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COMPARATIVE DELAY ANALYSIS BETWEEN PRIORITY CONTROL SCHEME AND MODIFIED PRIORITY CONTROL SCHEME

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***Abstract*-This paper is only based on the delay analysis of PCS and MPCS schemes using MATLAB. In PCS UGS, ertPS and rtPS keep in one category. And the voice takes fewer packets than the packet generated in the video conference. The single packet is transmitted when the time slot is allotted. The next station has to wait for a time period. So there is large delay for the transmission of the further packets. To overcome the limitations of the PCS, modified PCS (MPCS) proposed in this work. And then comparison between delay of PCS and MPCS is performed.**

Keywords- PCS, voice packets, MPCS, Non-voice packets.

I. INTRODUCTION

1. Priority Control Scheme (PCS)

The packet delay is mostly considered when WiMAX downlink and uplink delay scheme need to be design. Packet with the real time packet classification may suffer from the delay and packet dropped problems. Traffic classifier in the WiMAX classifies the PDU based on the Connection ID (CID), which is a 16 bit located in the Packet Data Unit (PDU) header.

There are five types of packet classification in WiMAX and these are known as Unsolicited Grant Service (UGS), Extended Real-time Polling Service (ertPS), Real-time Polling Service (rtPS), not-real-time Polling Service (nrtPS), and Best Effort (BE). These types of service classes have further three level of priority UGS as the gold priority class which is the highest priority class, ertPS and rtPS as the silver priority class, while nrtPS and BS as the bronze priority class which is lower priority class. Packets belonging to silver class, which is the real time sensitive, suffer a long delay in the buffer that lead to a poor Quality of Service (QoS). The PCS [2] scheme assumes that the service flow could be classified into two types: time delay sensitive and non-time delay sensitive. The time delay sensitive will have UGS, ertPS and rtPS as one class, whereas non-time delay sensitive will have both nrtPS and BE as another class.

In WiMAX classification service flow, the priority for each frame in consideration is UGS > ertPS > rtPS > nrtPS and BE where UGS is at higher priority and BE is the lowest priority. The PCS proposed that UGS + ertPS + rtPS > nrtPS + BE for each frame. Four types of traffics have been generated to support DL/UL in BS and SS for PCS scheme. Those traffics are video conferencing, voice, http, and ftp. Video conferencing and voice will be keep in the gold class which presenting high priority by (UGS, ertPS, and rtPS) whereas http and ftp will be the lower priority class which presented by nrtPS and BE. For each queue in the PCS scheme FIFO algorithm have been applied. Figure 3.1 shows both remained bandwidth (BWr) and granted bandwidth (BWg) for both DL/UL. The base station (BS) and subscriber station (SS) granted bandwidth with consideration maximum

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traffic for gold class and minimum traffic for bronze class [2].

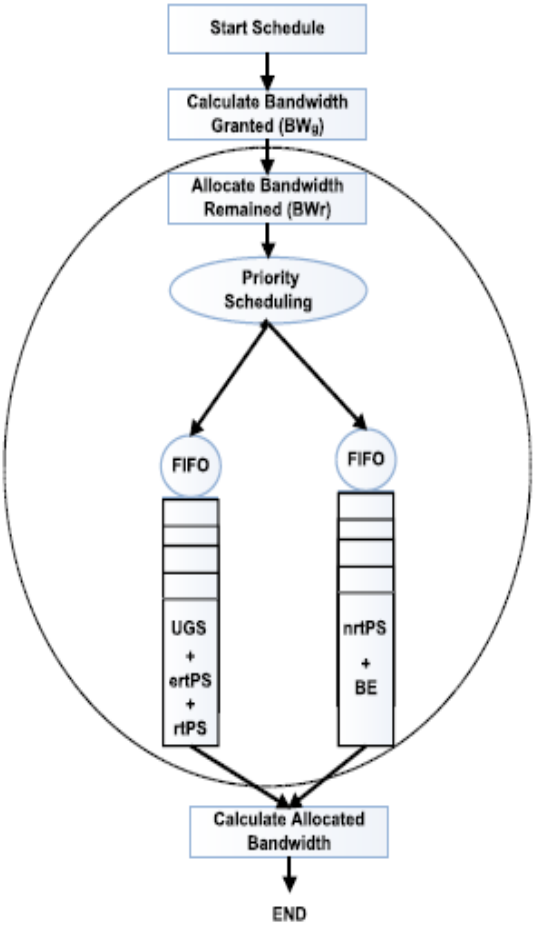

Fig.1 Design of the PCS scheme

1.1 Limitations of the PCS

The PCS has the following limitations –

- UGS, ertPS and rtPS keep in one category. The voice takes fewer packets than the packet generated in the video conference.
- The single packet is transmitted when the time slot is allotted. The next station has to wait for a time period. So there is large delay for the transmission of the further packets.

To overcome the limitations of the PCS, modified PCS (MPCS) proposed in this work.

2. Modified PCS

The MPCS is the modified version of the PCS algorithm. In the defined area there is some limited number of nodes. Each node has the packets to transmit. The packets are received from the upper layers. In the each MPCS node, the packets are classified in two categories – Voice packet and non – voice packet. In this work the voice packet transmission is considered.

The packets come from the upper layers. The voice packets are stored in the queue. Now when the turn of node comes to transmit, two packets are transmitted by the node at a time. The transmission of two packets reduces the waiting time for the node. This scheme reduces the delay for the voice packets.

3. Simulation Tool

For the simulation of MPCS scheme MATLAB 2009b is used. The MATALB is the user friendly for the scientific purpose and provide the accurate results of the experiments. The MATLAB provides a very extensive library of the predefined functions that make technical programming task easier and more efficient. The MATLAB has many advantages in comparison to another computer language for technical problem solving. Some of them are as following [5]:-

1. Ease of use
2. Platform independent
3. Pre-defined functions
4. Device independent plotting
5. Graphical User Interface

4. Parameters assumed

In the simulation of the MPCS, following parameters are assumed –

TABLE I: PARAMETERS USED IN MPCS

Sr. No.	Parameter	Value
1	Maximum SS	100
2	Maximum Distance	6 KM
3	Frame duration	5 ms
4	Data Rate	64 kbps
5	Standard	IEEE 802.16

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6	Propagation Speed of signal	3 X 10^8 m/sec
7	Number of Packet	10, 20
8	Antenna	Omni Directional
9	Antenna Range	250 m
10	Simulation area	6000 X 6000 m

Comparative Analysis of PCS and MPCS

(i) Node = 5

The graph is shown in Fig.2 between the Packet per node and Delay in Sec for the PCS and MPCS. It is seen that the PCS gives the higher delay than the MPCS. This is due to the single packet transfer method in the PCS. While in MPCS decrease the delay by sending two packets each time.

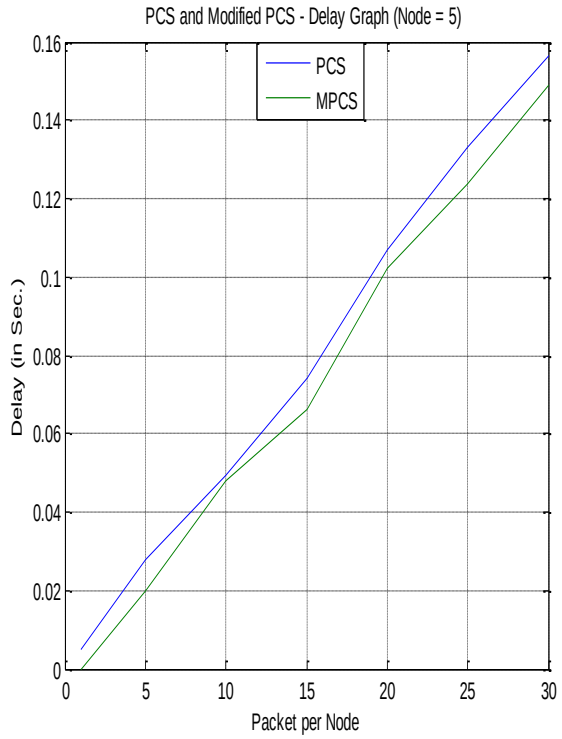

Fig.2 Comparative Delay graph for PCS and Modified PCS at Node = 5

(ii) Node = 10

The graph is shown in Fig.3 between the Packet per node and Delay in Sec for the PCS and MPCS. It is seen that the PCS gives the higher delay than the MPCS. This is due to the single packet transfer method in the PCS. While in MPCS decrease the delay by transferring two packets each time.

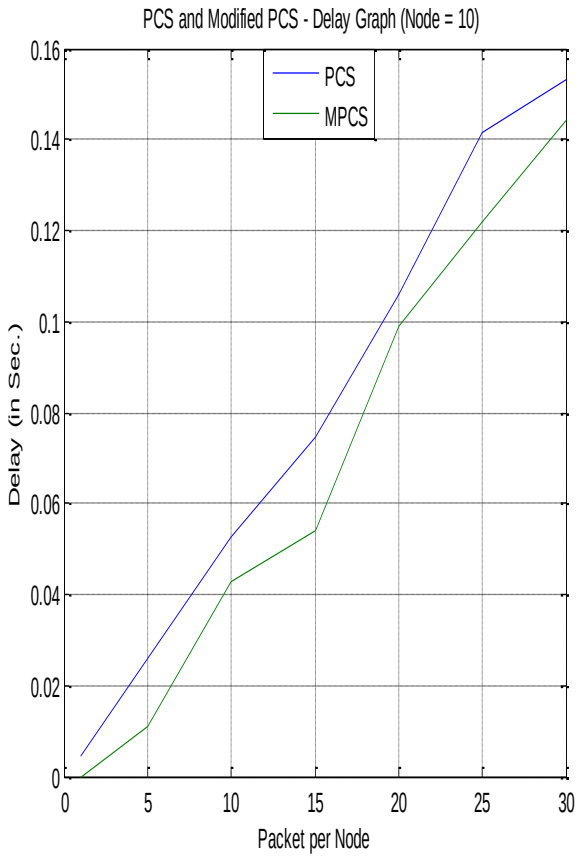

Fig.3 Comparative Delay graph for PCS and Modified PCS at Node = 10

(iii) Node = 15

The graph is shown in Fig. 4 between the Packet per node and Delay in Sec for the PCS and MPCS. It is seen that the PCS gives the higher delay than the MPCS. In Fig. 4 it is seen that at node =5, node=10 and node = 15, there is very less difference between the delay. This is occurred due to the random selection of the traffic in the network.

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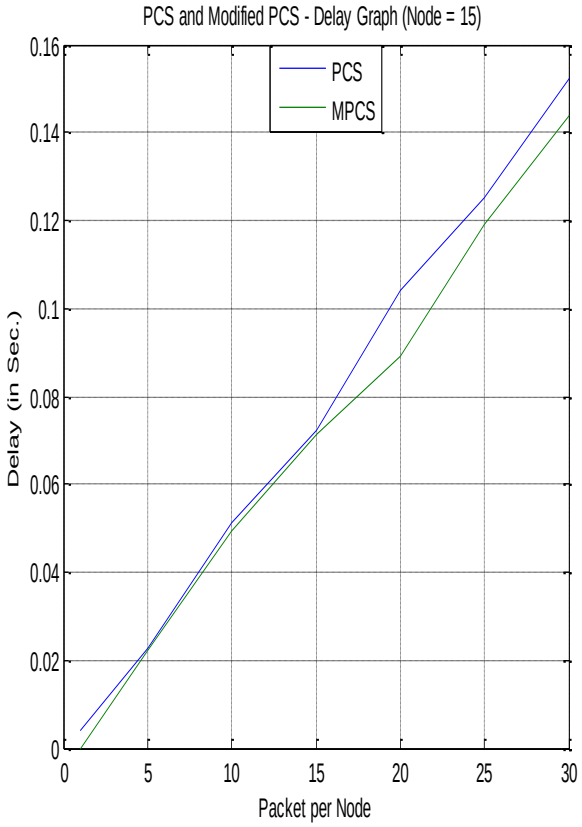

Fig.4 Comparative Delay graph for PCS and Modified PCS at Node = 15

(iv) Node = 20

The graph is shown in Fig. 5 between the Packet per node and Delay in Sec for the PCS and MPCS. It is seen that the PCS gives the higher delay than the MPCS. This is due to the single packet transfer method in the PCS. While in MPCS decrease the delay by sending two packets each time.

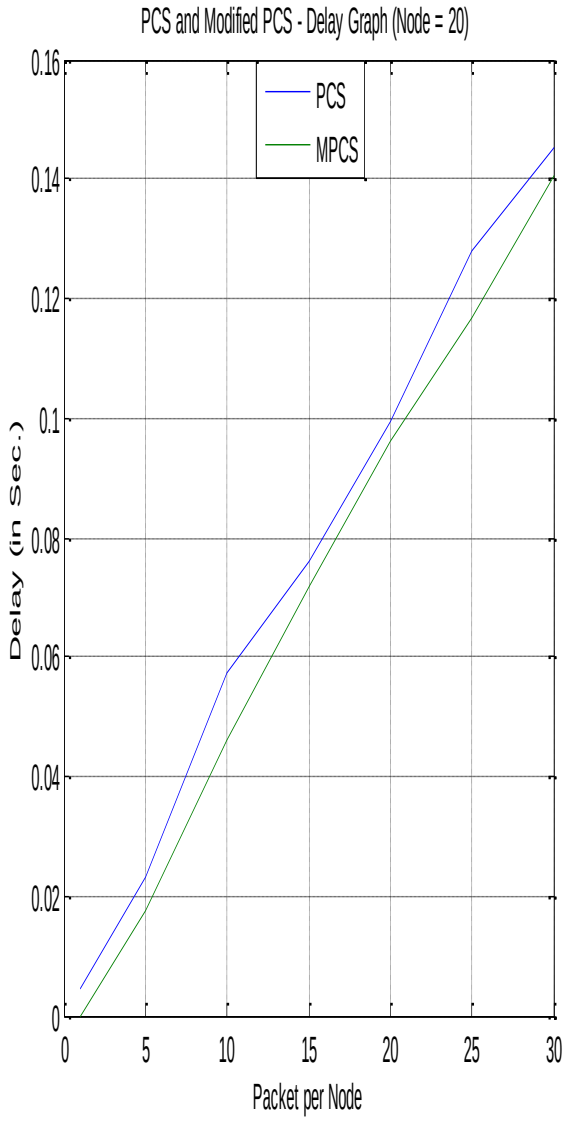

Fig.5 Comparative Delay graph for PCS and Modified PCS at Node = 20

(v) Node = 25

The graph is shown in Fig. 6 between the Packet per node and Delay in Sec for the PCS and MPCS. It is seen that the PCS gives the higher delay than the MPCS. This is due to the single packet transfer method in the PCS.

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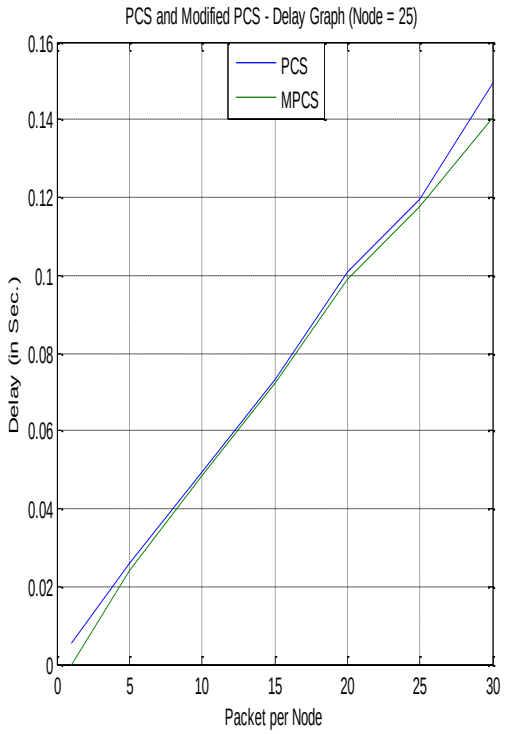

Fig.6 Comparative Delay graph for PCS and Modified PCS at Node = 25

5. Comparative Average Delay for PCS and MPCS

The Average Delay for per packet in the PCS and the Modified PCS is shown in table 2 at node 5 to 25. From the table it is seen that for each node the Modified PCS average delay is less than the PCS average delay. The concept of transferring more than one packet decreases the delay in the network.

In the Fig 7, the comparative graph between the number of nodes and average delay per packet is shown. From this graph it is clear that the MPCS has the very less per packet delay than the PCS. This reduce in the delay is due to transferring the twice packet by the node in the network. It is clear that Modified PCS is better than the PCS.

TABLE II: AVERAGE DELAY PER PACKET IN PCS AND MODIFIED PCS

PCS		**Modified PCS**	
Node	**Avg. Per Packet Delay**	**Node**	**Avg. Per Packet Delay**
5	0.00521	5	0.0048
10	0.00526	10	0.00446
15	0.00501	15	0.00467
20	0.00503	20	0.00461
25	0.00494	25	0.00473

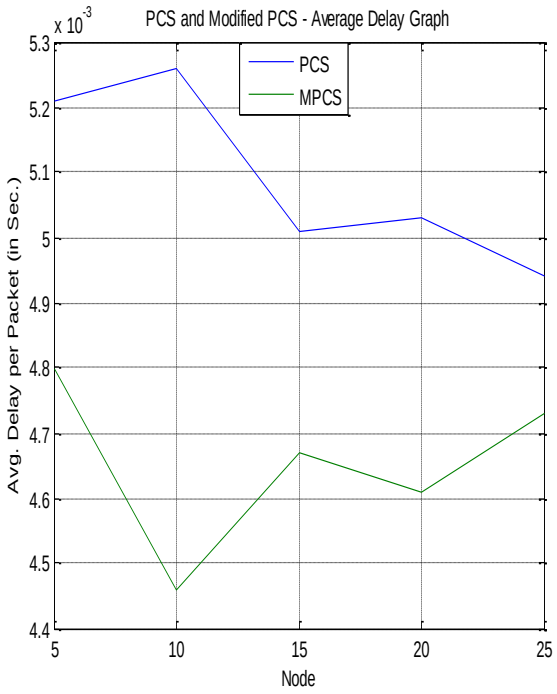

Fig.7 Comparative Average Delay graph for PCS and Modified PCS

II. CONCLUSION

In this dissertation, a new scheduling algorithm, called Modified PCS has been proposed. It is the

advanced version of the PCS scheme. It uses the voice traffic in the WiMAX. The packets are stored in the storage and multiple packets are transferred. The reduction in the delay improves the Quality of Services. The new algorithm is designed, implemented and results were obtained. From the results it is clear that the Modified PCS provides the better results than the PCS. The MPCS has the very less per packet delay than the PCS. This reduction in the delay is due to transferring the twice packet by the node in the network. The decrease in the delay improves the Quality of Services.

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