International Journal of Engineering Research and Science & Technology

ISSN 2319-5991 www.ijerst.com
Vol. 3, No. 2, May, 2014

Research Paper

A NOVEL ROUTER CONTROL MECHANISM FOR CONGESTION AVOIDANCE IN CDMA COMMUNICATION USING MATLAB

Dikkala Anusha[1]* and Selvaraj P[1]

Corresponding Author:* ***Dikkala Anusha,* ✉ *dikkala.anusha@gmail.com*

In this work a 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 active queue management is nothing but the regulation of the IP RAN load by adjusting the impact of router control. There is a poor service quality because of the drop tail mechanism used by the IP routers during congestion.The service quality during congestion can be increased by using the active queue management at the routers and also due to this the delays and loss correlation are reduced. This project 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.

Keywords: Congestion, Routability

INTRODUCTION

We present a novel method to reduce the routing congestion. This approach is through a global view. The entire design presented here removes the conflicts for a congested region. Certain metrics are taken and improved efficiently to evaluate a perfect route. Here the Quality of service and Quality of transmission are taken to account in a very flexible manner.

This work implements a congestion control policy for controlling congestion over IP based network. The method could suitably used for CDMA based wireless network, which uses IP communication for data transfer. The task also finds its application in areas such as video conferencing; Mobile based IP services such as web browsing, email, screaming packetised voice etc. where bandwidth is a important factor.

The Random Early Detection (RED) algorithm is a congestion avoidance technique highly used under networks to avoid network congestion. At the main bottle neck point this red system monitors the coming traffic load in an effort to anticipate and avoid congestion than the existing algorithms.

Moreover, RED uses Active Queue Management techniques currently deployed in large IP networks. It takes advantage of TCP's

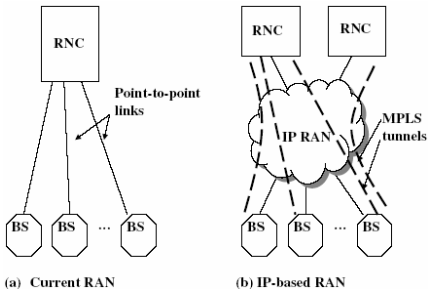
[1] Dept of Information Technology, SRM University, Kattankulathur, India.

congestion control mechanism to avoid congestion in network where Packets are dropped probabilistically prior to periods of high congestion.

CONGESTION

The T1/E1 links act as connection between the base stations and the radio network controllers in wireless access networks today. These links are expensive and also increase the operating costs. The radio network controller(RNCs) are shared by the base stations(BSs) and also at the time of maximum peak hours they contribute to significant blocking in this point to point architecture. Therefore the network operator should increase the RNC capacity, but because of this the cost increases. So finally theses point to point links are replaced with an ip based radio access network(IP- based RAN) to reduce the effective cost. Hereby the present wireless access network architecture and the architecture depending on IP-RAN is shown in Figure 2.1

Figure 2.1: Architecture of Wireless Sensor Network



The next generation UMTS networks are expected to have the IP as the access network.While IP RAN has to typically meet stringent delay and loss constraints, it also has to be designed to control the IP-RAN congestion. generally the congestion occurs when the given offered traffic is more than the engineered IP RAN capacity. So here three approaches are provided to control and avoid congestion.

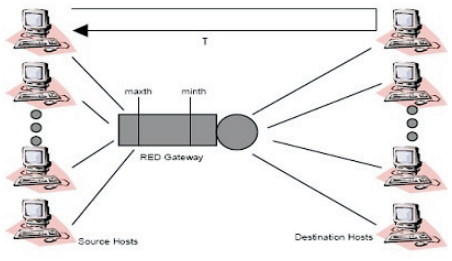
Initially, the network can be over-provisioned or peak-provisioned so that congestion never occurs. Access network bandwidth is expensive when compared to the core network bandwidth, so it is not possible. In the second approach. The access network has a facility to reserve resources but the various schemes even though proposed cannot be implemented in current IP networks. So finally the third approach that the best designed policies are evoked in IP-RAN for avoiding congestion .

ROUTER CONGESTION CONTROL METHOD

A. Random Early Detection Router

One of the Active queue managements deployed at gateways is random early detection router. This gateway detect congestion by average queue size compute which was introduced by Jacobson in 1998.By setting a bit in packet headers or dropping a packet the gateway could notify the connections of congestions. A preset threshold is marked. When the average queue size exceeds this already given threshold value then the gateway marks that arriving packet with some instinct probability. The Figure 3.1 shows the RED gateway with certain number of hosts and destinations.

Figure 3.1: A Network with RED Gateway



The RED congestion control mechanism monitors the average queue size for each output queue. Using randomization it chooses connections to tell about the congestion. If the

congestion is more then there is a similar increase in the queue size. For each output queue the average queue size is monitored by the RED congestion control mechanism. The Table 3.1 gives the information regarding the RED parameters.

Table 3.1: RED Gateway Parameters

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

B. Random Early Detection Algorithm

RED has two main algorithms. One which is used to calculate the average queue size which helps in determining the congestion. Second is used in ticking the probability which tells how often the packets arriving are dropped or picked. At certain spaced intervals if the packets are dropped or picked then both global synchronization and average queue sie are maintained. The Algorithm for the Random. Early Detection (RED) is given as,

Let the weight factor be 'wq' and the new instantaneous queue size be *qk+1*.

The average queue size is 'q' and lastly instantaneous queue size is 'q'. So the RED gateway gives the new average queue size at the packet arrival as

$$q_{k+1} = (1 - w_q).\ q_k + w_q.q_{k+1}$$

The estimation of the number of packets 'm' must have been transmitted by the router during the period when the RED gateway queue is empty are

$$q_{k+1} = (1 - w_q)^m.\ q_k,$$

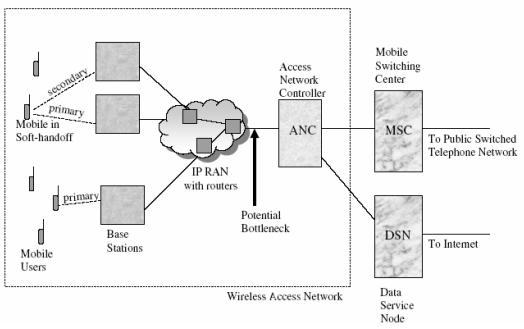
Where

m=idle time / transmission time

ARCHITECTURE

The implementation here in the communication system is little bit in link up with the wcdma architecture. Here the router unit and the wireless medium act as a wireless access between the transmitter and the receiver. The Figure 4.1 gives the image of the proposed architecture

Figure 4.1: Wireless Networks with IP-RAN



IMPLEMENTATION

Here for the process of implementation a GUI is built to show the process taken up clearly.Figure 5.1 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 5.1: Graphical user Interface for the Implementation

Figure 5.2 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. The maximum threshold passed is taken as 3/4th of the buffer length. The minimum threshold is considered to be less than half of the maximum threshold. The user data are spreaded using spread code and OVSF code before transmitting. The data is modulated using BPSK modulation method for transmitting.

Figure 5.2: User Interface for Buffer Length and Threshold Entry

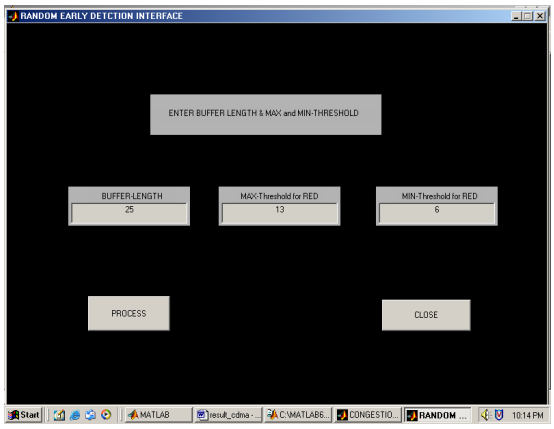
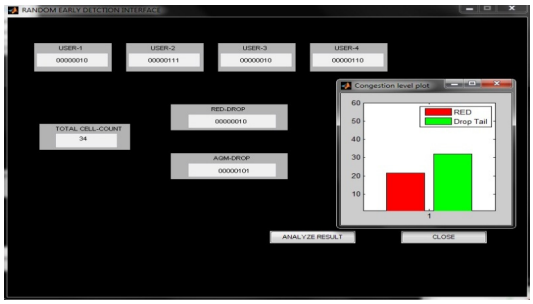


Figure 5.3 shows the transmission of four simultaneous user data processing under one router architecture with a buffer length of 35. Figure illustrates the congestion level at the buffer used the proposed control mechanism i.e., RED algorithm and the Drop Tail method. The packet dropped due to RED and Drop Tail method is also illustrated 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 5.3: Simulations for Implemented Router Method



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 project 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. So by the results we can clearly notify that the congestion level is very effectively controlled using this RED algorithm than the DROP TAIL mechanism. The

throughput is seen to be improved using RED algorithm than the DROP TAIL mechanism.

FUTURE SCOPE

This Project work implements a congestion avoidance algorithm for higher level of congestion avoidance in gateways. In this work the q-size threshold is calculated based on randomly generated values, work can be carried for optimizing the average q-size selection for maximizing the throughput with minimal delay. The algorithm can be further enhanced with incorporation of traffic management algorithms. The work is implemented targeting TCP protocol and further works can be carried out to make it compatible with other protocols.

BIBLIOGRAPHY

5. Andy Miller and Michael Gulotta (2004), “PN Generators Using the SRL Macro”, Xilinx, Vol. 1.2.

1. B Braden, D Clark, J Crowcroft, B Davie, S Deering, D Estrin, S Floyd, V Jacobson, G Minshall, C Partridge, L Peterson, K Ramakrishnan, S Shenker, J Wroclawski and L Zhang (1998), "Recommendations on Queue Management and Congestion Avoidance in the Internet", The Internet Society.

7. C N Toll Charles, “The Hand Book of Communications of Satellites Systems Problems”.

3. IP Based CDMA router congestion control by venkateswarulu in Radio Access Network.

4. “PCS Networks with Cell Blocking and Mobility of Impact of Busy Lines Detection”, by chen.

2. Richard J Vaccaro (1995), “Digital Control:A State-Space Approach”, Mcgraw Hill.

6. “The Literature Book of Communication Systems Acknowledgment Publishers”, by ieee systems acknowledgment author haykin.

International Journal of Engineering Research and Science & Technology
Hyderabad, INDIA. Ph: +91-09441351700, 09059645577
E-mail: editorijlerst@gmail.com or editor@ijerst.com
Website: www.ijerst.com