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Proposed Router and Switch Design With Introduction of Buffering to Reduce Retransmission Cost By Reducing Bandwidth and Time of Corrupt Packet

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Abstract— **A new design of router and switch is proposed in this paper to decrease the unnecessary wastage of transmission bandwidth capacity because of retransmission of corrupt or lost packets. A buffer memory is joined to every router and switch. Every one of the packets that go through a router is stored in the buffer memory for a short time. On the off-chance that a packet is discarded at any router, it tends to be asked from the past router, which has a duplicate of the packet in its buffer. Through our approach, we spare a great deal of data transmission bandwidth, as a retransmission from sender to receiver isn't required. If there arises an occurrence of any discarded or corrupt packet, then an additional bandwidth capacity required for retransmission is not required. This paper gives a brief explanation on how to reduce retransmission time and increase its throughput.**

Keywords— Router, Switch, Packet, Bandwidth, Throughput

I. INTRODUCTION

The requirement for buffering is a central unavoidable truth for packet-switching networks [1]. The router is a gadget which passes information between different networks. It works at the Network Link Layer. The router must have the capacity to perceive data packets so it can send them to their destination. Switch is a very high-speed network device that receives any incoming data packets and re-directs them to their destination on a local area *network.* In a unicast connection, a source sends it to a single destination and in a multicast connection, a source sends it to various goals [2]. Packets are transmitted through a host to another host, and in the middle of it, if a couple of parcels are ruined/discarded/corrupt in any router, then it requests the packets from the source. This results in loss of bandwidth, and is also a waste of time. Retransmission request from a receiver host can lead to the sender receiver and network overload [3]. This will eventually waste the network bandwidth and degrade the overall performance [3]. This paper has showed a way to achieve bandwidth utilization and improve retransmissions time by adding buffer to routers and switch in a network.

II. . EXISTING SYSTEM IN CASE OF CORRUPT PACKETS

During the transmission of data packets from the source host to the destination host, packets get corrupted due to different reasons. These reasons include noise, slow in link speed, link overload, and also due to the packet size being greater than the link capacity. When a packet gets corrupts and does not reach its destination in the required time, a retransmission is required. The quantity of the packets that gets corrupted is diverse for the various links on account of each connecting link working in an alternate situation. For a lower noisy connection, chances of getting the packet corrupt is low compared to a high noise connection environment. When the packet gets corrupt, that particular packet is to be resent from the sender this time, and the bandwidth consumed is more, resulting in network overload. Packet destination address is contained in the packet header layer, which is in the packet. Packet starts travelling through different routers to reach its destination; different routes may contain different number of routers and switches. For example, if a packet is corrupted in the 8th router, and the 10th router is the destination of that packet , then that particular packet has too been resent from the sender. This paper shows a new way where instead of resending it from the sender, we can resend it from the 7th router only.

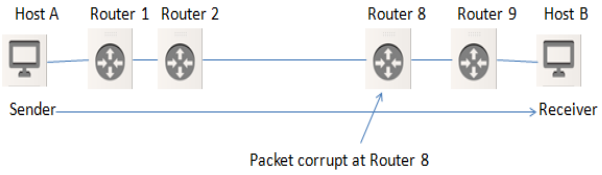

Fig.1 Existing Method if Packet Lost

III. MODIFIED SWITCH -ROUTER DESIGN WITH INTRODUCTION OF BUFFER MEMORY

We have proposed a new way for retransmission of a packet in case the packet gets corrupted. As we can see in Fig.1, if a packet is lost in between any router, then that packet needs to be resent from the sender, which increases the overall message transmission time, and extra bandwidth is needed to retransmit that corrupt packet. Instead, we proposed that every switch and router be enabled with buffer memory, that is, if the packet is lost in the midst of the travelling route, then the previous router or the switch, from which the

packet is forwarded to the next router/switch, will forward the packet instead of the sender node.

Fig.2 in our proposed network shows every router and switch has been attached with some amount of memory buffer. Consider an example where 4th router has lost the packet, then the 3rd router will forward that particular packet to the 4th router. That is, the 4th router will RE-SEND NACK to the previous node, in our case the 3rd router, which is the previous node, The 3rd router will have the forwarded packet stored in its buffer memory for a certain amount of time, after which it will forward that packet to the 4th router. Each router and switch in our approach will have a list that contains the information as to which router has what packets that have been forwarded. Each router may forward multiple packets in a multiple directional rout, which is a multi-connection, so it maintains a list that contains the information regarding the packets forwarding. The maximum number of packets stored in each switch and router varies depending on the link speed and transmission route.

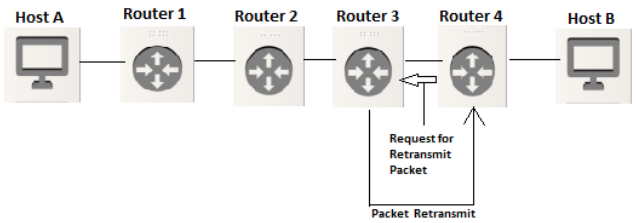

Fig.2 Retransmission of Corrupt Packet With Buffer Memory Attached to Router

In the case of a switch, a similar incidence occurs, an example is shown in Fig.3. Consider an example, where hosts A, B, C are connected to switch 1, which is connected to router 1, which is connected to router 2, which is in turn connected to router 3, then it is connected to switch 2, which has three hosts X, Y, Z. Host A is the source and host X is the destination. If a packet is corrupted in router 1, then NACK is sent from source host A, then host A must only retransmit the packet in existing the method. In our case, the previous node, that is Switch 1, will re-transmit that packet, which has all the switch and router in network in its buffer memory. If a packet is corrupt at router 1 then switch 1 will retransmit that corrupt packet. In the buffer memory, each packet is stored for a certain amount of time, thus TIME is = Maximum Amount of Time Required to Reach Next Node + Time Required to Process Packet and Check Error Detection and Correction + Time for Congestion In Link to Transmitted Packet.

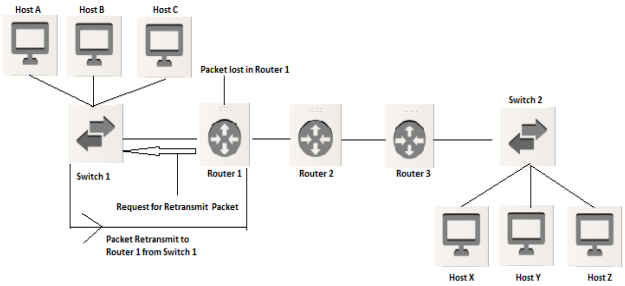

Fig.3 Switch Retransmit Packet to Router

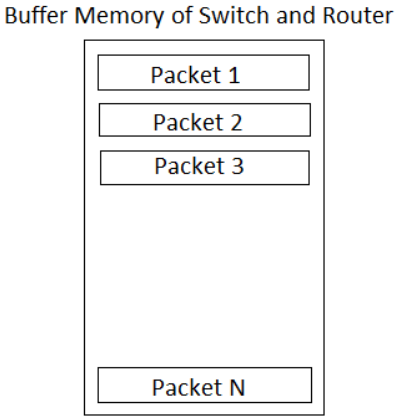

Fig.4 Buffer Memory used in Every Router and Switch

IV. NETWORK SIMULATION RESULTS

For our network simulation results, we have taken two scenarios. The first is two hosts and four routers, where the packet lost in the 4th router. Consider the existing method where the router is without the buffering, the throughput is very low, the bandwidth is consumed more, and the time of the overall transmission is increased compared to a router with buffering. In the existing system, the packet is retransmitted from source host, but in our proposed system, the previous router will retransmit the packet. In our second scenario, two switches and three routers are considered, where the packet is corrupted in router 1, and the retransmition occurs from the previous node, that is switch 1. Fig.5 and Fig.6 show network simulating expected experimental results.

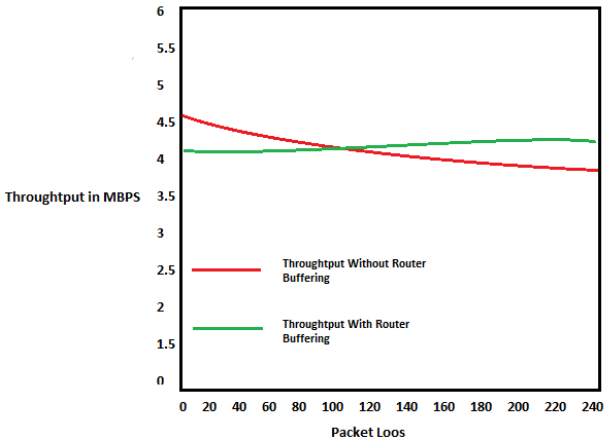

Fig. 5 Two Host Four Router Simulation Results

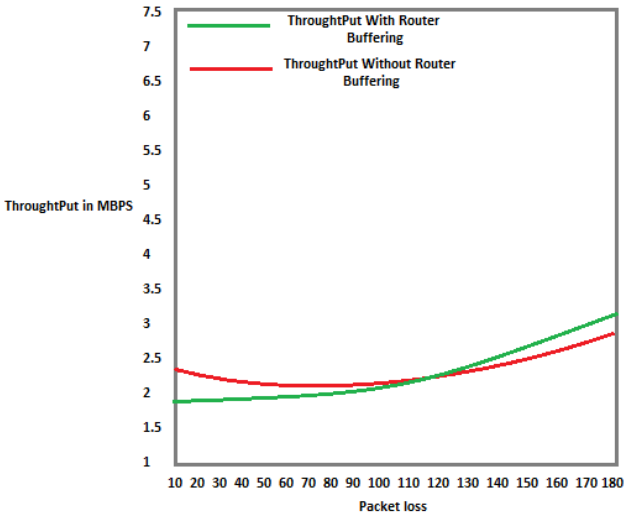

Fig.6 Two Switch Three Router Simulation Results

V. CONCLUSHION

We have proposed a new and more reliable technique for data transmission through switch and router. Data transmission problems in normal case are discussed. And solutions to these methods are also discussed by introducing buffer memory for both the switch and router by this method, where we can save re-transmission time and bandwidth, which helps in improving the overall efficiency and throughput of the network. The modified system may be expensive, but the results are more improved as, in today's technology, results are preferred over cost.

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