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Bandwidth allocation mechanisms in the next mobile generation: A practical Approach

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Abstract: *This paper presents an algorithm for bandwidth management in integrated LTE network and WLAN. The proposed algorithm also suitable for multimedia network (image, telephone and videophone).*
A software tool is implemented to simulate the proposed algorithm it is basedon windows for random distribution numbers such as Poisson distribution functionfor traffic generation and uniform distribution for mobile location using MATLAB. The parameters taken in this proposed simulation model are: number of user, type of traffic, user class and user bandwidth. The results of the simulation indicate that the new algorithm increases the bandwidth availability in the lower data rate network and this reduces the congestion in the high data network.

I. Introduction:

"Mobile wireless industry has started its technology creation, revolution and evolution since early 1970s.In the past few decades, mobile wireless technologieshave experience 4 or 5 generations of technologyrevolution and evolution, namely from 1G to 4G.The cellular concept was introduced in the 1G tech-neology which made the large scale mobile wirelesscommunication possible. Digital communication has replaced the analogy technology in the 2G which improved the wireless communicationquality. Data communication, in addition to thevoice communication, has been the main focus in the3G technologies and a converged network for bothvoice and data communication is emerging. Withcontinued RD, there are many killer applicationopportunities for the 4G as well as technological challenges."[1]

The 5G potential will require the design of a single wireless user terminal able to autonomously operate in different heterogeneous access networks.A fully reconfigurable terminal changes its communication functions depending on network and/or user demands. Moreover, this terminal will have to exploit various surrounding information such as communication with navigation and localization systems and communications with weather forecast and emergency systems in order to provide richer user services. However, the richness of the services will necessitate higher bit rates, which will be the main driving factor towards broadband multimedia development. [2]

Table (i):Comparison ofallGenerationsofmobileTechnology [3].

Technology Features	1G	2G	3G	4G	5G
Start/Deployment	1970-1980	1990-2004	2004-2010	Now	Soon(probaly2020)
Data Bandwidth	2Kbps	64 Kbps	2Mbp	1Gbps	high
Technology	Analog cellular technology	Digital Cellular Technology	CDMA 2000(1XRTT,EVDO) UMTS,EDGE	WiMAX LTE Wi-Fi	WWWW(comin g soon)
Service	Mobile telephony (voice)	Digital voice SMS, Higher capacity packetized date	Integrated high quality audio, video and data	Dynamic Information access, Wearable devices	Dynamic Information access, Wearable devices with AI Capabilities
Multiplexing	FDMA	TDMA-CDMA	CDMA	CDMA	CDMA

Switching	Circuit	Circuit, packet	Packet	All Packet	All Packet
Core network	PSTN	PSTN	Packet N/W	Internet	Internet

II. Bandwidth requirement formultimedia:

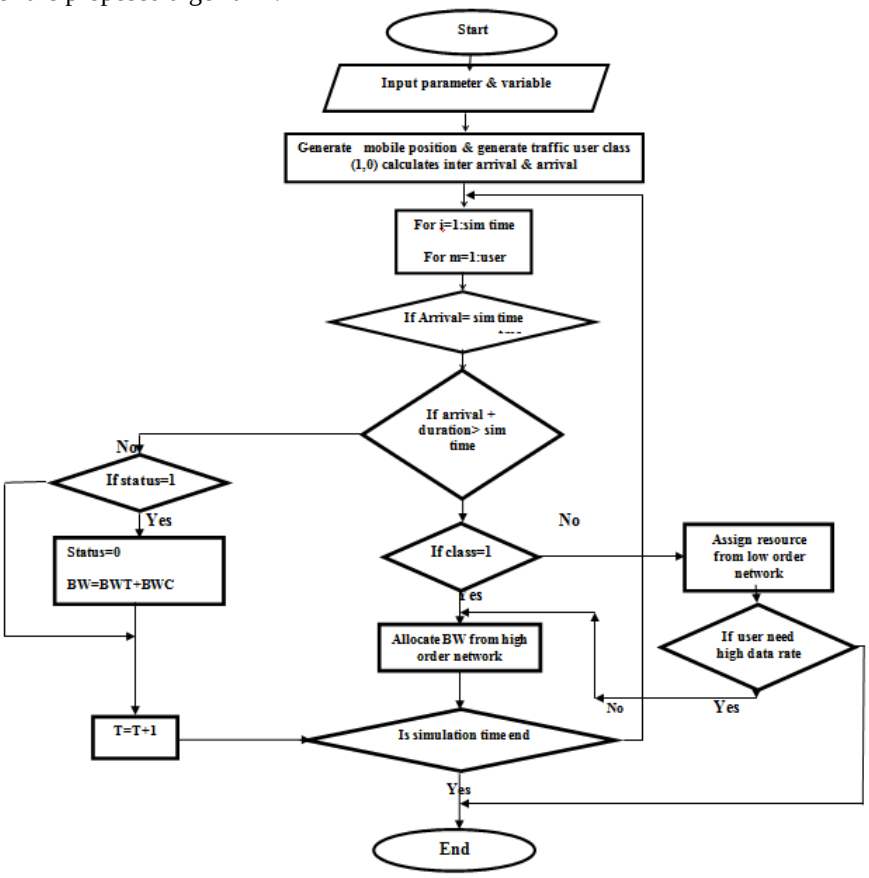
The network bandwidth is divided among users sharing a cell. The amount of bandwidth per user is a measure of the network capacity, because it depends on the distribution of the user population [4]. The total bandwidth for 5th Generation proposed as 1.056Gbit/s distance of up to 2kilometres with the use of an 8*8MIMO [5]. Table (ii) shows the service requirements in term of bandwidth

Table (ii): service requirements [6]

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

III. Simulation Scenario:

The flow chart for the proposed algorithm:



IV. Mathematical model:

For the application of the proposed model we used MATLAB to configure like environment real environment for users of mobile cellular systems. Using random generator function, we select a random location for users of mobile terminals in the model. And to generate calls to the users arrival times randomly used.

We used Poisson distribution function because of the advantages it is simple, stable and independent in all moments of time. Poisson distribution gives the number of arrivals in a constant length (t) distributed in the mean value (λt) [7], the following relationship

$$P\ x,t = ((\lambda t)^x/x!)e{-}\lambda t \quad (1)$$

After making that environment through consideration of the physical model we can use the data to find less can receive user when the maximum distance it can travel without having to transfer it to the base station.

Simulation:

Figure 4.1 shows that simulation windows and it represented the random distribution of nodes inside the building as defined previously, the X axis represent window length and Y axis represented width equal 50 meter both of them.

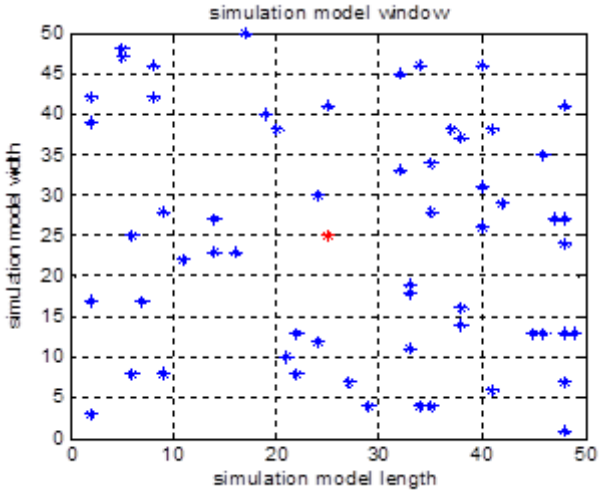


Fig:4.1: simulation model window

The second result shown and this random generated depend on the user class (real time and no real time).the X in figure 4.2 represented the users or nodes needed data rate axis is the number of node which equal 60 user and Y axis represented data rate that each user needed .

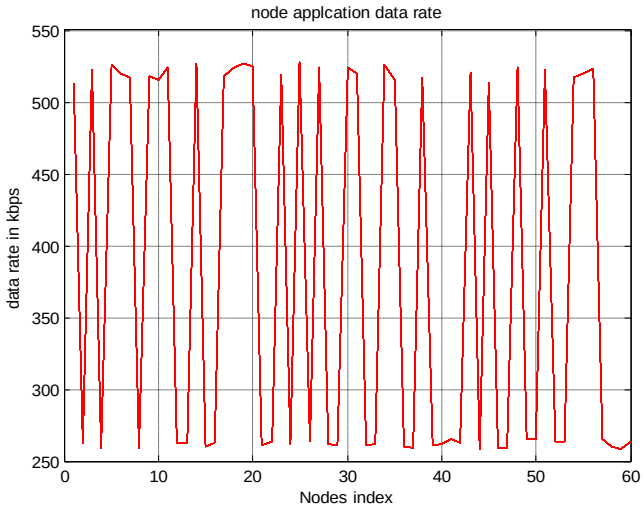


Fig: 4.2: node application data rate

The third result as shown in figure 4.3 it represented the type of traffic or user class (real time and non-realtime) random generated 1 for real time user and 0 for non-real time user. The X axis is user class 1 or 0, and Y axis represented number or user in each class. Also figure 4.4 show the percentage of each type of users in pipe diagram.

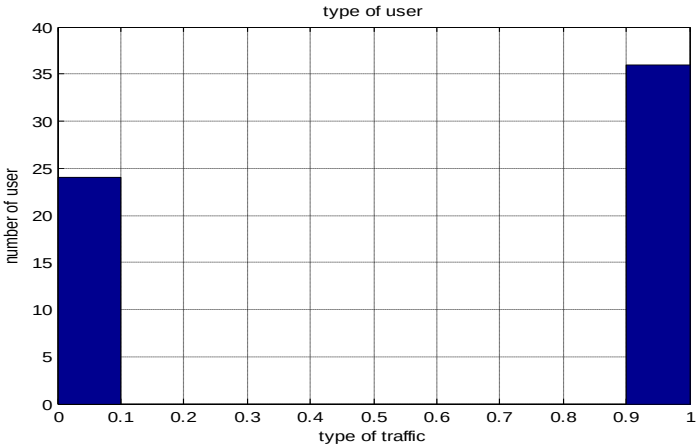


Fig: 4.3: Traffic classification for users

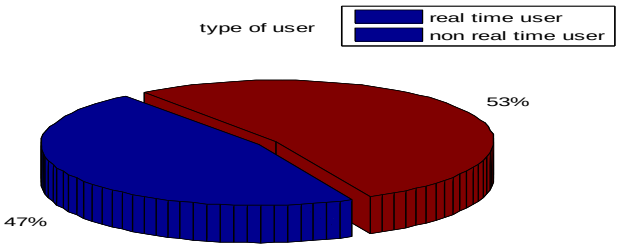


Fig: 4.4:type of user in pipe diagram

Figure 4.5 represented the maximum data user nodes. The X axis is the nodes index which equal 60 users and Y axis represented bandwidth in kbps.

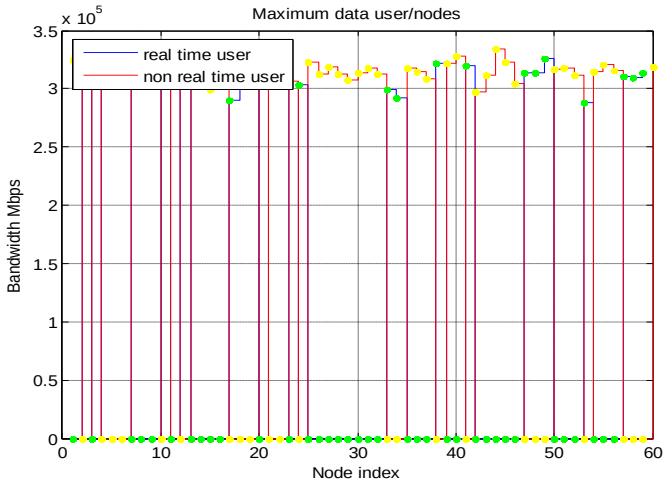


Fig: 4.5:maximum data user nodes

The result as shown in figure 4.6 it represented the assign resource WLAN user bandwidth. The X axis is nodes index and Y axis represented bandwidth in kbps and figure 4.7shows the WLAN available bandwidth after new algorithm.

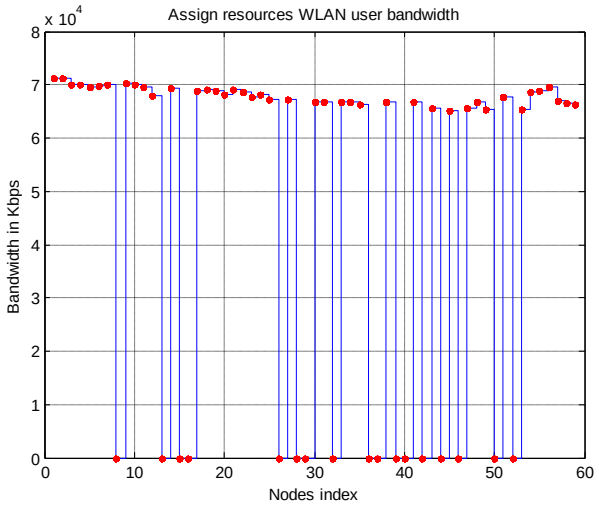


Fig: 4.6:assign resource WLAN user bandwidth

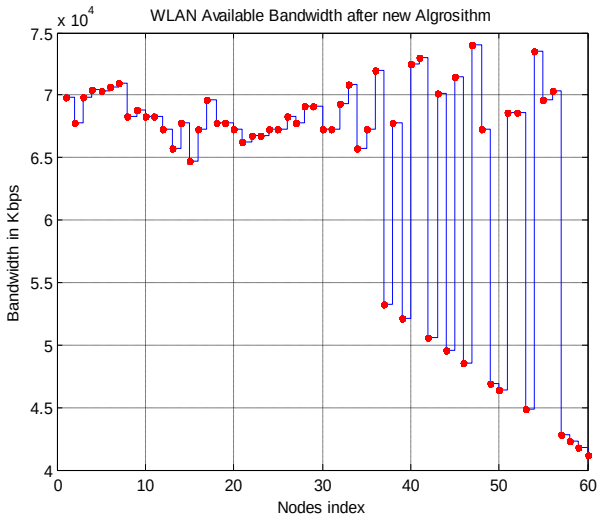


Fig:4.7 :WLAN available bandwidth after new algorithm

Figure 4.8 represented the assign resource LTE user bandwidth and figure 4.9shows available bandwidth after new algorithm. The X axis is the nodes index which equal 60 users and Y axis represented bandwidth in kbps.

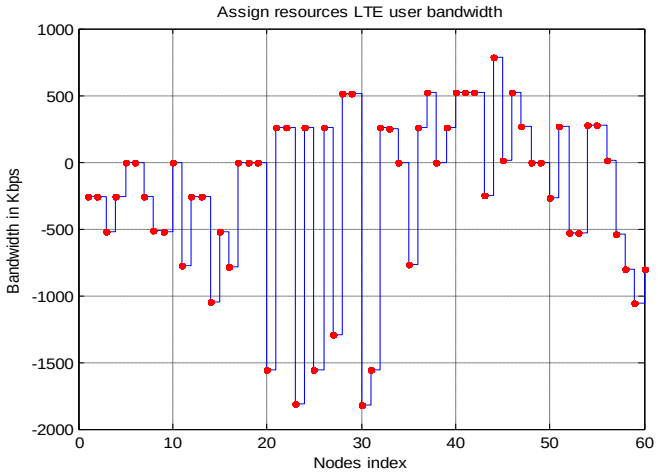


Fig: 4.8: assign resource LTE user bandwidth

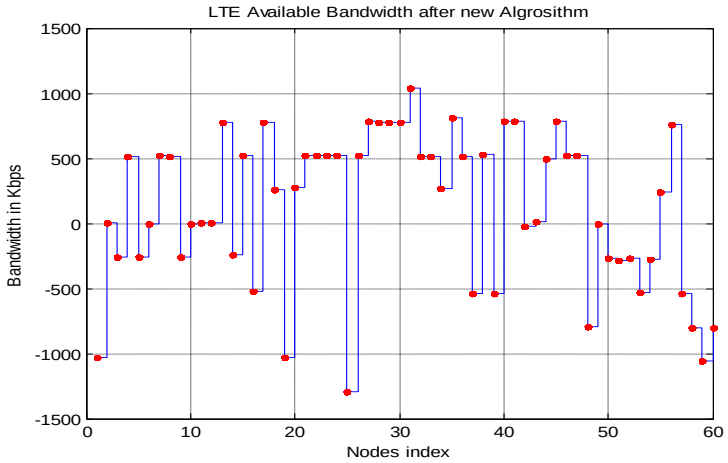


Fig:4.9: LTEavailable bandwidth after new algorithm

IV. Conclusion:

The effective bandwidth management algorithm enhances the bandwidth optimization and utilization. In this study the proposed algorithm for bandwidth management,in integrated LTE and WLAN networks, improved the bandwidth availability in the WLAN and it reduces the congestion in the LTE band. This will grantee the required quality of services however it will introduce a high signaling load due to the frequent handover between the two networks.

References:

[1]. http://www.isindexing.com/isi/papers/1396420201.pdf)
[2]. Dr. Anwar M. Mousa"Prospective of Fifth Generation MobileCommunication" University of Palestine,Gaza- Palestine.
[3]. "5G Mobile Technologies"
[4]. http://www.doc.ic.ac.uk/~nd/surprise_95/journal/vol1/mjf/article1.html
[5]. Metis project presentation (general overview 25/3/2013) Disclaimer .some of the icons used in the METIS project presentation are owned by Eriksson. They will be later removed and replaced by METIS specific icons.
[6]. Data communication and computer network PHI learning retrieved 10 July 2011.
[7]. V. B. Iverson, "Tele traffic engineering and network planning," Technical University of Denmark, Technical University of Denmark Building 343, May 2010. [Online]. Available:http://www.fotonik.dtu.dk .