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Enhanced Performance of Mobile Multimedia Network

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Abstract: ***In this paper bandwidth reduction is proposed for multimedia application to fit the available bandwidth. This leads to minimization of the bandwidth problem in mobile multimedia network. This proposed algorithm is efficient When the bandwidth required is not available. The algorithm was modeled using MATLAB program .The simulation model was build based on a geographical and call generation model .The simulation result shows a good performance of the algorithm during high traffic load and its performance is poor for low traffic***.

Keyword: bandwidth, multimedia

1. Introduction

The explosion of mobile devices is driving a wireless-everywhere expectation. With many users carrying multiple Wi-Fi-enabled devices and expecting Internet access for each one, it becomes crucial to manage bandwidth properly. This keeps visitors happy and coming back. Bandwidth management and it performance is very important.

Table 1: Service Requirements

Service	Data Rate
Image	16kbit/s
Telephone	8kbit/s
Videophone	16kbit/s

Whether your business is a hotel, restaurant, sports arena, transportation center or the like, bandwidth management allows you to control the amount of bandwidth available to your patrons. Used correctly, bandwidth management ensures that each user receives a fair share of bandwidth. The need for bandwidth management is all the more important for locations that provide free public Internet access, because the volume of users is typically greater as opposed to locations that charge for the access.

Bandwidth management is the process of measuring and controlling the communications (traffic, packets) on a network link, to avoid filling the link to capacity or overfilling the link, which would result in network congestion and poor performance of the network. Bandwidth management is measured in bits per second (bit/s) or bytes per second (B/s).

A bandwidth manager is a tool that can change the rate and volume of traffic flows on your network in a controlled manner. It also can make decisions about what types of traffic or which users have priority when there is more traffic than there is bandwidth available, thus "shaping" traffic flows to sets of user-defined behaviors. With a 100Mb/s Ethernet LAN, for example, all traffic travels at 100 megabits per second, and all devices on the LAN have equal access to the bandwidth. If all of your traffic were local, this might be acceptable; you want things to run as fast as possible most of the time, and Ethernet devices are designed to share the 100Mb/s bandwidth on an equal basis.

In most cases, however, the upstream internet connection has less bandwidth then the LAN, which creates an uncontrolled bottleneck without a bandwidth management device. A bandwidth management device allows you to reduce and control the flows through your upstream bottleneck, based on criteria that you select. The goal may be to share available bandwidth equally among devices, or to allocate more bandwidth to users in higher service level classes by enforcing service level agreements, allowing them to get a higher quality of service (QoS).

2. Geographical Models

In this study three cell cluster was considered. The three cells performed by sector antenna with 120^0 looking angle and 2km radius as in figure (1).

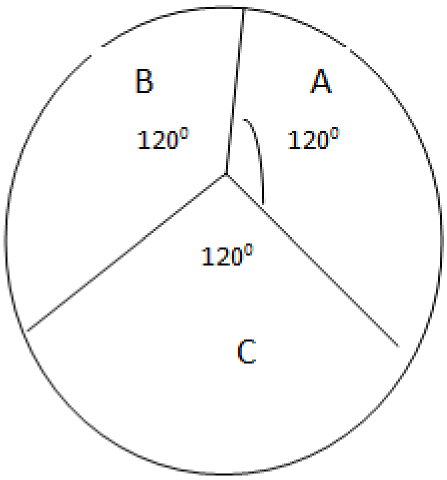

Figure 1: Geographical model

3. Traffic model

We consider the arrival of both incoming and outgoing calls, the call arrival process is assumed to Poisson. For high mobility users, the rate of incoming calls is assumed to be higher than the corresponding outgoing, because incoming calls are for both private and business communications.

Poisson call arrival process and an exponentially distributed call are assumed. The call arrival rate refers to the total number of incoming and outgoing calls during busy hour conditions.

Regarding the multiple access protocol, the protocol is capable of supporting three service classes, namely, circuit-mode voice, burst-mode voice and data, by performing statistical multiplexing of connections of the three classes at two different levels:

a) The call-level (for circuit-mode voice).
b) The talk spurt/ message-level (for burstmode voice and data).

The average pedestrian speed is 5km/hr. the vehicle (private car, taxi, bus) speed average is based 60km/hr. Note that, the model could be further enhanced by taking into account the relation between car density and speed on a certain street.

- Not Moving Users

Estimation can be based on relevant estimations from fixed networks.

- Moving Users

4. Traffic Generation

The traffic load, in Erlang, is the product of the call arrival time and the call duration. The calls arrival time represent the cumulative sum of calls inter-arrival time, which follows a Poisson distribution with an average arrival time (2). The inter-arrival time define the time period between two consecutive calls.

$$f(x) = \frac{e^{-\lambda}\lambda^x}{x!} \quad x = 0,1,2,\ldots$$

During the first part of the simulation was kept constant to investigate the performance at a certain time period with a fixed traffic load. In the second part the traffic load varying with the simulation time, thus the performance was evaluated according to the traffic load. The call duration is chosen as a negative exponentially distributed because for all the calls the arrival time and call duration are treated as an independent Random variables. Figure (2) shows the inter-arrival time and call duration. Interarrival is shown between call 1 and 2 also between call 3 and call 4, while the call duration of call 1and call 3 is shown:

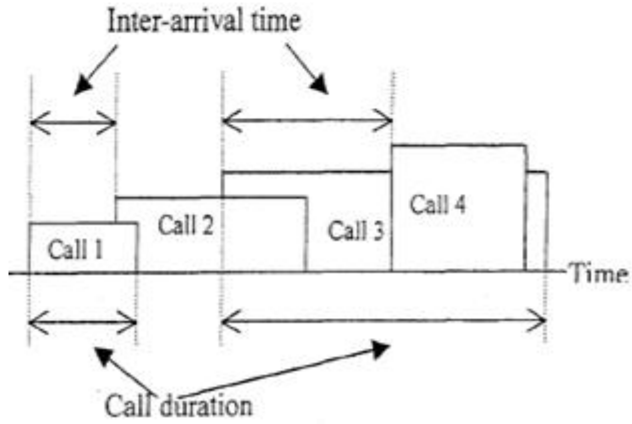

Figure 2: Inter-arrival time and call duration

$$P(X > x) = P(N = 0) = \frac{e^{-\lambda x}\lambda x^0}{0!}$$
$$= e^{-\lambda x}$$

During the simulation process an external traffic loads, on each cell was introduced to optimize the running time of the simulator and to provide an initial values, such as the number of active mobile at time (t) equal to zero. The simulator provides a software tool for Teletraffic analysis, which involves the determination of the new calls blocking and an existing call drop probability. Non-completion probability is defined as the probability of the call to be terminated due to blocking call or due to shadowing effect, if the mobile terminal moved to shadowing area whiles the call on progress. In this study the non-completion probability assumed to be equal to the new call failure probability because the satellite is used to overcome the shadowing effect.

Mobile terminals (MTs) are uniformly distributed in the simulation window. Thus, symmetrical traffic load was applied. However, asymmetrical traffic load was generated as well to investigate the system performance at a busy hour. Asymmetric and symmetric traffic load was generated for the new call based on two different scenarios. In the first scenario the free channel for each cell are not equally distributed and in the second scenario the free channel was equally distributed.

5. Simulation Scenario

Figure 3 shows the block diagram for the simulation program. This program is written using MATLAB instruction.

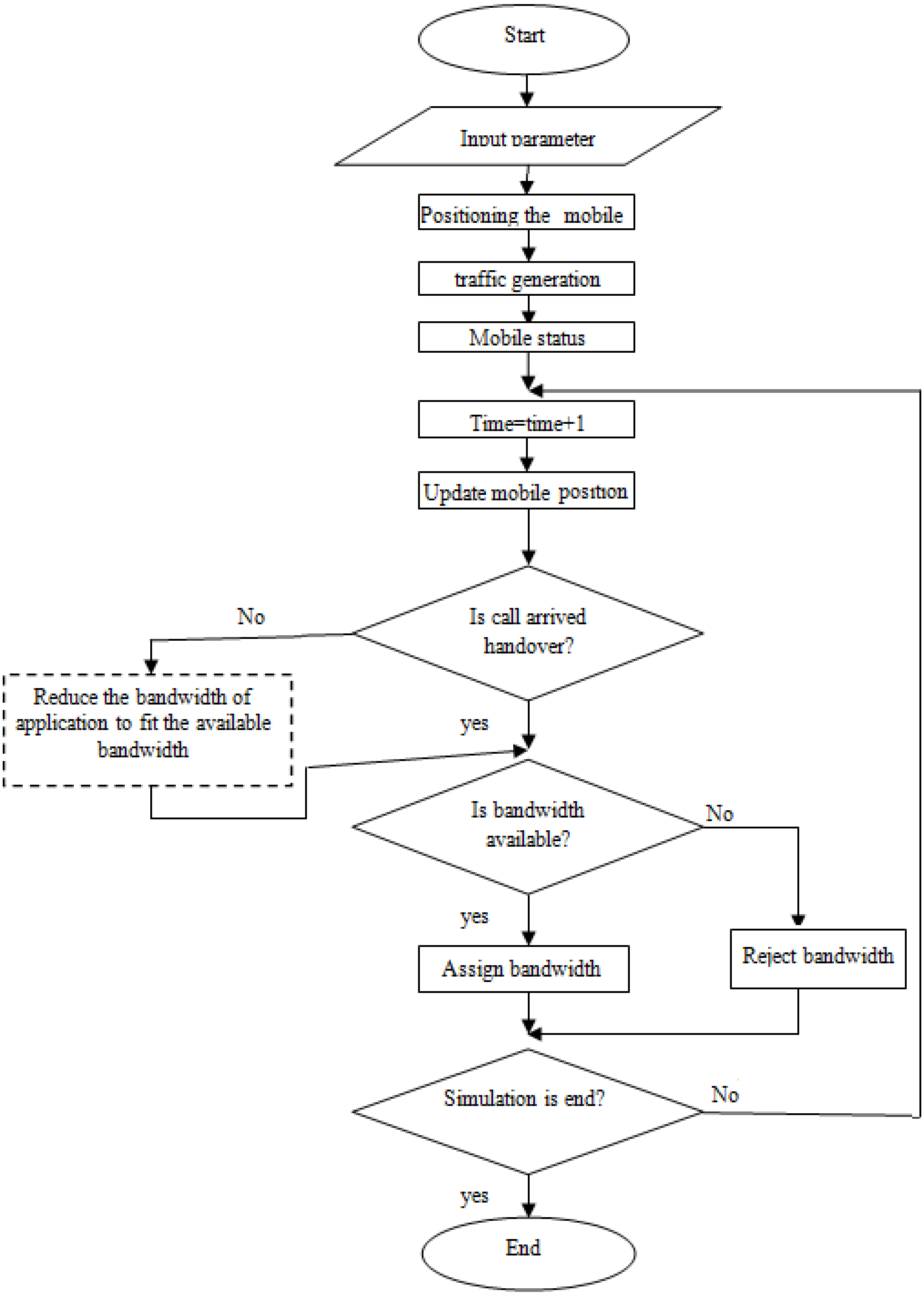

Figure 3: Flow Chart

6. Result and Discussion

Figure 4 shows that simulation windows and it represented the random distribution of user inside the building as defined previously, the X axis represent window length and Y axis represented width equal 4km both of them.

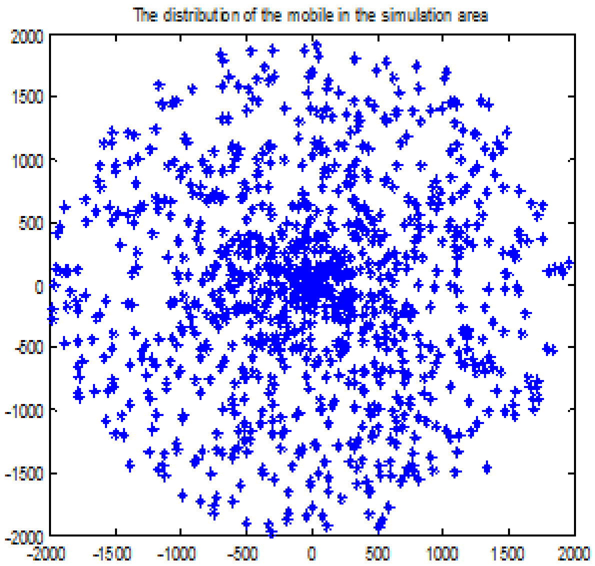

Figure 4: Simulation Model Window

Figure 5 shows the histogram where X axis is the interarrival time [s] and Y axis represented frequency .

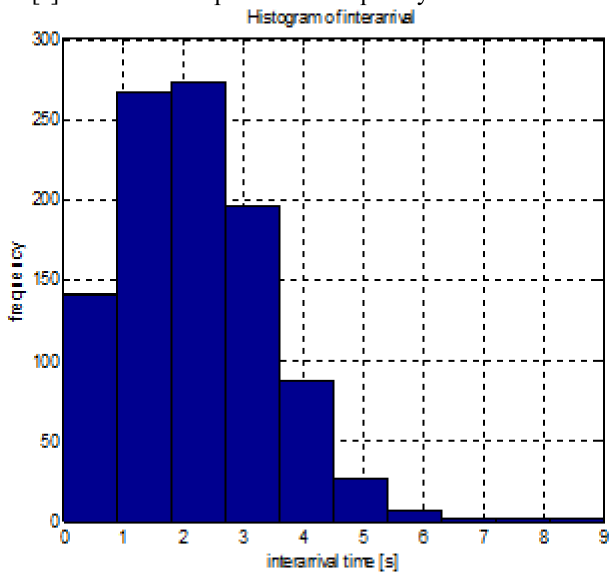

Figure 5: Histogram of interarrival

Figure 6 shows the The distributon of call arrival time where X axis is User ID and Y axis represented arrival time [s].

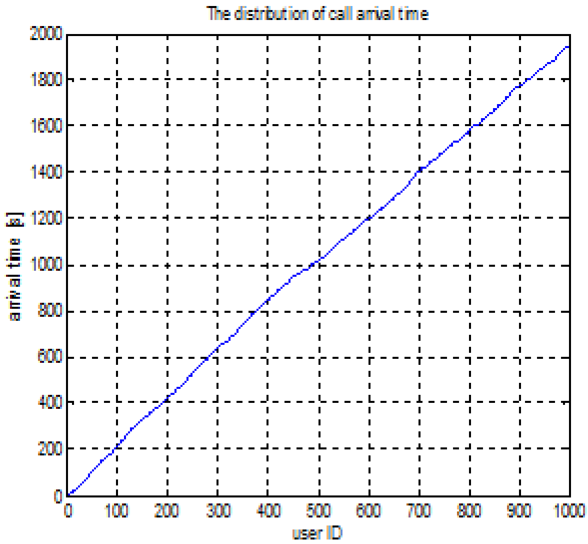

Figure 6: The distributon of call arrival time

Figure 7 shows the The required bandwidth where X axis is User ID and Y axis represented Bandwidth[Kbps]. Table (3) &(4) show the results without adaptation and with adaptation

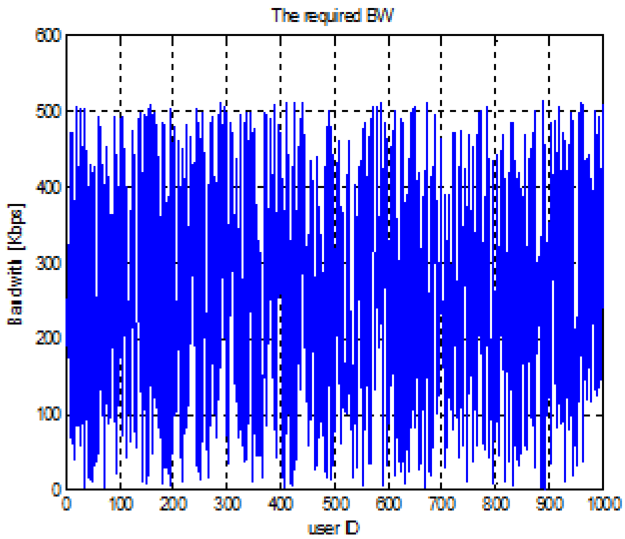

Figure 7: The requried BW

Table 3: Results Without Adaptation

user	Rn	TC A	TC B	TC C
1000	13	17.6067	1024	54.3935
500	9	3.7789	1024	71.9793
300	1	15.5224	1024	44.6784

Table 4: Results Adaptation

user	Rn new	TC A	TC B	TC C
1000	11	6.6461	1024	7.3671
500	10	47.3016	1024	28.075
300	7	2.0208	1024	1.8372

7. Conclusion

The proposed Algorithm has good performance for large number of user (high traffic), however in case of small number of user (low traffic) is not useful.

References

[1] S.Rappaport, Wireless Communication Principles and Practice, Second Edition, Theodore,2005.
[2] Asharaf Gasim Elseed Abdalla assignment and handover strategies in an integrated mobile satellite telecommunication system", Ph.D thesis UKM, 2002.
[3] Robert G.Winch, Telecommunication Transmission Systems, Second Edition, Delhi, 2006.
[4] Sigmmd, M.Redl malhias, k.weber, Malcom W.Oliphat, GSM and personal communication Artech House Publishers / ISBN: 0890069573 2009.
[5] Peter Stavroulakis, Terrestrial trunked radio TETRA: a global security tool, springer,
[6] Gordon L. Stuber, Principles of mobile communication, second edition.
[7] W. Stallings, Wireless communication and Network,, 2nd ed., C. W. Networks, Ed., New Jersey, 2005, pp 266 -274
[8] A. Sgora and D. D. Vergados, "Handoff prioritization and decision schemes in wireless cellular networks: a survey,"vol. 11, no. 4, october 2009.
[9] Li & Drew, Fundamentals of Multimedia,2003.
[10] Fox, E.A (1991) Adanced in interactive digital multimedia systems. IEEE computer , 24 : 9-21 .
[11] Furht, B. (1994) multimedia systems: an overview. IEEE multimedia, 1:47-59.

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