ \left[\frac{(\alpha\lambda_h)^N}{\prod_{i=1}^{N}(S\mu + i\mu_d)}\right] \frac{1}{\prod_{i=1}^{S} C+i} \left[\frac{\gamma\lambda_n + \beta\gamma\lambda_n + \alpha\lambda_h}{\mu}\right]^S \left[\frac{\lambda_n + \beta\lambda_n + \alpha\lambda_h}{\mu}\right]^C \frac{1}{C!} \end{array}\right]^{-1}$$

The blocking probability of new calls and handoff calls are given by equations 10 and 11 respectively. as

$$NCBP = \sum_{j=C+1}^{S} \frac{1}{\prod_{i=1}^{S} C+i} \left[\frac{\gamma\lambda_n + \beta\gamma\lambda_n + \alpha\lambda_h}{\mu}\right]^S \left[\frac{\lambda_n + \beta\lambda_n + \alpha\lambda_h}{\mu}\right]^C \frac{P_0}{C!} \qquad 10$$

$$HCDP = \left[\frac{(\alpha\lambda_h)^N}{\prod_{i=1}^{N}(S\mu + i\mu_d)}\right] \frac{1}{\prod_{i=1}^{S} C+i} \left[\frac{\gamma\lambda_n + \beta\gamma\lambda_n + \alpha\lambda_h}{\mu}\right]^S \left[\frac{\lambda_n + \beta\lambda_n + \alpha\lambda_h}{\mu}\right]^C \frac{P_0}{C!} \qquad 11$$

These equations were developed into M-files in MATLAB to simulate and investigate the effect of mobile terminal speed on the HCDP and NCBP. The parameters used for simulation are given below:

$\lambda_n = n$ew call arrival rate is varied from 1 to 100000 (call arrivals/second).

λ_h =handoff call arrival rate. It is assumed to be 10 percent of new call arrival rate

α =signal strength factor: 0.6. The signal strength factor is associated with the handoff calls only. The signal strength factor depends on the relative position of the mobile terminal to the base station. As the mobile terminal moves away from the base station, the signal strength factor decreases and it assumed to lie between 0 and 1.

γ =acceptability factor: 0.6. This parameter depends on the network traffic condition. A high probability of 0.6 is assumed for Υ to permit more new calls to access the reserved channel so as improve NCBP.

N = queue length: Varied between 2 and 10.

S=20; Fixed base station capacity (Voice channel capacity of two transceivers plus four additional channels in a GSM base station.

C= common channels varied between 4 and 10.

$\mu = c$all service rate: The service facility is assumed to be one E1 (30 voice channels plus 2 signaling channels) deployed in wireless Asynchronous Transfer Mode (WATM) network. The transmission rate in one E1 is 32 ×64 kbps which translates to 2.048 Mbps. Each ATM cell is 53 bytes (424 bits). Therefore the service rate of one E1 is 2.048 Mbps/424 (4831 bits/second).

$\mu_d =$ Service rate in the queue facility and it is assumed to be unity.

3.0 Numerical Results and Discussions

3.2 Effect of mobile terminal speed on handoff dropping probability

In the analysis of the effect of mobile terminal speed on the handoff call dropping probability (HCDP) and new call blocking probability (NCBP), the service rate is fixed at 4831 bits/second which is the service rate for one E1 deployed in WATM network. The graph of HCDP against traffic intensity for different mobile terminal speeds is shown in figure 1.Generally, the HCDP increases with increase in traffic intensity. However, the effect is not pronounced at lower values of traffic intensities. The effect of the traffic intensity starts manifesting at higher value of the traffic intensity. It has been observed that the HCDP exhibited error margins when compared with the HCDP obtained when the speed of the movement of the mobile terminal was neglected. In this study, traffic intensity was varied from 0.09 to 8688.97 Erlangs. At the six speeds considered namely, 0 km/hr, 25 km/hr , 50 km/hr, 75 km/hr, 100 km/hr and 125 km/hr, the HCDP maintained low values until the traffic intensity attains a value of about 2000 erlangs. Between 2000 and 2500 erlangs, the HCDP for the mobile terminal at 70 km/hr above depart from the rest and increases significantly with increase in traffic intensity. In order to evaluate the error margin in HCDP when the speed of the mobile terminal is neglected, the HCDP at specific values of traffic intensities were recorded and shown in table 1. The error margins which are the difference between the HCDP at other specified speeds and that at 0 km/hr speed are computed and recorded in table 2. The graph of the error margin at specific traffic intensity against the speeds of the mobile terminal terminals is shown in figure 2. It could be observed that the HCDP error margin increases with increasing mobile terminal speed. However, this (Onyishi, 2015) tends to converge above 70 km/hr speed of the mobile terminal. This clearly shows that there is a very serious error in neglecting the speed of the mobile terminal in the development of a handoff scheme for a wireless cellular network.

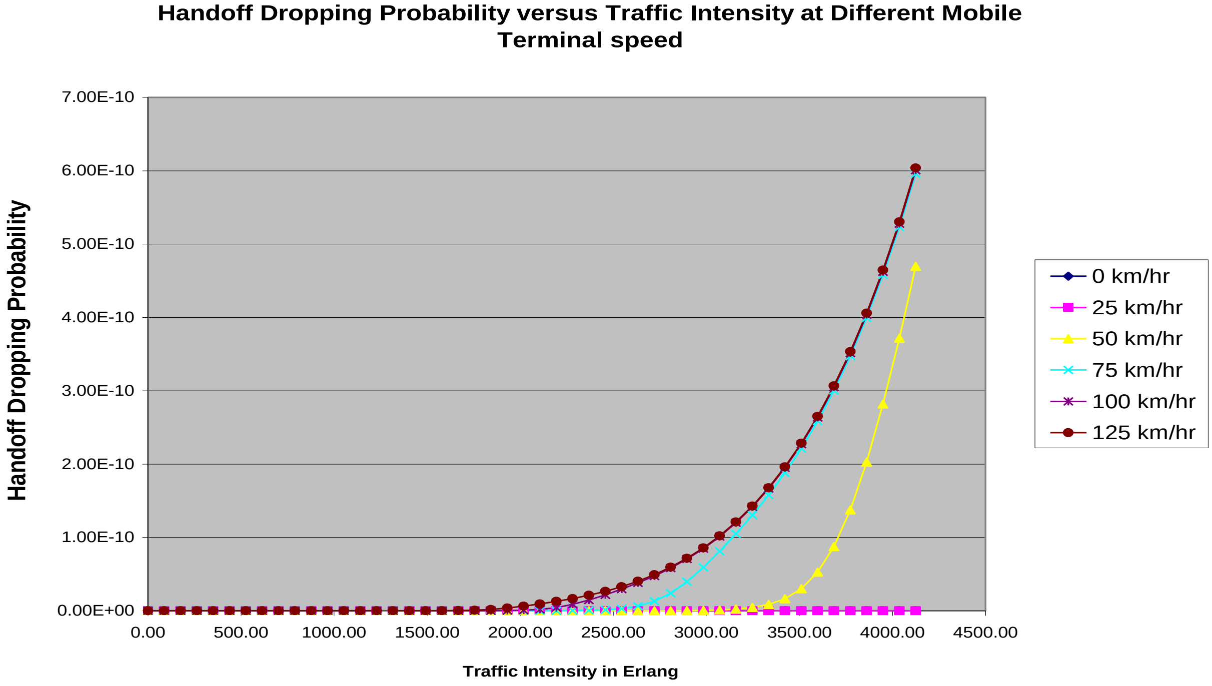


Figure 3: Effect of speed of mobile terminal on handoff call dropping probability

Table 1: HCDP versus mobile terminal speed at different traffic intensity

Speed in km/hr	HCDP at 2018 erlangs	HCDP at 3247 erlangs	HCDP at 4037 erlangs	HCDP at 4915 erlangs	HCDP at 5968 erlangs	HCDP at 7021 erlangs	HCDP at 7635 erlangs
0	9.90E-29	2.39E-23	6.86E-21	1.14E-18	1.78E-16	1.22E-14	1.08E-13
25	4.01E-22	9.37E-17	2.69E-14	4.47E-12	6.18E-10	1.11E-08	2.26E-08
50	1.91E-17	4.43E-12	3.72E-10	1.68E-09	5.48E-09	1.46E-08	2.42E-08
75	7.54E-15	1.30E-10	5.23E-10	1.72E-09	5.53E-09	1.47E-08	2.44E-08
100	6.83E-13	1.42E-10	5.28E-10	1.73E-09	5.56E-09	1.48E-08	2.45E-08
125	6.42E-12	1.43E-10	5.30E-10	1.73E-09	5.58E-09	1.48E-08	2.46E-08

Table 2: Error margin in HCDP with increase in mobile terminal speed

Speed in km/hr	HCDP at 2018 erlangs	HCDP at 3247 erlangs	HCDP at 4037 erlangs	HCDP at 4915 erlangs	HCDP at 5968 erlangs	HCDP at 7021 erlangs	HCDP at 7635 erlangs
25	4.01E-22	9.37E-17	2.69E-14	4.47E-12	6.18E-10	1.11E-08	2.26E-08
50	1.91E-17	4.43E-12	3.72E-10	1.68E-09	5.48E-09	1.46E-08	2.42E-08
75	7.54E-15	1.30E-10	5.23E-10	1.72E-09	5.53E-09	1.47E-08	2.44E-08
100	6.83E-13	1.42E-10	5.28E-10	1.73E-09	5.56E-09	1.48E-08	2.45E-08
125	6.42E-12	1.43E-10	5.80E-10	1.73E-09	5.58E-09	1.48E-08	2.46E-08

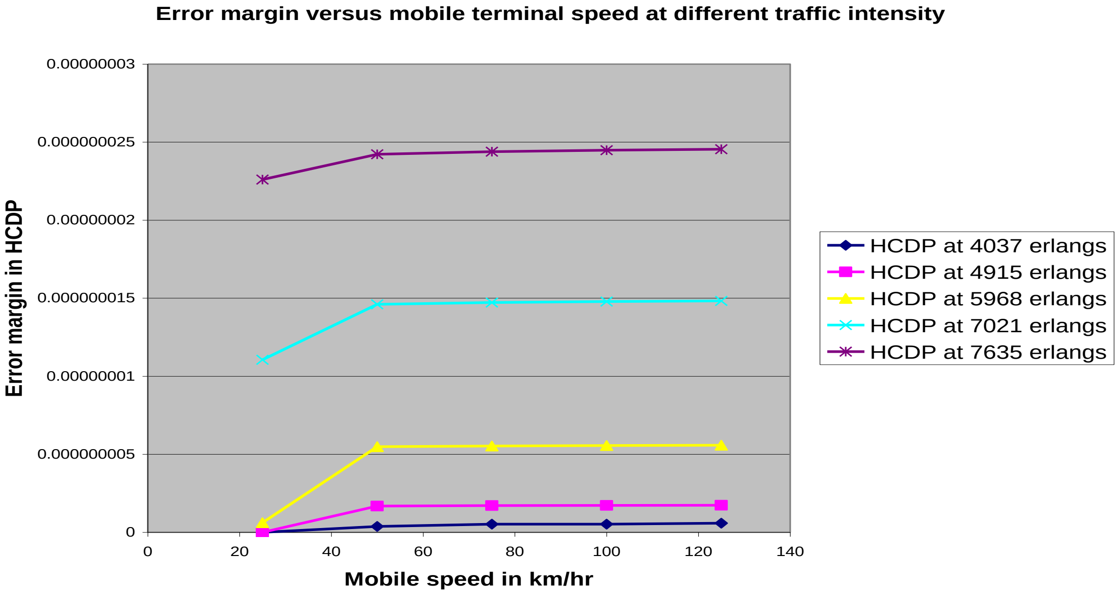


Figure 4: Error Margin in HCDP versus mobile terminal speed in km/hr at different traffic intensity

3.3 Effect of mobile terminal speed on new call blocking probability

The graph of NCBP against traffic intensity at different mobile terminal speed is shown in figure 5. The service rate has also been fixed at 4831 bits/second which is the service rate for one E1deployed in wireless ATM network. Also, the NCBP increases with increase in traffic intensity. However, the effect is not also significant at lower values of traffic intensities no matter the speed of the mobile terminal. The effect of traffic intensity on NCBP is only noticed when the traffic intensity builds to about 1500 erlangs. With the traffic intensity at about 1500 erlangs, the NCBP at the mobile speed of 125 km/hr veers off from the others and increases significantly with small increase in traffic intensity. This clearly shows that mobile terminal speed has direct effect on NCBP as this QoS parameter is increased with increase in the mobile terminal speed. The effect can be seen in table 3 while table 4 shows the error margin in neglecting the influence of mobile terminal speed in evaluating the connection level QoS parameters in WATM network. The graph of the error margin in NCBP versus mobile terminal speed is shown in figure 6 it also shows that the error margin in NBCP as the speed of the mobile terminal increases also increases at fixed traffic intensity.

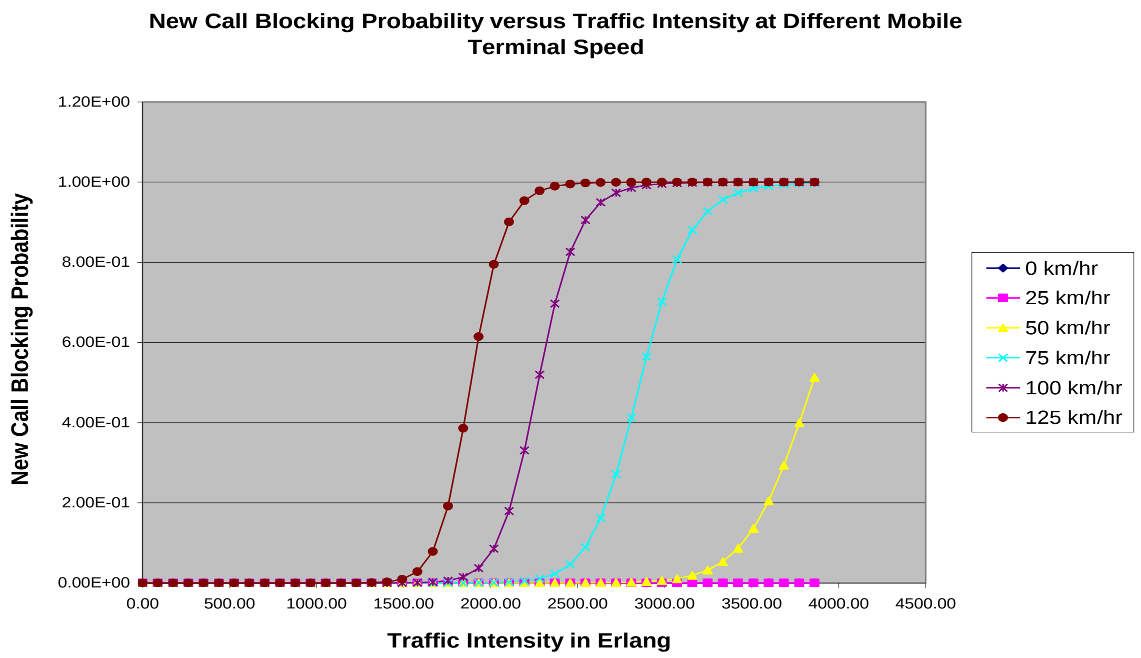


Figure 5: Effect of mobile terminal speed on new call blocking probability

Table 3: NCBP versus mobile terminal speed at different traffic intensity

Mobile Terminal Speed in km/hr	NCBP at 2018 erlangs	NCBP at 3247 erlangs	NCBP at 4037 erlangs	NCBP at 4915 erlangs	NCBP at 5968 erlangs	NCBP at 7021 erlangs	NCBP at 7635 erlangs
0	9.90E-29	2.39E-23	6.86E-21	1.14E-18	1.78E-16	1.22E-14	1.08E-13
25	5.56E-11	7.02E-07	5.35E-05	0.002691	0.114707	0.768324	0.94649
50	2.50E-06	0.03202	0.719187	0.992392	0.999842	0.999994	0.999999
75	0.000957	0.927267	0.998989	0.99998	1	1	1
100	0.085407	0.999198	0.99999	1	1	1	1
125	0.79462	0.999981	1	1	1	1	1

Table 4: Error margin in NCBP with increase in mobile terminal speed at different traffic intensity

Mobile Terminal Speed in km/hr	NCBP at 2018 erlangs	NCBP at 3247 erlangs	NCBP at 4037 erlangs	NCBP at 4915 erlangs	NCBP at 5968 erlangs	NCBP at 7021 erlangs	NCBP at 7635 erlangs
25	5.56E-11	7.02E-07	5.35E-05	0.002691	0.114707	0.768324	0.94649
50	2.50E-06	0.03202	0.719187	0.992392	0.999842	0.999994	0.999999
75	0.000957	0.927267	0.998989	0.99998	1	1	1
100	0.085407	0.999198	0.99999	1	1	1	1
125	0.79462	0.999981	1	1	1	1	1

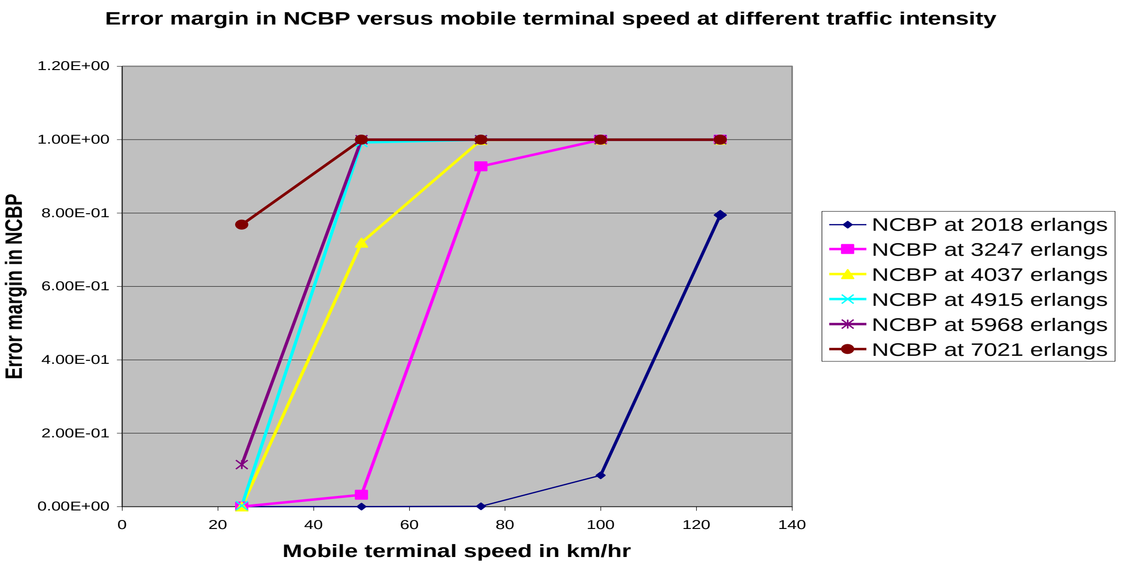


Figure 6: Error Margin in NCBP versus mobile terminal speed in km/hr at different traffic intensity

4.0 Conclusions

In this investigation, the effect of mobile terminal speed on the HCDP and NCBP for a handoff scheme deployed in a WATM was studied. The handoff scheme is a fractional guard model which used 1-dimentional Markov Chain and state transitions analytical approach that considered both fresh and handoff calls on the same platform. The intension was to create the environment where HCDP and NCBP could be employed as the quality of service parameters for the appraisal of the performance of the developed handoff scheme. In the analysis, the focus was on the effect of the speed of the mobile terminal on these QoS parameters.

The numerical results have shown that HCDP and NCBP exhibited error margin between the decisions reached without the consideration of the mobile terminal speed and that with mobile terminal speed. At a fixed traffic intensity, this error margin increases with increase in the speed of the mobile terminal. Furthermore, when the traffic intensity is higher, the error margin is more pronounced. It can therefore be stated that the mobile terminal speed has significant effect on the handoff dropping probability and new call blocking probability in any cellular based mobile network.

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