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Efficient Congestion Avoidance by using Random Early Detection method in IP Based CDMA Radio Access Network

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Abstract: ***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. In this network the Transmission Control Protocol (TCP) is the most widely used method to achieve elastic sharing between end-to-end IP flows. 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. 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. This paper presents Random Early Detection (RED) which realizes router control using Routers as channel for the transmission of data over radio networks. RED method is used for congestion control effectively and in this RED method Queue system is used which provides better results compared to the conventional (Drop Tail) techniques. This paper provides the comparison results of Drop Tail method and RED (Random Early Detection).***

Keywords: ***(CDMA) Code division Multiple Access, DROP TAIL, (PDPU) Packet dropped probability unit, (RAN) Radio Access Network, Random Drop Router, (RED) Random early detection, (RNC) Radio Network Controllers. Scramble code.***

I. INTRODUCTION

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.

This paper focus on the storage facility in Routers, Data accessing and congestion issues with effective data transmission are be analyzed.

II. RADIO ACCESS NETWORK

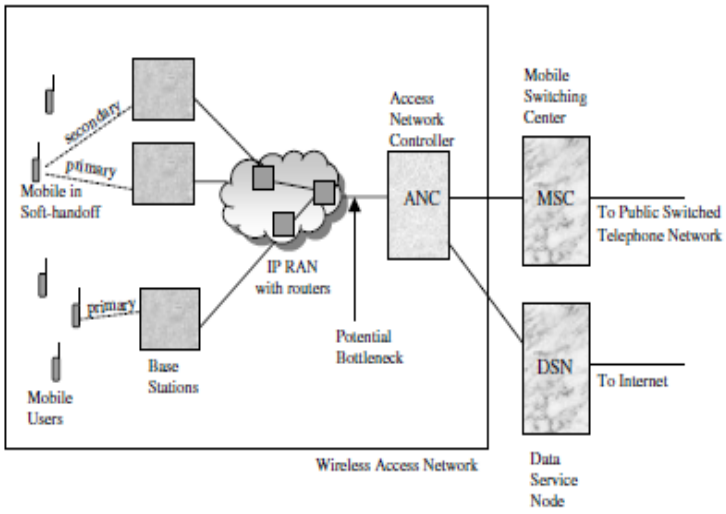

Fig. 1. CDMA Wireless Access Network with IP RAN

In this project 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.

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 (S. Floyd and V. Jacobson [1]) 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 project objective is to implement a efficient congestion control (S. Floyd and V. Jacobson [1]) mechanism on router using RED, Random Early detection method for improving the performance of IP-Based Radio Access Network (G. Heijenk, G. Karagiannis, V. Rexhepi [2]).

III. ALGORITHM DESIGN

ACTIVE QUEUE MANAGEMENT:

Active queue management (AQM) (S. Floyd and V. Jacobson[1]) is a form of router control that attempts to provide congestion control (S. Floyd and V. Jacobson [1]) by monitoring the congestion state of a router queue and proactively dropping packets (B. Braden et al [3]) before the buffers become full and queuing delays become too high. Some of the AQM policies drop packets with a certain probability to avoid busty loss.

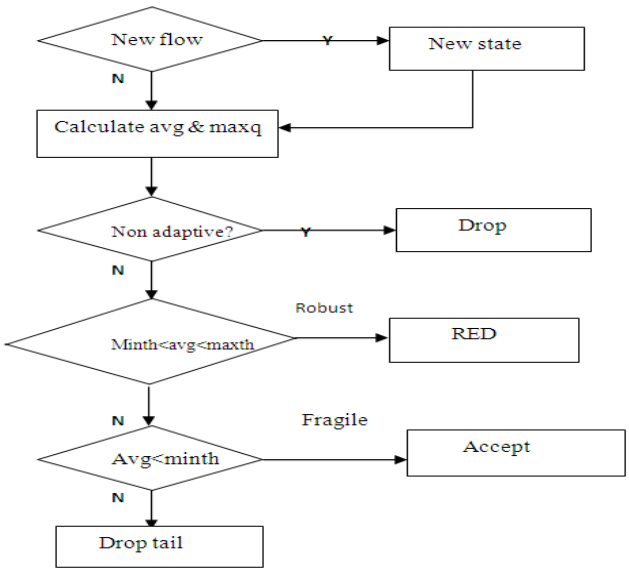

Fig. 2 Active queue management

IV. SIMULATION RESULT

We have taken four inputs image samples are taken to work with RED algorithm (B. Braden et al [3]) the results shown here.

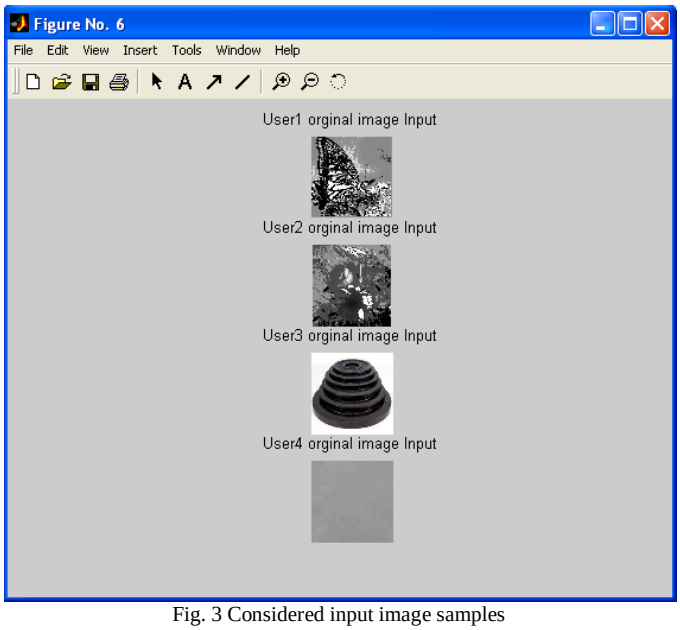

Fig. 3 Considered input image samples

The transmission of four simultaneous users 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 (B. Braden et al [3]) 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.

The comparison for the two-implemented methods named the RED and DROP TAIL method for throughput analysis on variation of Queue size. It is observed from the plot that with the increase in buffer size with data the throughput of DROP TAIL AQM method remain constant because of constant congestion level comparative the RED method increases its throughput once the minimum threshold is reached as the congestion level is maintained below the maximum level.

No. of packets	Threshold Q max	Threshold Q min	Arrival packets for RED	Arrival packets for DROP	Dropped packets for RED	Dropped packets for DROP	Efficiency for RED	Efficiency for DROP
16	14	4	13	11	3	5	81%	69%
16	7	2	12	12	4	4	75%	75%
32	30	8	20	13	12	19	63%	60%
32	15	4	19	14	13	18	60%	45%

Table 1: For different Threshold values

Table 1 shows the comparison between number of packets arrival, Dropped and efficiency for different Threshold values for RED and DROP TAIL methods. Here Buffer length is same.

No. of packets	Threshold Q max	Threshold Q min	Arrival packets for RED	Arrival packets for DROP	Dropped packets for RED	Dropped packets for DROP	Efficiency for RED	Efficiency for DROP
8	7	2	7	7	1	1	88%	88%
16	7	2	12	11	4	5	75%	69%
32	7	2	22	13	10	19	69%	41%

Table 2: For different Buffer length

Table 2 shows the comparison between number of packets arrival, Dropped and efficiency for different Buffer lengths for RED and DROP TAIL methods. Here Threshold values are same.

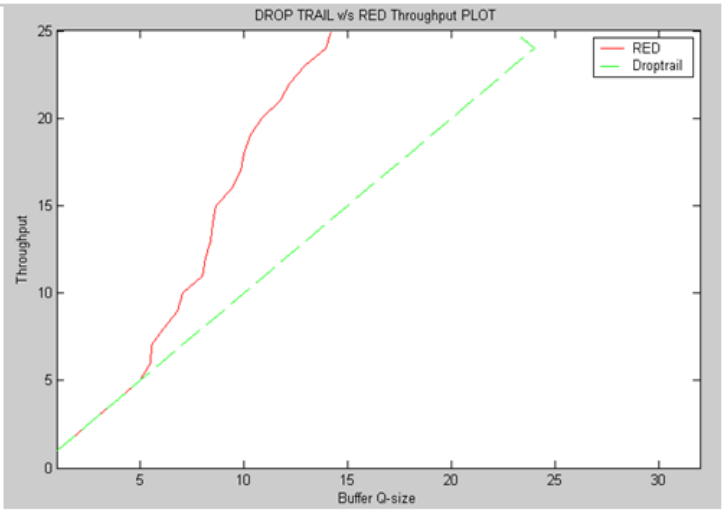

Fig 4: Queue size versus Throughput plot

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.

1 Cell = 32 bits

16 Cells =16x32 bits = 512 bits

Each bit has 4 concurrent connections 512x4 = 2048

Total Band Width = 2.5x4 = 10 Mbps.

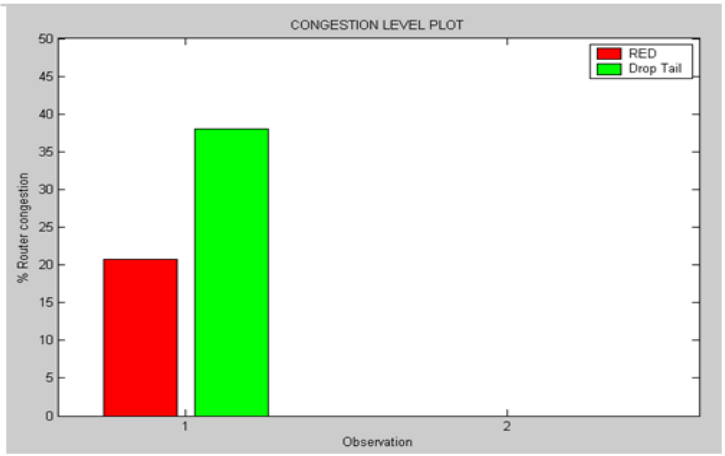

Figure 5: Percentage of Router Congestion for two methods

V. CONCLUSION

In this paper, we studied the problem of congestion control in the IP RAN of a CDMA (E.H. Dinan, B. Jabbari [7]) wireless access network and examined two control techniques are called Random Early Detection (RED), DROP TAIL mechanism. For larger data transmission such as audio video transmission and Internet accessing a new network called IP based Radio Access Network is evolved. 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 (B. Braden et al [3]) than the DROP TAIL mechanism. The throughput of RED algorithm is more efficiently than the DROP TAIL mechanism as comparison of arrival packets.

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