

Performance Evaluation of Optical Burst Switching With Average Packet Delay And Burst Size

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ABSTRACT

This paper studies loss performance of optical burst switching with average packet delay and burst size at edge node. We apply here Tree topology for optical burst switching architecture. Our analysis shows that achieving best performance in average packet delay closely related to frame sent and queue length at edge node. Based on characteristics of such average packet delay and burst size, an accurate performance model for OBS is provided, Which works better than traditional models.

Keywords – Assembler, CPH, Dissembler, OBS, OXC

1. INTRODUCTION

OBS differs from standard circuit switching in two main aspects. OBS burst immediately follow their request headers without waiting for a reservation acknowledgement. Burst may use bandwidth along several links and still be blocked and lost without completing their routers. In circuit switching, transmission starts after end to end reservation is acknowledged.

Allocation of resources in circuit switching kept throughout the duration of transmission. OBS is also different from packet switching since OBS bursts are not buffered at switches. Due to reservations, OBS bursts use them asynchronously. This is not happen in OBS ,where link propagation delay is significantly larger than burst transmission time, multiple bursts could simultaneously propagate not only along the same route but along the same link[1][2].

In OBS control and payload is decoupled. Control is sent on a control channel and payload data on data channels. Control packet is sent first followed by the payload on a separate wavelength channel after an offset time equal to the processing time of control packet at intermediate node[3]. Control packet is processed electronically at each intermediate node and reserves resources for a period

starting from the time the payload/ data burst is expected to arrive at the node until the transmission is completed. If reservation is successful the control packet is

transmitted to the next node on the path, else it is dropped at the node. For a successful reservation, switches are configured by the time payload/ data burst arrive at the node. Hence the data burst remains in optical domain from source to destination[4].

of the paper. Although a conclusion may review the main points of the paper, do not replicate the abstract as the conclusion. A conclusion might elaborate on the importance of the work or suggest applications and extensions.

since it generally uses one-way reservation protocols, where data bursts are transmitted without confirmation that resources along the path will be successfully reserved to establish the required end-to-end transparent connection[6]. Consequently, whenever the number of simultaneous reservation attempts exceed the number of available resources some will fail and owing to the lack of sophisticated optical buffers, will result in burst loss. Burst loss degrades the global OBS performance since dropping leads to rescheduling of lost data with significant impact on any end-to-end applications running in the network layers above, reducing its overall throughput.

Therefore, minimizing average packet delay is a key factor for the practical implementation of OBS networks.

Average packet delay degrade the performance of OBS model by making overall model slower and with this problem allocation time of resources for transmission increases for better performing OBS architecture it is needed to decrease packet delay. This improvement in packet delay boost the performance of OBS as well as increases resources availability by decreasing packet delay.

In this paper we present a discrete event simulation model for evaluation of packet delay. The implementation of the model under OMNET++[5].

Our results show that the novel strategies reduce packet delay compared to traditional system and demonstrate that the simulation model here presented is suitable for OBS studies under the scope of the above mentioned objectives.

The rest of paper is organized as follows. Section II OBS model . In section III the performance of packet delay evaluated using OBS model.

2. THE OBS NETWORK MODEL

The OBS network model consists of core node and edge node. In core architecture view data transmitted only in optical domain and control part transmitted through O/E/O conversion process[3]. Here is my topology in OMNET++ simulator that describe best output for our requirement for

improving packet delay performance at edge node.

Together with network topology description, the OBS model, which is essentially composed of OBS capable nodes interconnected by Optical fibers .There are two OMNET++ compound modules, EDGE node and CORE node will be presented from functional point of view in next section[5].

2.1 Edge Node

Depending on input/output this node configured as ingress/egress node. Here, obs named module consist of two part that assembler and dissembler ,where assembler assemble with dispatcher ,queue and sender as shown in Figure 1.

Internal parts of Edge node

Dispatcher initiates the signaling process and manages a system of queues where bursts are retained for a certain offset time. The offset time is calculated based on the processing delay introduced by the core nodes and the number of hops that the CPH will travel.

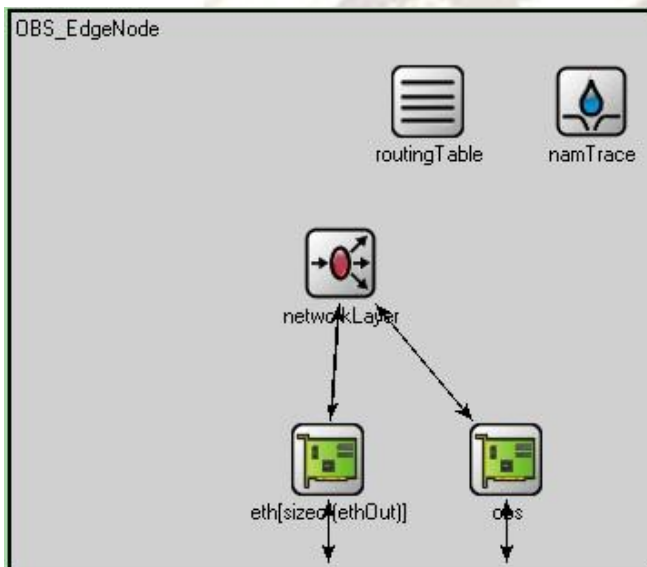


Figure 1: OBS Edge Node

RoutingTable holds the routing information of the node and all the related protected and public functions.

2.2 Core Node

Core node consist of main two components that are control unit and OXC optical switch as shown in Figure 2[4]. Control unit used to forward control packet to particular output link according to routing table entry Control packets are gone through conversion O/E/O and data packets are transferred directly through optical domain. Packet delay that decreased also by this control unit that allocate packet to forward next destination by allocating fast resources.

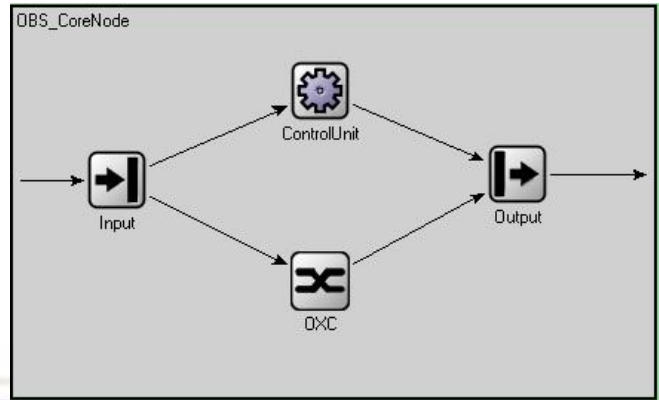


Figure 2: OBS Core Node

3. SIMULATION MODEL

OMNET++ simulation model we use for our minimizing packet delay is shown in figure 3. Packet delay at edge node minimizing with different way that are to minimize offset time between control packet and data burst minimizes routing table allocation , to minimize queue size.

We focus on our parameter queue size at edge node and burst size at edge node. By decreasing offset delay get better output at queue at edge that we get in our simulation results.

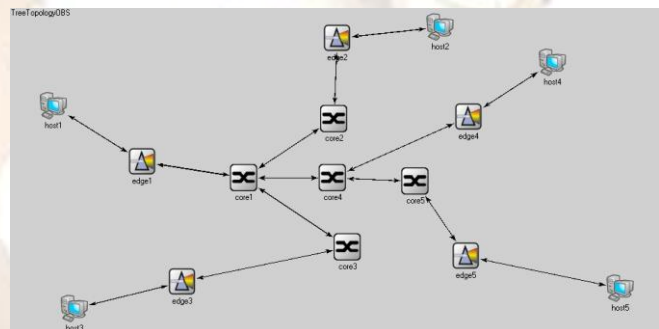


Figure 3: OBS Simulation Model

In this simulation model link between core nodes of 1 Gbps capacity with our network model we minimizing average packet delay at each edge node. Each fiber has capacity of 1 Gbps we simulate our network model data rate of 1 Gbps for each lambda(data burst). Optimized guard time edge guardTime = 0.000001, core guardTime = 0.000001

3.1 Simulation Results

After Simulating minimizing algorithm for guard time and offset minimizing we get better result of minimized average packet delay at edge node 1 as shown in Figure 4. Minimized packet delay decreases burst losses occurs at node. As shown in Figure 4 minimizing delay at edge node.

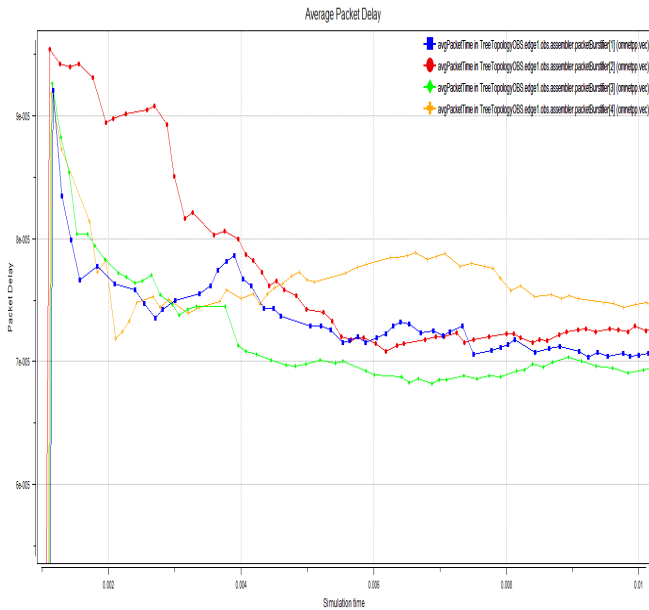


Figure 4: Average Packet Delay v/s Simulation time
 After improving packet delay statistics we able to minimize burst drop at core control unit that is shown in Figure 5.

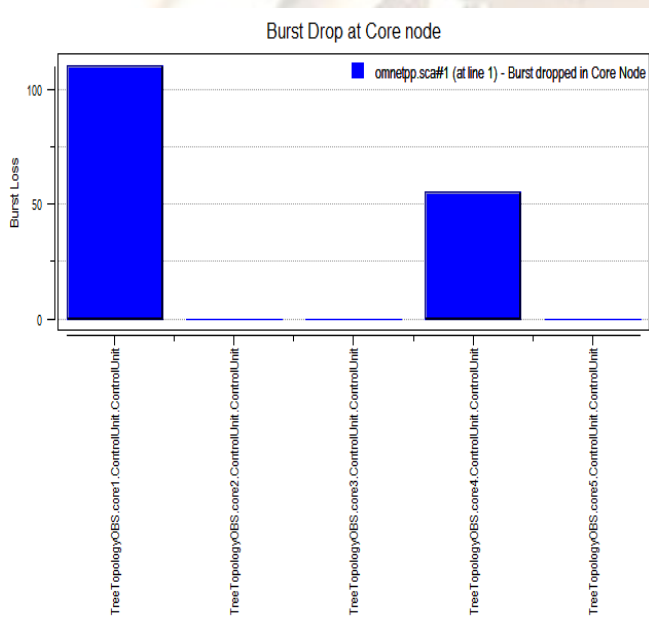


Figure 5 : Burst Dropped at Core Node

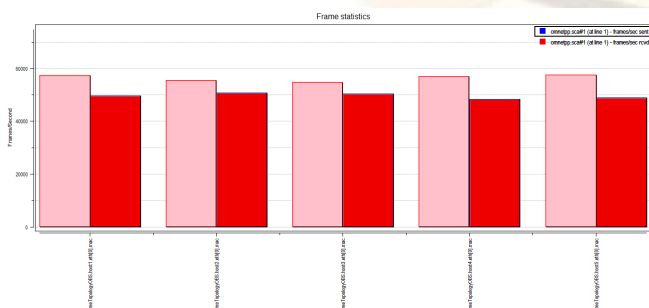


Figure 6: Frames/second Sent and Frames/second Received.

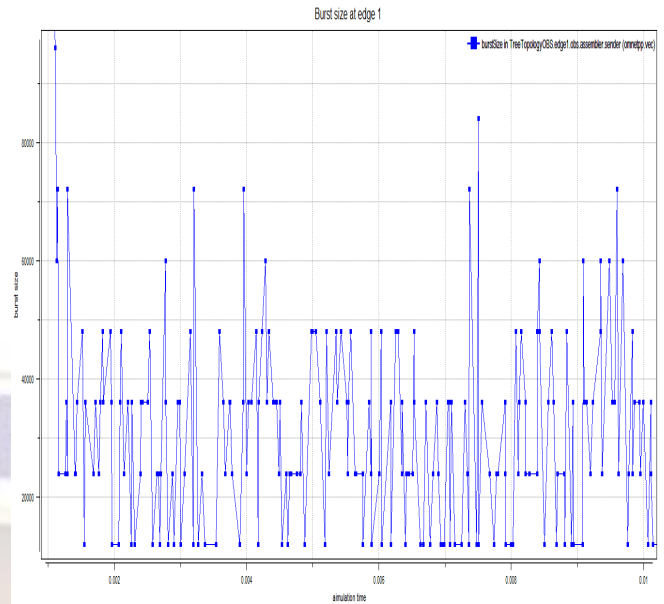


Figure 7: Burst size v/s simulation time

Observing Figure 4 average packet delay gradually decreased by simulation time that decreases burst drop at OBS core node that shown in figure 5 and we get better output at frames/second shown in figure 6. Burst size in simulation topology edge node as shown in Figure 7.

4. CONCLUSION

In this paper we proposed new solution to the practical implementation of OBS with much lower average packet delay that minimize burst drop at core node and get better output in frames sent and receiving ratio. Decreasing packet delay makes overall system bandwidth efficient and decreases propagation delay in OBS system. This will boost up the system to outperform in complex environment.

References

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