IOSR Journal of VLSI and Signal Processing (IOSR-JVSP)
ISSN: 2319 – 4200, ISBN No. : 2319 – 4197 Volume 1, Issue 2 (Sep. - Oct. 2012), PP 53-60
www.iosrjournals.org

Congession Avoidence in Ip Based CDMA Radio Access Network (Ran) Through Router Control

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Abstract: *As communication plays an important role in day to day life, the effective and efficient data transmission is to be maintained. This paper mainly deals with implements a congestion control mechanism using Router control method for IP-RAN on CDMA cellular network. The Router control mechanism uses the features of CDMA networks using active Queue Management technique to reduce delay and to minimize the correlated losses. The Random Early Detection Active Queue Management scheme (REDAQM) is to be realized for the router control for data transmission over the radio network using routers as the channel. As technology develops, we can satisfy these needs by using new tools, new applications and new personal devices. When utilizing these new personal tools and services to enrich our lives, while being mobile, we are using Mobile Multimedia applications. As new handsets, new technologies and new business models are introduced on the marketplace, new attractive multimedia services can and will be launched, fulfilling the demands. Because the number of multimedia services and even more so, the context in which the services are used is numerous, the following model is introduced in order to simplify and clarify how different services will evolve, enrich our lives and fulfill our desires.The proposed paper work is to be realized using Matlab platform.*
Keywords: *REDAQM, CDMA, IP-RAN, Matlab.*

I. Introduction

A typical communication system will input data, perform some form of processing and frequency translation, transmit the data, and perform the converse operations at the receiver. Wireless communication is the transfer of data from one place to another through electromagnetic waves. It is a mode of communication that uses free space instead of wires[1]. Hence the data travels in the air as same as light does. Wireless communication mostly related to radio, microwave and infrared waves. Cellular wireless Network has become an indispensable part of communication infrastructure. CDMA is an important air interface technologies for cellular wireless networks. Traditionally in these wireless access networks, the base station are connected to radio network controller or base station controller by Point to Point links. These Links are expensive and their use imposes and ongoing cost on the service providers. In such networks, reliability comes at a high price. As CDMA-based cellular networks mature, the current point-to-point links will evolve to an IP-based Radio Access Network (RAN). While the use of RAN has many advantages, mechanisms must be designed to control the IP Radio Access Network congestion. Congestion occurs when the offered traffic exceeds the engineered IP RAN capacity.

II. Problem Statement

The present wireless communication system is moving towards the IP enabled network, where the cellular services are integrated with IP network for the transmission of data. Such networks are generally termed as IP-RAN network[7]. In this network the Transmission Control Protocol (TCP) is the most widely used method to achieve elastic sharing between end-to-end IP flows[4]. At present the core network basically relies on end-system TCP to provide congestion control and sharing but this will not be acceptable in coming future because, to avoid time-out, each TCP connection requires few packets to be stored in the network, and most of that storage occurs in the router buffer which leads to congestion.

Without sufficient storage in router, the time-out will give a poor performance to the end user and prevent sharing in network. Providing larger storage for large number of connections will cause too much latency. So, if latency is to be limited then the number of connections must be severely reduced.

With the increase in the data access using these protocol, demands for larger bandwidth in coming future. Increasing bandwidth may not be a suitable solution as it is economically non-advisable. The decrease in the resources may lead to congestion in the network resulting to complete collapsing of the network[7]. A mechanism is hence required to overcome these problems so as to support larger data in the constraint resource to provide fair routing with least congestion.

III. Objective Of Study

In this paper work implementation is proposed for the control of congestion in IP-RAN network to maximize network capacity while maintaining good voice quality router control mechanism is evaluated.

The principle underlying the scheme is regulation of the IP RAN load by adjusting the impact of router control in the form of active queue management. IP routers using a drop tail mechanism during congestion could produce high delays and bursty losses resulting in poor service quality. Use of active queue management at the routers reduces delays and loss correlation, thereby improving service quality during congestion. This paper objective is to implement a efficient congestion control mechanism on router using RED, Random Early detection method for improving the performance of IP-Based Radio Access Network.

IV. Cdma Theory

In a code-division multiple-access (CDMA) communication system, a communication channel with a given bandwidth is accessed by all the users simultaneously. The different mobile users are distinguished at the base station receiver by the “unique spreading code” assigned to the users to modulate the transmitted signals. Hence, the CDMA signal transmitted by any given user consists of that user's data which modulates the unique spreading code assigned to that user, which in turn modulates a carrier using any well-known modulation scheme[5]. The frequency of this carrier is the same for all users. At the receiver separation is possible because each user spreads the modulated waveform over a wide bandwidth using unique spreading codes. This technique is used for channels, which suffer frequency selective fading or interference.

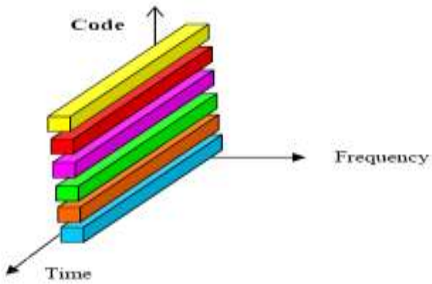

Figure 1: Code Division Multiple Access

In wireless access networks today, the base stations and the radio network controllers are connected by point-to-point T1/E1 links. These back-haul links are expensive and add to operating costs[2]. Additionally, in this point-to-point architecture, the Radio Network Controllers (RNCs) are only shared by a small set of base stations (BSs) and can contribute to significant blocking during hot-spot and peak hours; thus, the network operator needs to appropriately scale-up the RNC capacity thereby increasing capital costs. Furthermore, in this architecture, RNC is typically a single point of failure and is thus made highly redundant - this again increases the cost of each RNC[5].

One effective way to reduce these costs is to replace the point-to-point links with an IP-based Radio Access Network [3] (IP-based RAN). The current wireless access network architecture and an architecture based on IP RANs is shown below.

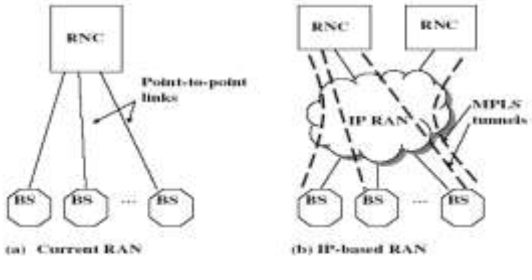

Figure 2: Wireless access network architectures

In the data transfer form IP-RAN is done through the control of congestion in router and a RANDOM DROP ROUTER is used to better data transmission in average.

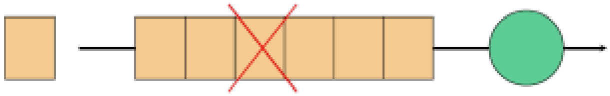

Figure 3: Random Drop Router

V. Random Early Detection Router

Random early Detection is one of the active queue management control mechanism deployed at gateways. The RED gateway detects incipient congestion by computing the average queue size (Jacobson, 1998). The gateway could notify connections of congestions either by dropping packets arriving at the gateway or by setting a bit in packet headers. When the average queue size exceeds a preset threshold, the gateway drops or marks each arriving packet with a certain probability, where the exact probability is a function of the average queue size[3]. RED gateways keep the average queue size low while allowing occasional burst of packets in the queue. Figure 4 show a network that uses RED gateway with a number of source and destination host while Table 1 shows RED gateway parameters and their meanings. The RED congestion control mechanism monitors the average queue size for each output queue, and using randomization, chooses connections to notify of the congestion Transient congestion is accommodated by a temporary increase in the queue. Longer-lived congestion is reflected by an increase in the computed average queue size and result In randomized feedback to some of the connections to decrease their windows[1]. The probability that a connection is notified of congestion is proportional to that connection's share of the throughput through the gateway.

Table 1: RED gateway parameters and their meanings

Parameter	Meanings
Min_{th}	Minimum threshold
Max_{th}	Maximum threshold
q_w	Weight factor for averaging
Max_p	Maximum packet marking probability
W(k)	Window size at slot k
N(k)	The number of TCP connections at slot k
τ	Propagation delay of TCP connections

5.1 Red Algorithm

RED mechanism contains two key algorithms. One is used to calculate the exponentially weighted moving average of the queue size, so as to determine the burstiness that is allowed in the gateway queue and to detect possible congestion. The second algorithm is for computing the drop or marking probability, which determines how frequently the gateway drops or marks arrival packets[9]. This algorithm can avoid global synchronization by dropping or marking packets at fairly evenly spaced intervals. Furthermore, sufficiently dropping or marking packets, this algorithm can maintain a reasonable bound of the average delay, if the average queue length is under control.

VI. Transmitter Module

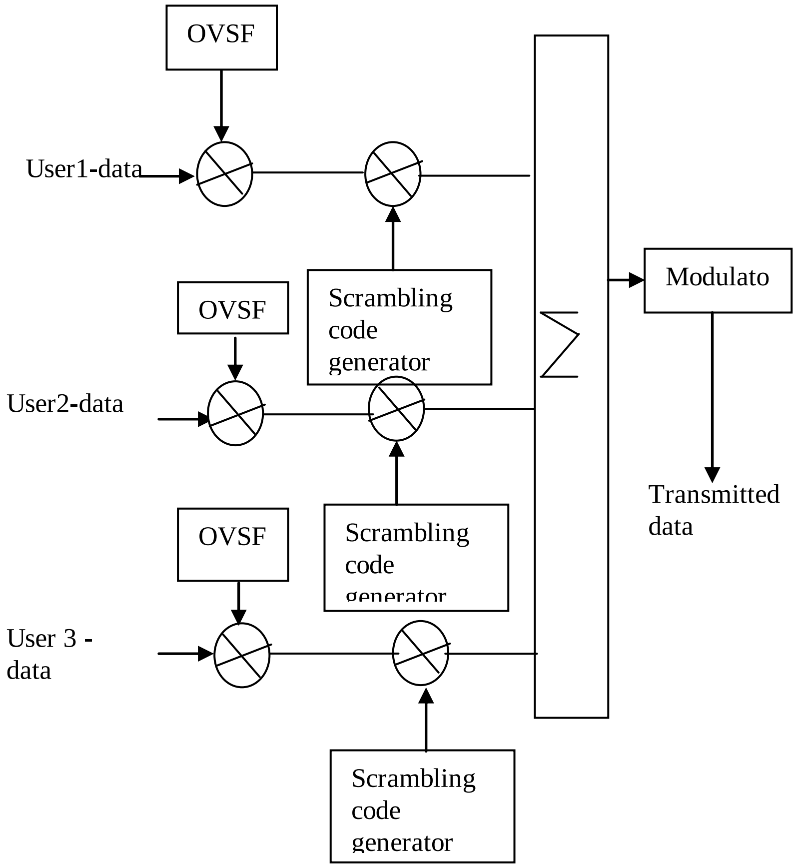

Fig: 4: Transmitting module architecture

Transmissions from a single source are separated by channelization codes, i.e., download connections within one sector and the dedicated physical channel on the uplink[8]. The OVSF channelization code preserves the orthogonality between different physical channels using a tree-structured orthogonal code. Scrambling codes make the direct sequence CDMA (DS-CDMA) technique more effective in a multipath environment. It significantly reduces the auto-correlation between different time delayed versions of a spreading code so that the different paths can be uniquely decoded by the receiver[10]. Additionally, scrambling codes separate users and base station sectors from each other by allowing them to manage their own OVSF trees without coordinating amongst themselves.

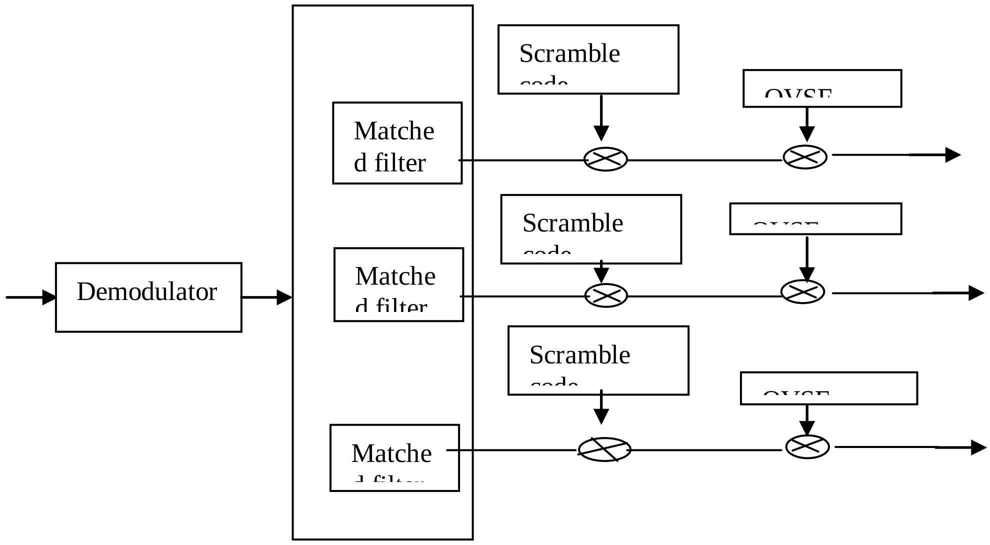

Figure 5: Receiver Module

The basic function of the DPSK demodulator is illustrated below. At the receiver, a reference carrier is created from the input signal. This recovered carrier is at the same frequency as that of the original carrier, but without any phase changes, in the sense the reference carrier has a constant phase, the recovery scheme used is explained. The recovered carrier is mixed with the input modulated signal to retrieve the unmodulated signal. At the receiver input, the received DPSK signal plus noise is passed through a band-pass filter centered at the carrier frequency f_c, so as to limit the noise power.

VII. Simulation Results

The matlab results explain you about the router congestion in IP-RAN mode and the transfer of data with help of RED algorithm.

The below plot shows the user interface created for simulating the implementation. There are two active buttons designed for the process. Continue and close buttons. The continue button is linked for execution of implementation and close button terminates the application.

Figure 6: Graphical user interface for implemented system

Figure 7: User Interface for Buffer length and Threshold entry

The above plot shows the user interface for entering the value of buffer length , maximum and minimum threshold passed to Random Early Detection algorithm for the evaluation of congestion. For the testing of implemented system buffer length of 25 is passed.

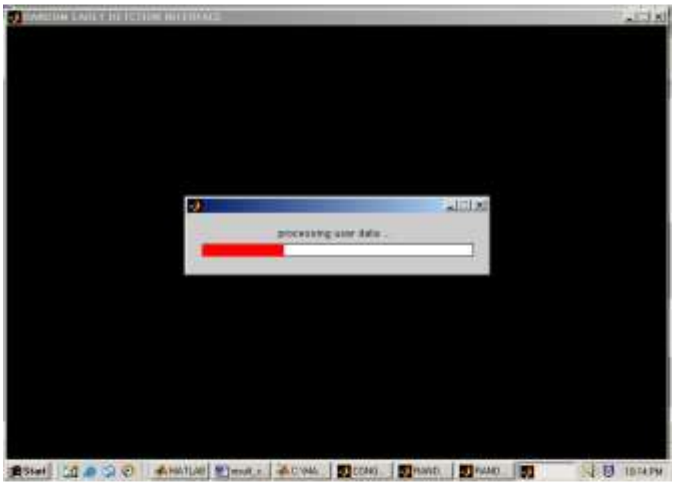

Figure 8: processing user data using CDMA

This plot shows the process bar indicating the computation of the user data to be processed using CDMA architecture.

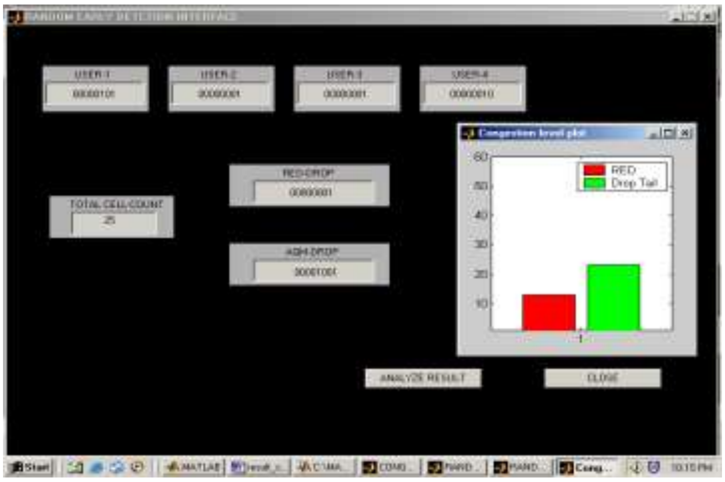

Figure 9: Simulation for Implemented Router Method

This plot shows the transmission of four simultaneous user data processing under one router architecture with a buffer length of 25. Figure illustrates the congestion level at the buffer used the proposed control mechanism i.e., RED algorithm and the Drop Tail method. The packet dropped due to RED and Drop Tail method is also illustrated.

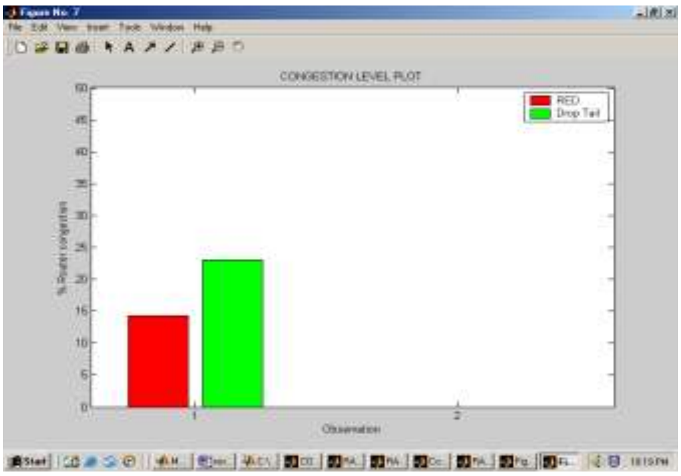

Figure 10: Percentage of Router Congestion for two methods

This plot shows the congestion level obtained for the two methods namely RED and DROP TAIL method for the implemented system. From the observation it is seen that for the delivery of the complete data about 55% congestion level is reduced in case of RED compared to DROP TAIL method.

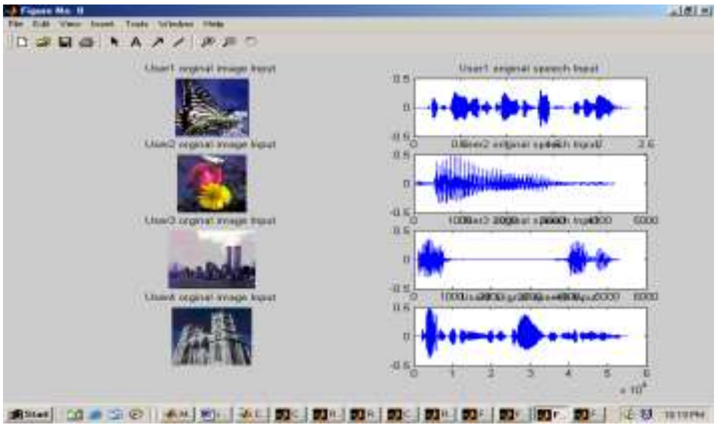

Figure 11: showing considered input image and speech samples

The plot input considered for processing the implementation. Four images and speech samples read and processed for evaluation of the proposed system. The two data's are considered so as to evaluate the performance for both audio and video compatibility.

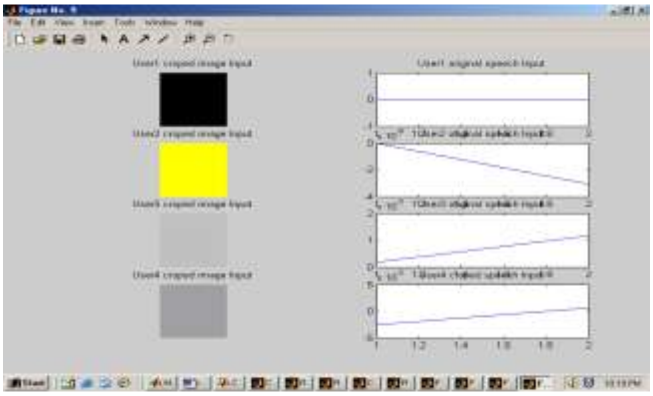

Figure 12: Input cropped image

This plot shows the implementations cropped into smaller region for processing the implemented system. Input figure shown in figure 6.8 are read contained data of about 50,000 samples. Processing on such data may take large time and require high resource for supporting the process. The data are hence cropped to smaller size for faster evaluation of the implemented system. The result obtained for the cropped data is found proportional to the original image.

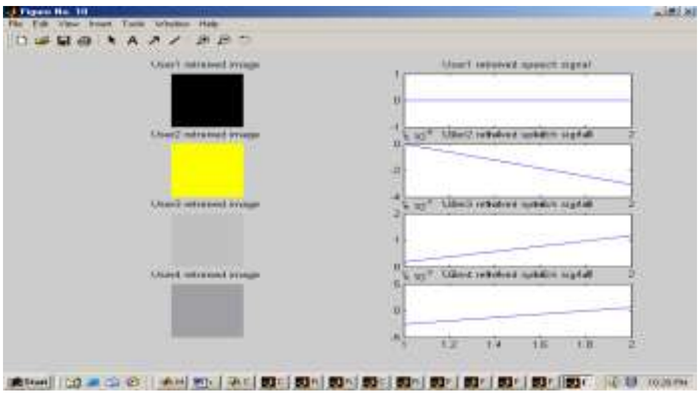

Figure 13: Final Retrieved Data

This plot shows the retrieved image and speech samples after processing the implemented system. The obtained results compared to the original data are found to be almost same. This shows an accurate system implementation with congestion avoidance algorithm for terrestrial controlling.

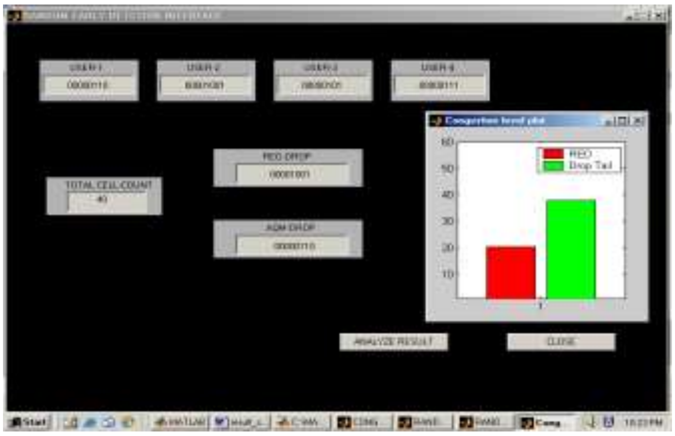

Figure 14: Simulation for Implemented Router Method

This plot shows the transmission of four simultaneous user data processing under one router architecture with a buffer length of 40. Figure illustrates the congestion level at the buffer used the proposed control mechanism i.e., RED algorithm and the Drop Tail method. The packet dropped due to RED and Drop Tail method is also illustrated. The two functional buttons analyze and close is used for the evaluation of the implemented system with the existing system.

VIII. Conclusion

With the advancement of communication technology need for supporting larger data communication over the constraint resource becomes a challenging task. For the present point to point access the resource available may support low bit applications such as voice data. But for larger data transmission such as audio video transmission, over these constraint resources the system needs to be modified. With the increase in demand for multiple services such as image and voice transmission and Internet accessing a new network called IP based Radio Access Network is evolved.

IP based Radio Access Network communicate the data throw router interface to avoid congestion that with the increasing demand for heavy traffic, existing congestion control policies fails. This demands in realization of an efficient congestion control mechanism for terrestrial congestion control throw router.

This paper realizes a control mechanism for CDMA based IP network for controlling the congestion using Active Queue Congestion control method. An algorithm called Random Early Detection (RED) is implemented to control the congestion at router level. From the obtained results it is observed that the congestion level is quite efficiently will control using RED algorithm than the DROP TAIL mechanism. The throughput is seen to be improved using RED algorithm than the DROP TAIL mechanism.

Acknowledgment

The authors thank Sri. A.Vamsidhar Professor, Department of E.C.E, DADI INSTITUTE OF ENGINEERING & TECHNOLOGY, for his valuable suggestions in completing this paper

References

[1] Andy Miller and Michael Gulotta,(1999) "PN Generators Using the SRL Macro", Application Note: Virtex Series, Virtex-II Series, and Spartan-II Family, Xilinx Website
[2] E.H. Dinan, B. Jabbari, "Spreading codes for direct sequence CDMA", IEEE Communications Magazine, pp. 48-54, September 1998.
[3] Marat and Bosquet, (2002)"Satellite Communications Systems", Fourth Edition, John Wiley & Sons, Inc
[4] Simon Haykin,(2000) "Communication Systems ", Fourth Edition, John Wiley & Sons, Inc
[5] Timothy Pratt, Charles W. Bostian, (1989) "Satellite Communications", John Wiley & Sons, Inc
[6] B. Braden et al, "Recommendations on queue management and congestion avoidance in the internet," Request for Comments 2309, Network Working Group, April 1998.
[7] V.GARG, wireless Network Evolution 2G to 3G,Prentice-Hall, 2001.
[8] R. Vaccaro, Digital control, a state space approach, McGraw Hill, 1998.
[9] S. Floyd and V. Jacobson "Random early detection gateways for congestion avoidance ," IEEE/ACM Transactions on Networking, vol.1 no. 4, pp. 397-413, August 1993.
[10] Y.B. Lin and W.Chen, "Impact of busy lines and mobility on cell blocking in pcs networks," International Journal of communication Systems, , no. 9, pp. 35-45, 1996.