International Journal of Electronics Communication and Computer Engineering
Volume 7, Issue 1, ISSN (Online): 2249–071X, ISSN (Print): 2278–4209

Admission Control for Vehicular Mobility Aware Scheme for QoS Improvement

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***Abstract* – The recent development in wireless network technology provides the uninterrupted service to the mobile users roaming around the network. In this work handoff queue (HQ) is propose with different admission control policies depends on mobility of vehicle for new arrived call blocking probability (NCBP), arrived handoff-call dropping probability (HCDP), handoff-call holding time in the handoff queue, and channel utilization with system carried traffic. At the static stage of vehicle a handoff priority with guard channels is use since the user in static vehicles are not fixed, it may get in or get off the vehicle. In addition, an Handoff Queue is examined during stopping to further accept handoff users.**

***Keywords* – Admission Control, Vehicular, Mobility, QoS.**

I. Introduction

The users spend their maximum time in mobile vehicles such as cars, buses, subways and trains. Handoff is the process to transfer access of mobile station from one channel base station to other channel base station (BS). Handoff is categorized into horizontal handoff i.e. within the same wireless access network technology and vertical handoff i.e. among heterogeneous wireless access network technologies. The handoff process is classified as hard handoff and soft handoff. In hard hand off process the communication is break from base station before making handoff. In soft handoff communication have the connection with both base station. When the vehicle is stop at any specific location a handoff priority scheme with guard channels and handoff queue is use. When the vehicle is in moving phase then guard channel are not require as the number of users in moving vehicles are fixed and users are allocated to maximize channel utilization.

II. Vehicular Mobility

In this work, vehicles are classified into handoff vehicles, new vehicles, and adjustment vehicles. A handoff vehicle is defined as one coming into a tagged cell from another cell. On the other hand, a vehicle newly starting a call in the tagged cell is referred to as a new vehicle. The number of passengers in a vehicle can be changed when the vehicle stops at a station because several passengers get on or off the vehicle. Such a vehicle can request the adjustment of bandwidth units and thus it is named as an adjustment vehicle. In vehicular environments, handoff vehicles should be assigned bandwidth units as much as ones in the previous cell in order to provide a consistent level of QoS to passengers even after handoff. Moreover, it is worse to disrupt ongoing calls than to block new calls with the respect to the user's perceived QoS. Therefore, handoff vehicles and adjustment vehicles should have higher priority than new vehicles when they compete bandwidth units of a BS.

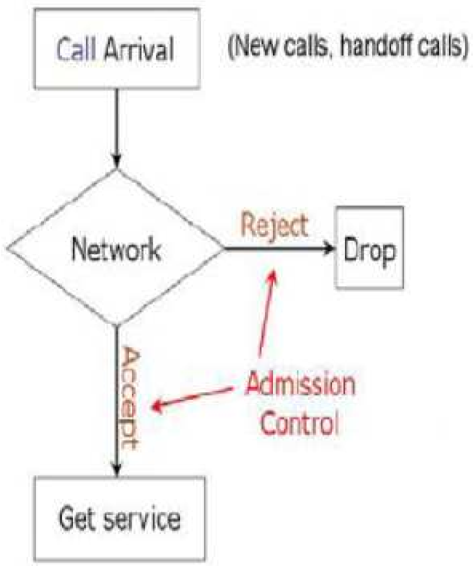

Fig. 1. New and Handoff calls in Process

III. Propose Flow

To develop an analytical model, we consider a stochastic process for mobile hotspots, as shown in Fig. . From $\tau 0$ to $\tau 1$, a vehicle is in the stop phase. During this time period, both handoff and new calls can be generated. Assume that the arrival processes of handoff calls and new calls follow Poisson distributions with rates λH and λN, respectively. Then, the total call arrival rate in the stop phase is drawn from the Poisson process with rate $\lambda H + \lambda N$. On the other hand, the call duration time in the stop phase follows an exponential distribution with mean $1/\mu S$. In addition, the dwell time in the stop phase follows an exponential distribution with mean $1/\xi S$. Note that there are no users riding a vehicle in the moving phase (i.e., from $\tau 1$ to $\tau 2$). Hence, the new-call arrival process in the moving phase is given by a Poisson process with rate λN. In addition, the call duration and the dwell time in the moving

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phase follow exponential distributions with means 1/μM and 1/ξM, respectively[1].

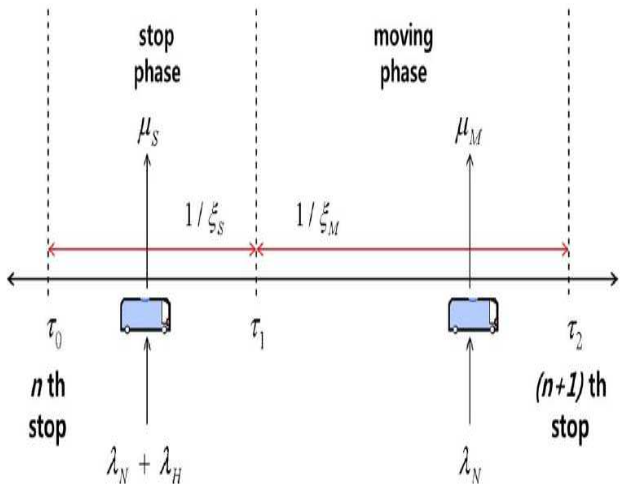
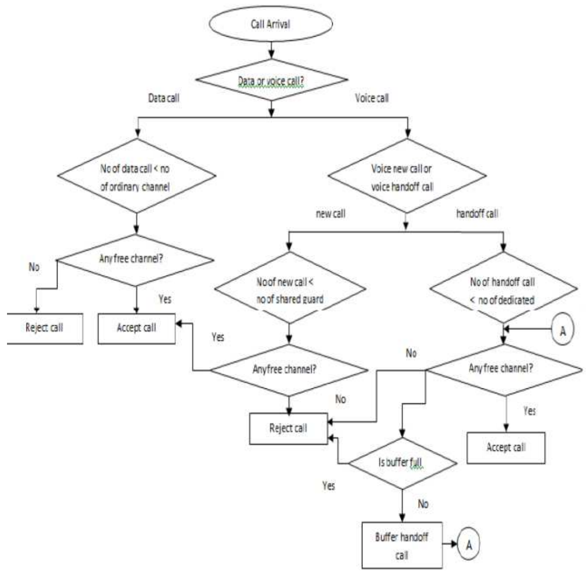


Fig. 2. System model for performance analysis



Notation Description [1,2]

C : Total capacity of a base station
K : Threshold value for the handoff prioritization
L : Maximum number of passengers in a vehicle
α : Coefficient value for bandwidth allocation
λn : Arrival rate for new vehicles
λh : Arrival rate for handoff vehicles
1/μc : Average cell residence time for vehicles
1/μm : Average moving time of vehicle between adjacent stations
φb :Steady state probability that there are b passengers in a vehicle
πi,j : Steady state probability that there are i and j vehicles assigned one and two bandwidth units
PNV : New vehicle service blocking probability
PHV : Handoff vehicle service dropping probability
PAV : Adjustment vehicle service blocking probability

IV. Handoff Complexities

Several factors complicate the process of handoff. Some of these handoff complexities are briefly listed below:

Cellular Structures and Topographical Features

There are different types of cellular system deployment scenarios. There could be big cells in rural or suburban areas (called macro cells), small cells in urban areas (called microcells) or an overlay system with a given area, both containing macro cells and microcells. The propagation environment is quite different in micro or macro cells. Large scale fading and small scale fading has large variations in urban microcells then in rural macro cells. Furthermore, in urban microcells effects such as street corner effect exists, are characterized by a sudden drop in signal strength over a short distance.

Traffic

Traffic distribution is a function of time and space. The handoff process should work well in different traffic scenarios. Examples of approaches to deal with traffic no uniformities include traffic balancing in adjacent cells, use of different cell sizes, no uniform channel allocation and dynamic channel allocation.

System Constraints

Several systems have constraints over common characteristics, such as transmit power and propagation delay. The handoff process should consider such system constraints.

Mobility

The quality of communication link is influenced by the degree of mobility. A high speed MS moving away from a serving BS, experiences signal degradation faster than a low speed MS. Hence mobility plays an important role in the handoff process.

The handover process is required when the following situations occurs.

• When the motion of the user equipment is very fast.
• The movement of the user's equipment from one cell to another during an ongoing session.
• The experience of interference phenomena by the user's equipment from the near cell.nimize the interference level.

V. Prioritization Schemes

One of the ways to reduce the handoff failure rate is to prioritize handoff. Handoff algorithms that try to minimize the number of handoff give poor performance in heavy traffic situations. In such situations, a significant handoff performance improvement can be obtained by prioritizing handoff. Two of the most important parameter for evaluating a handoff processes are forced termination probability and call blocking probability. An ideal handoff is one in which forced probability decreases while maintaining blocking probability. In non prioritization scheme new call and handoff calls are treated in same way, leading to increases in the forced termination probability. Prioritization scheme reduce the forced termination probability by assigning more channel to handoff calls. The two known prioritization schemes are: Guard channels and Queuing of handoff calls.

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VI. Parameters

Channel Utilization

The channel utilization depends on the total traffic, λ t and is given by

P = Trafic intensity / number of channel

Call Arrival Rate

Call arrival rate, λt , refers to the traffic offered expressed as the number of call attempts per unit time [12], which in this case is given as:

λ = number of call attempts per busy hour / 14400 second per busy hour

To relate call arrival rate to the performance of a network, the term grade of service (GOS) denoted by B is used. The GOS can be mean proportion of time for which congestion exists, or probability of congestion or blocking probability, or probability that a call will be dropped due to congestion. It is defined in as:

GoS = Traffic lost / Traffic offered

In general,

$GoS = A – A_0 / A$

Where, A= offered traffic

A_0 = carried traffic

$A-A_0$ = lost traffic

GoS= α* Phb+ Pnb ;

Where

* α = 10, Which indicate Priority level from handoff call to new call
* Phb = Handoff blocking probability
* Pnb = New call blocking probability

It is obvious that drop call-probability varies inversely with call arrival rate, that is, drop-call probability decreases as call arrival rate increases. This leads to the deduction that system performance improves as the traffic entering the system increases.

Load Computation

* CAC algorithm computes the increase in the load as given by,

$$\Delta\eta i+\eta\leq\eta Thr.i$$

where,

Load factor increment for new User uplink threshold load (new User = $\Delta\eta_i = \eta Thr.i$) then arrived call can admitted to enter the target cell, otherwise arrive call is queued or rejected based on queue available

Call Duration

Call duration is another parameter that can affect the quality of service in a cellular network, hence it is considered when planning the network. Call duration or mean call holding time is defined as the time a mobile station takes to complete a call connection. Mathematically, call duration is given by:

$$H = A / \lambda$$

Where,

A = traffic intensity in Erlangs,

λ = call arrival rate

Thus call arrival rate varies with call duration the same way it varies with drop-call probability. Thus drop-call probability increases with a decrease in call duration.

Drop-Call Probability

Drop-call probability is given by

$$P(Y=n)=\frac{(v_d t)^n}{n!}e^{-v_d t},\quad n\geq 0$$

Where,

vd is the drop-call rate,

t the call duration,

Y is a random variable that counts the number of drops and

N is the confirmed calls dropped.

This is a Poisson Probability function with a discrete variable which counts the number of dropped calls

Drop call rate = Number of dropped call / number of call attempt

The probability of occurrence of the call dropping event (drop-call probability) is based on the above formula.

VII. Conclusion

In this paper, the uplink capacity and load estimation formulas is formulated. Then, a prioritized throughput based uplink call admission control algorithm for a WCDMA cellular system with perfect power control is presented. To give priority to soft handoff calls, we introduce queuing techniques and the idea of 'soft guard channels', which is represented by reserving a small fraction of the cell load for the higher priority calls. A Good Call Admission Control Algorithm Must Have The Following Features In Order Of Importance: Maximize Channel Utilization In A Fair Manner To All Call, Minimize The Dropping Probability Of Connected Calls, Minimize The Reduction Of The Qos For The Connected Calls, Minimize The Blocking Probability Of New Calls.

References

[1] Younghyun Kim, HaneulKo, Sangheon Pack, Wonjun Lee, and XueminShen "Mobility-Aware Call Admission Control Algorithm With Handoff Queue in Mobile Hotspots" IEEE Transactions On Vehicular Technology, Vol. 62, No. 8, October 2013 pp no. 3903.

[2] Santosh Kumar Emmadi, T.G.Venkatesh "Call Admission Control Schemes in Cellular Networks: A Comparative Study" 11th International Joint Conference on Computer Science and Software Engineering (JCSSE) year 2014.

[3] Perumalraja Rengaraju, Chung-Horng Lung, Member, IEEE, and AnandSrinivasan "QoS-Aware Distributed Security Architecture for 4G Multihop Wireless Networks" IEEE Transactions On Vehicular TechnoloGy, Vol. 63, No. 6, July 2014 pp no. 2886.

[4] Racha Ben Ali, and Samuel Pierre "On the Impact of Mobility and Soft Vertical Handoff on Voice Admission Control in Loosely Coupled 3G/WLAN Networks" IEEE Communications Letters, Vol. 13, No. 5, May 2009 pp no. 303.

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