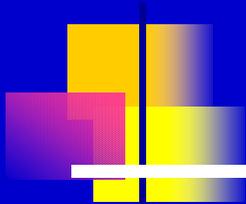


Performance Study of Buffering within Switches in Local Area Networks

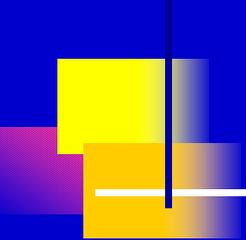


Amr Elsaadany, Mukesh Singhal, Ming T. Liu
Proceedings of Computer Communications and
Networks on Fourth International Conference,
1995 Page(s): 451 –455

Presenter: Z.J. Chen

What's the Problem?

- The **performance** of a network is affected by the **buffer size** at the switch.
- The tradeoff between **buffer size** and **switching delay**.



Introduction

- Today's applications put tremendous requirements on LANs, thus use of switches is becoming wide spread in the design of high performance LANs.
- The packet loss rate and the packet delay at the switch are two very important performance criteria.

Switch architecture

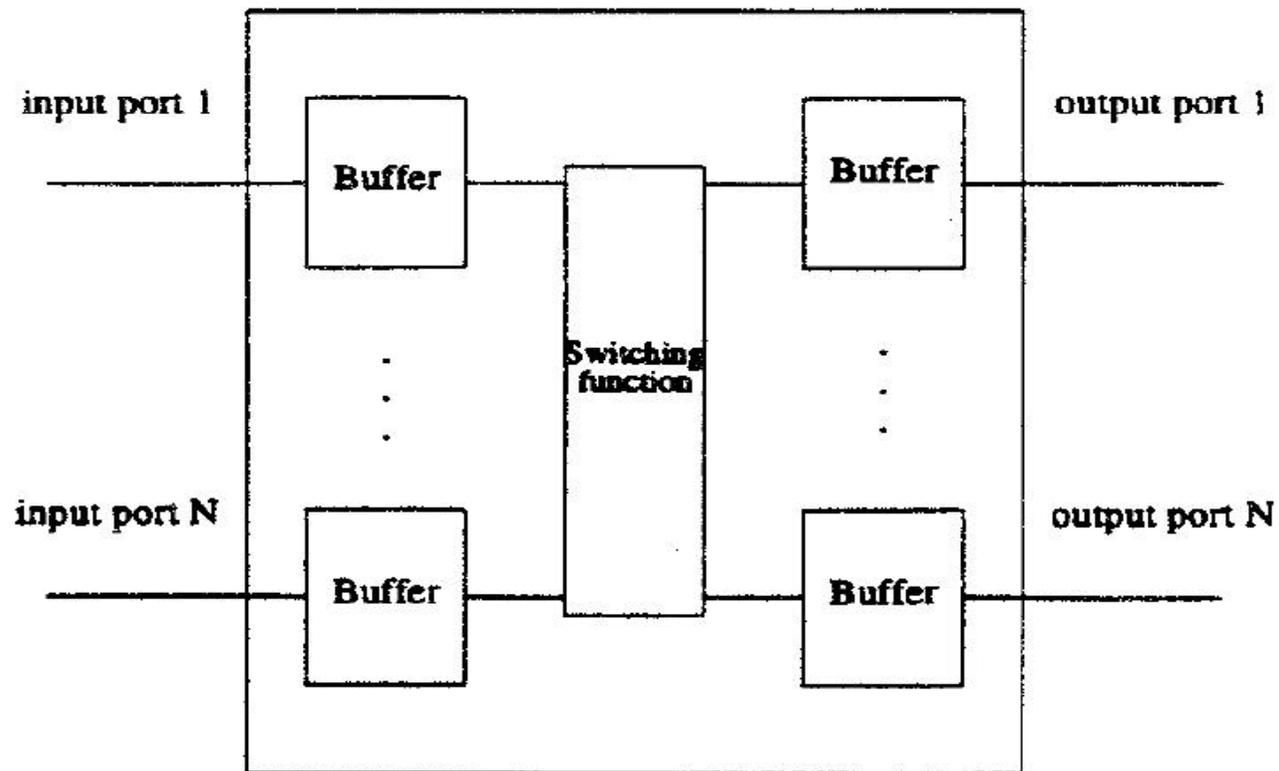


Figure 1: A General Switch Architecture

The varying vectors

- Traffic load:

ARRIVAL: 2~4 (jobs/milliseconds)

the arrival rate;

- Buffer size:

32~100 packets (packets)

- Number of ports:

16 or 8 ports

Packet Delay as Buffer Increase

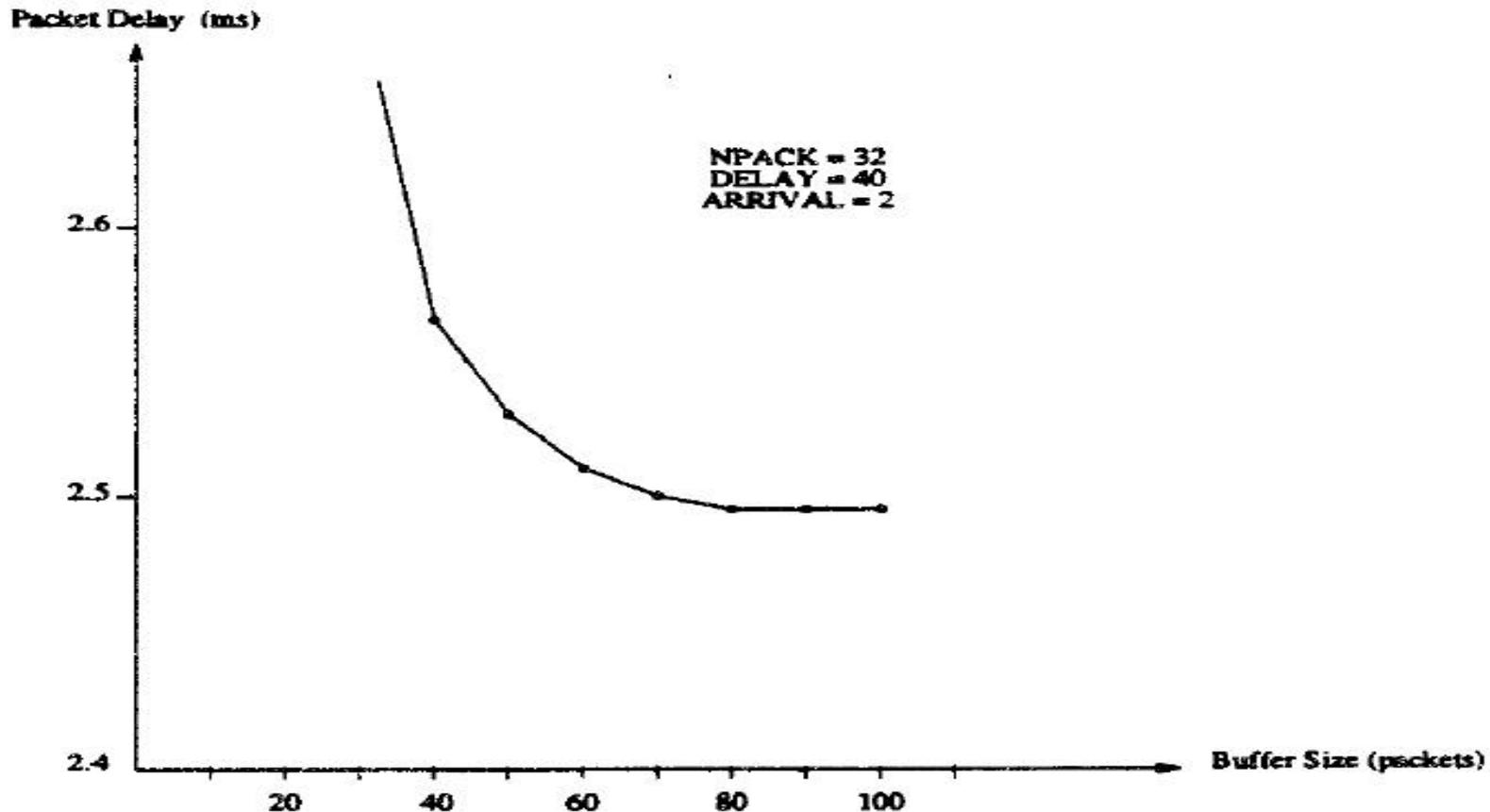
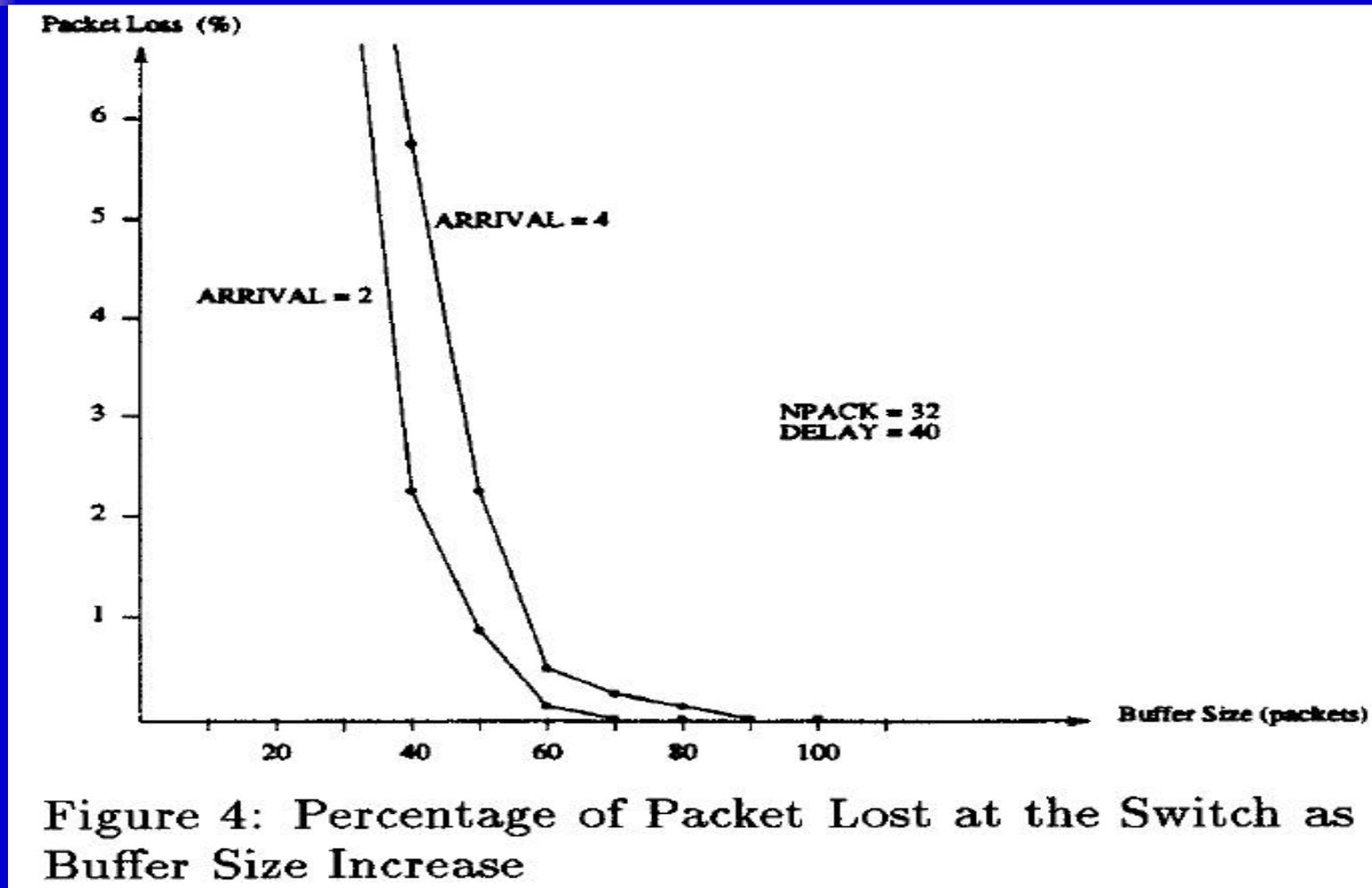


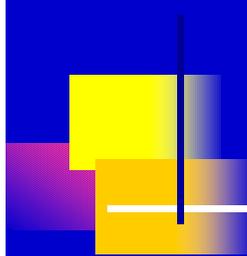
Figure 3: Packet Delay at the Switch as Buffer Size Increase

Packet Delay as Buffer Increase

- Packet Delay drops off quickly as buffer size increase beyond **30** packets and then levels out as the buffer size is increased beyond **80** packets.
- The reason is that when the buffer size increases, less packets have to wait for the output buffers to become available.

Percentage of Packet Lost





Percentage of Packet Lost

- Packet loss rate decreases as the buffer size increases.
- This is because when the buffer size increases, the output port buffer is more hardly to be full, thus the packet transmit is getting hardly to be delayed.

Percentage of Delayed Packets

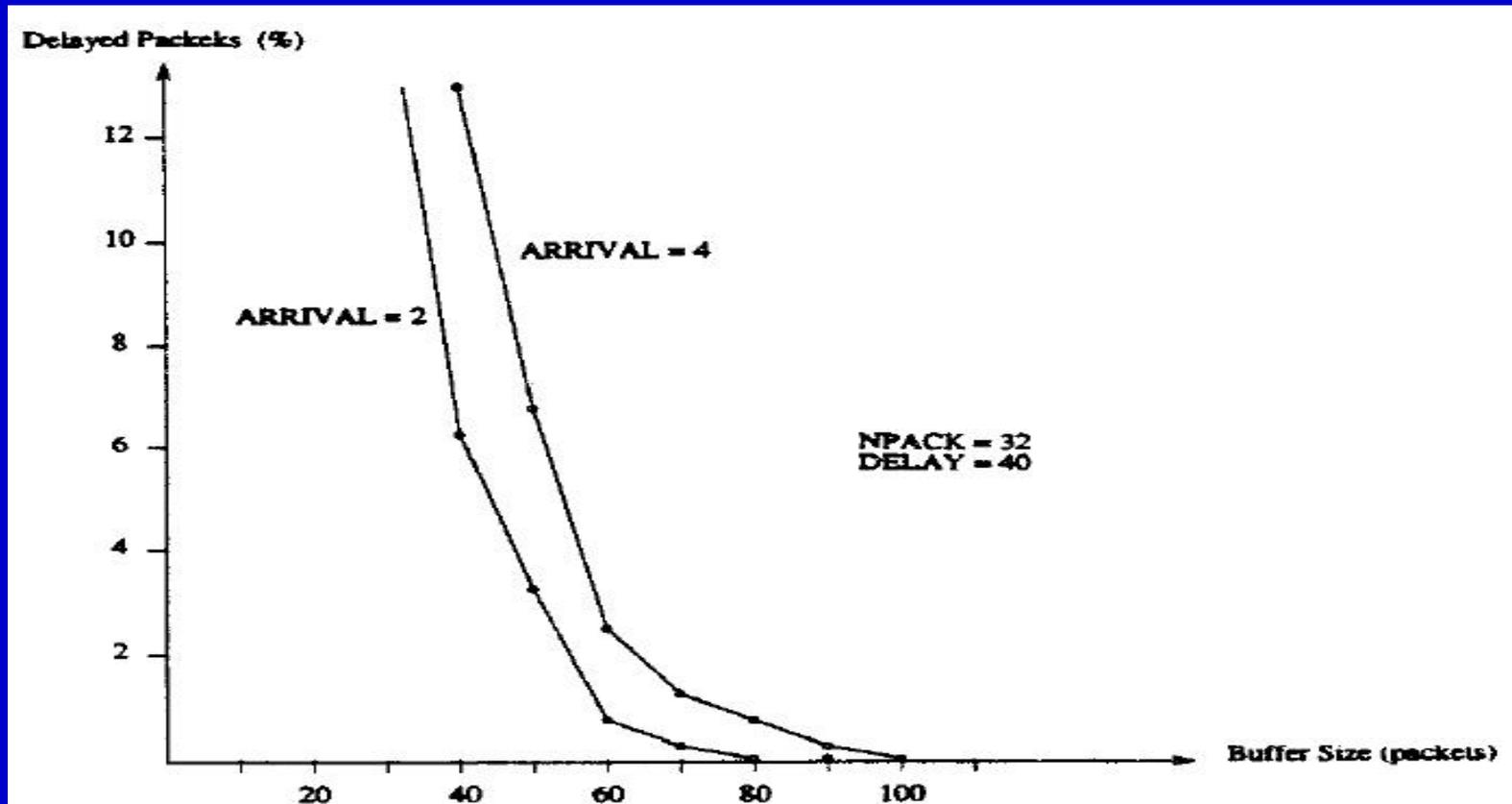
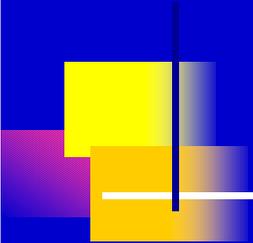
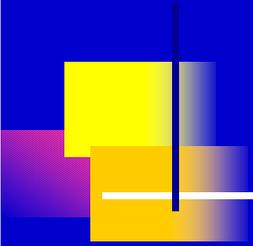


Figure 5: Percentage of Delayed Packets at the Switch as Buffer Size Increase



Percentage of Delayed Packets

- Delayed packets are decreased as buffer size increases.
- This is because if packets are bound to an output port that has all of its buffers full, packets delayed.



Different between packet delay and loss rate

- The percentage of delayed packets is higher than the percentage of dropped packets for the same offered traffic load.
- The reason is that the average service time of the switching function is much less than the transmission.

Response time for small Buffer as Traffic Load Increase

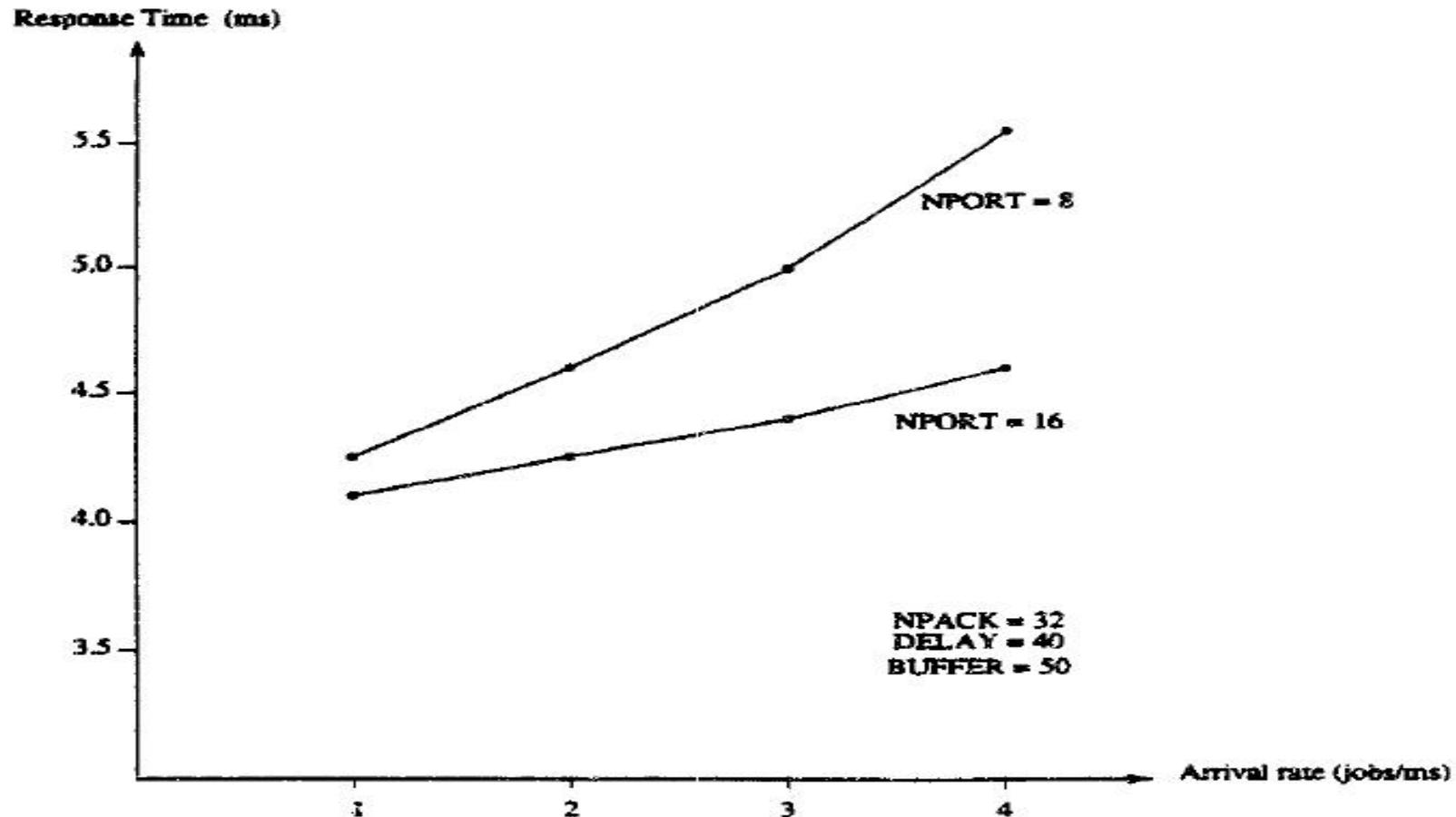
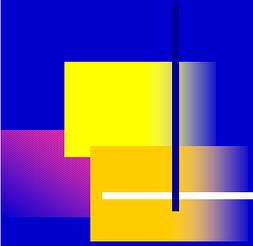


Figure 6: Response Time for Small Buffer as Traffic Load Increase



Response time for small Buffer as Traffic Load Increase

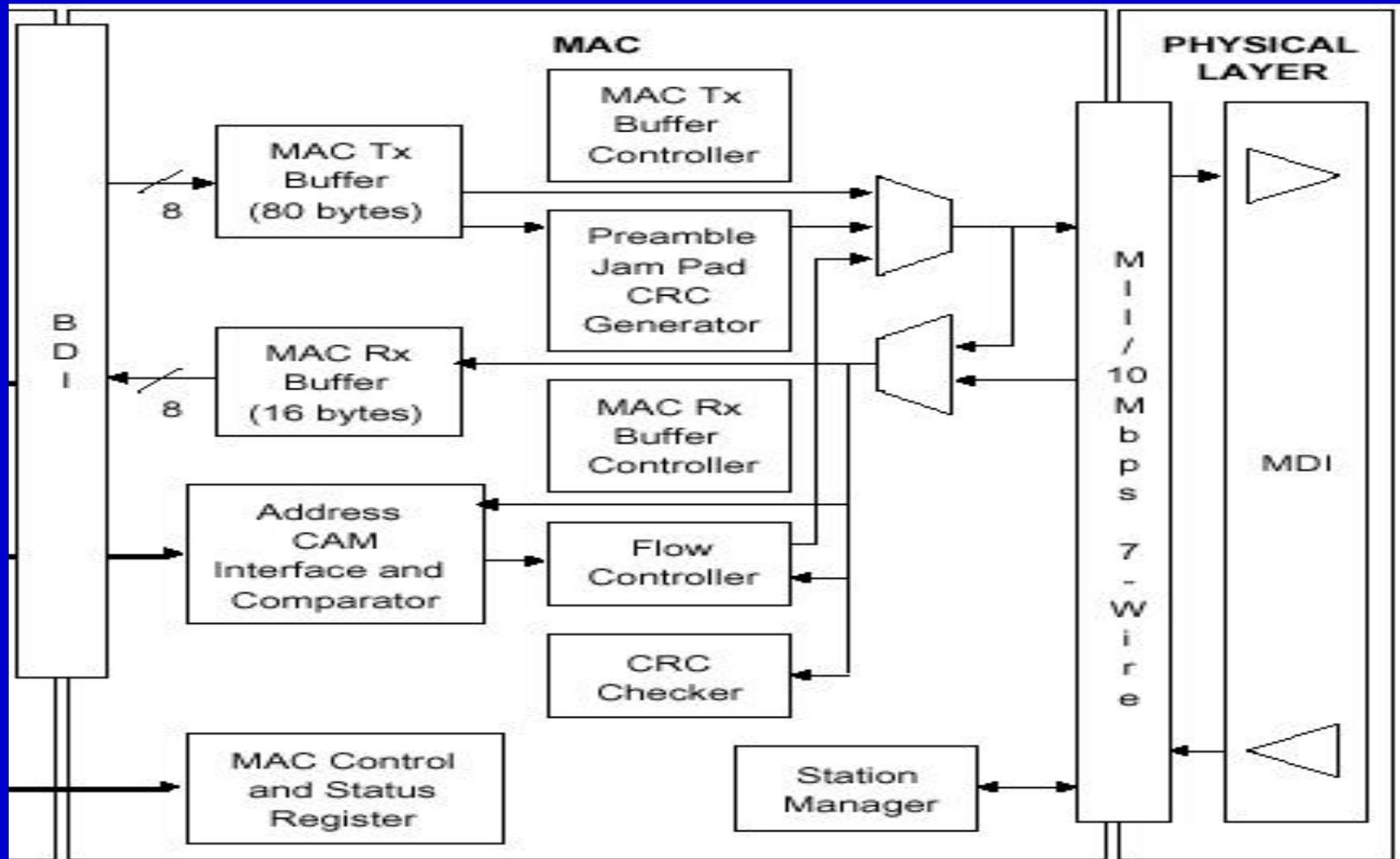
- The response time increases as the load increases, and 8 ports is faster than 16 ports.

A comparison

- arrival rate = 4 jobs/ms

	8 ports		16 ports	
	Buffer 50	Buffer 100	Buffer 50	Buffer 100
Percentage of Delayed packets	17.06	1.06	7.78	0.05

Implementation



Conclusions

- The percentage of delayed packets is higher than the percentage of dropped packets for the same offered traffic load.
- So that the output buffer of a switch should be larger than the input buffer.