INVESTIGATION OF DELAY IN PASSIVE OPTICAL NETWORK

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Abstract – During transmission of data in a network it is desirable that packet transmission will complete without packet loss and take less time. There are many major causes of packet loss such as congestion. Because of this there is a requirement of some methodology that can reduce the packet loss and return reliable data transmission over the network. In this paper, the proposed work is representing the solution of the same problem as the major hypothesis. The proposed system is the advancement of existing PON technology with the inclusion of bandwidth utilization as well improving the network throughput by utilizing the bandwidth in an effective way. The proposed system will benefit the higher reliability of data communication in a Private Network. The reliability is presented here in terms of lower packet loss than the existing system. The proposed approach will work dynamically. In this approach, the system will first detect the packet loss and then provide the solution of the problem by reducing the packet loss.

Keywords- Packet Delay, PON, End to End delay

I INTRODUCTION

Today, with the increasing development and usage of electronic media, the demand for number of nodes in a network has significantly increased. In addition, there are number of networks in which different kind of data is usually transferred, using multicasting and/or broadcasting. The access methods based on the optical fiber are getting more and more attention as they offer the ultimate solution in delivering different services to the customer premises. Due to the lack of active units in the light path the architecture of PON is simple, cost effective and offer wide bandwidth. In this paper we evaluate the packet delay of subnetwork that form PON through analysis and simulation. We uses the 2 lane system that is based on ring topology to reduce the packet loss than existing system. With the aim to provide a better solution to this problem of packet delay we evaluate delay. In this proposed work, a scenario is defined that is based on ring topology with 10 numbers of nodes with same number of save points. The dimension of topography is about 750m * 750m. CBR is used for traffic generation with packet size of 512 bytes at the rate of 25 Mbps. Red circles defines the nodes and green color diamond shapes represents the save points over the ring network. In this proposed work any random node can start communication by taking any random node as the destination node. The figure 1 shows the network communication in the ring form. Where the sender is fixed at node 1 and the receiver is selected at random. Time taken for successful packet delivery is 2.07 seconds.

II PROPOSED METHODOLOGY

To represent the complete PON system, ring based architecture with N number of nodes is taken. All Nodes are identical and placed at equal distance in a ring from. To monitor the nodes and to track the network faults placed save points over the path of Ring. We have placed N number of Checkpoints placed at equal distance from each Node. Now as the communication begins, selected a source and the receiver node dynamically. If no fault occurs the data will be transferred uninterrupted. As the fault occurs the fault is detected by the previous save point and it will find the alternative path to transmit the data over the network. The complete bandwidth is divided in two parts, one for the normal communication and other for the recovery option. As the fault occurs the data will be transferred from this recovery path. The system has given the better results as compared to existing approach. We proposed a algorithm named as rerouting to alternative path(RAR)

III NETWORK MODEL

In this paper we define a types of network for the analysis delay over network, based on the ring topology for reducing the packet loss when data is transmitted over it. Matlab is used for simulation purposes. The proposed work is about to find the optimal solution of any broken link or data loss in a high speed WIRELESS PON-network. The proposed work is about the generation of such an approach that will dynamically compensate the problem of link failure and provide the optimize solution without any data loss. In this proposed work, a scenario is defined that is based on ring topology with 10 numbers of nodes with same number of save points. The dimension of topography is about 750m * 750m. CBR is used for traffic generation with packet size of 512 bytes at the rate of 25 Mbps. Red circles defines the nodes and green color diamond shapes represents the save points over the ring network. In this proposed work any random node can start communication by taking any random node as the destination node. The figure 1, shows the network communication in the ring form. Where the sender is fixed at node 1 and the receiver is selected at random. Time taken for successful packet delivery is 2.07 seconds.
In figure 2, the fault is generated at some random position and find the destination node from the opposite side. And perform the packet delivery successfully.

![Fig. 2: Fault Recovery in Existing Method](image)

The time taken by existing method for packet delivery is 7.923 seconds as fault occur over the network.

Here figure 3, shows the successful packet delivery in case of proposed approach where the recovery path will be selected to transfer data over the network for successful packet delivery. The time taken by the proposed approach is 3.074 seconds.

![Fig. 3: Successful Packet Delivery (Proposed Approach)](image)

**IV PERFORMANCE METRICS**

**End-to-End Delay**

- End-to-End delay is the time taken for a packet to reach the destination from the source node.

\[
\text{End to End delay (ms)} = \frac{\sum (\text{Delay of each entities data packet})}{\text{Total number of delivered data packets}}
\]

**V RESULTS**

The analysis is showing the comparison of existing and proposed approach in terms of time taken.

Here figure 4 is showing the comparison of existing and proposed approach. As we can see the proposed work has improved the overall time taken by the network in case of fault recovery.

**VI CONCLUSION**

For reducing packet delay a RAR algorithm is applied, which has proven to significantly reduce the packet delay in ring network. We have developed a comprehensive probabilistic analysis for evaluating the packet delay performance of next-generation PONs (NG-PONs). This algorithm will help in reliable communication over a network in terms of lower packet loss. It is found that RAR approach provides better results than existing approach.

**REFERENCES**


