

A QOS BASED LOAD BALANCED SWITCH

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ABSTRACT

The simple architecture with high forwarding capacity bandwidth is load balancing switch is build with two stage switch fabric to eliminate the mis sequencing problems and kept packets of the same flow in the order of load balanced two stage switch. Before load balancing two stages has perform with the Full frame first algorithm and use centralized scheduler to eliminate those mis sequencing problems and getting the 100% throughput result. There comes at some additional cost and needs costly online scheduling algorithms and need for a complex scheduler and quality being reduced. In this paper we introduce the two stage switch fabric with round robin scheduling algorithm is used to solve mis sequencing problems and two maximum weight matching algorithms Longest queue first(LQF) and Oldest cell first(OCF) to achieve 100% throughput results. Theoretical analysis and simulation results shows that using these algorithms, achieve all the possible outcome results in the switch.

KEYWORDS: Load balancing, Throughput, Mis-sequencing.

1. INTRODUCTION

The simple architecture with the load balancing scheme perform with interesting two different stage switch fabric to eliminate the mis sequencing problems and kept packets of the same flow to the destination path in the order of load balanced two stage switch fabric. The two stage load balancing switch is more scalable than the any other switch in the network architecture. Hardly load balanced switch got some problem with that, on sending and receiving the data in wired or wireless networks[8], the major problem with that is mis sequencing problems has arised to loss of data packets or mis matched data formats. Somehow in earlier they are tired to clear those problems with the algorithms named, Full frame first algorithm to get mis sequencing problems and they put the centralized scheduler to achieve the 100% throughput results[4][2] in their data packets. Oftenly they got the perfect data packets arrival in destination, but the problem with that methodology is the quality of data is reduced to lower. And manually they they need costly online scheduling algorithms to rectify the mis matching of data and need more complex scheduler to achieve the 100% throughput result of outcome data.

We introduce in this paper to rectify the mis sequencing problems[1] and avoid the costly online scheduling algorithms, we use Round robin scheduling algorithms(RRS) to rectify the mis matching of data packets in the tcp applications and two maximum weight matching algorithms namely, Longest queue first(LOQ) and Oldest cell first(OCF) to achieve 100% throughput result for all independent arrival packets.[11]These algorithms are used to eliminate the complex scheduler and needs of online costly scheduling algorithm to schedule the data packets in the destination node. The another approach of this proposed is to get the high quality of data packets in destination node which is the data which is send by sender, the receiver also got the same quality of data[9] without defragmentation and reduction of quality. We observed that in the algorithms and methodology of using those above like, RRS, LOQ and OCF, not only to solve mis sequencing problems and also get quality of data packets service of the same aapplication[10]. Yet we are consider more algorithm to get the quality of data packets. Our idea is to just keep packets

of the same flow in order in the source node to destination node without being interrupted in the load balancing two stage architecture. Early measurement results in load balancing shows that the number of packets flows can be extremely large or small, rendering per flow queuing infeasible[12].

The intraflow packet interval from the analysis of traffic traces, the authors of load balancing switch observed that most of the intraflow packets intravals are more than tens of microseconds. To make the implementations of the RRS algorithm are dynamically shared among active node of the neighbour node of the source packets. By investigating the distribution of the data packets in the round robin method it is partially distribute the data packets the each and every packets and send the sequential fashion to every node to reach the destination node properly and without delay of data packets in the load balanced switch. And the high performance routing algorithm is detected to data packets are in the 100% throughput and achieve the actual quality of data[10][2] what the sender sends and how the receiver receives.

This paper is organized as follows. In Section II we propose the architecture of load balancing switch with the round robin algorithm how the data packets are seperated partially and interchanging the date between the intermediate nodes and solve those mis matching of data packets.

1.1. SWITCH ARCHITECTURE

In fig1 shows the two stages load balanced switch architecture with the round robin scheduling algorithm. In this, switch consists of two different stages, one is get the external output and perform with round robin algorithm and gives internal input to second switch fabric and that second stage perform with high performance algorithm and gives external outputs to destination port [3].

The key components of RRS algorithm are the snod (starting node of the round robin) and the intermediate nodes (n1, n2, n3,... nN) N denotes number of intermediate nodes, and important and finally the temporary storage of data buffers. And the second stage with LQF and OCF algorithms to give the external outputs with 100% throughput results decrease the waiting time.

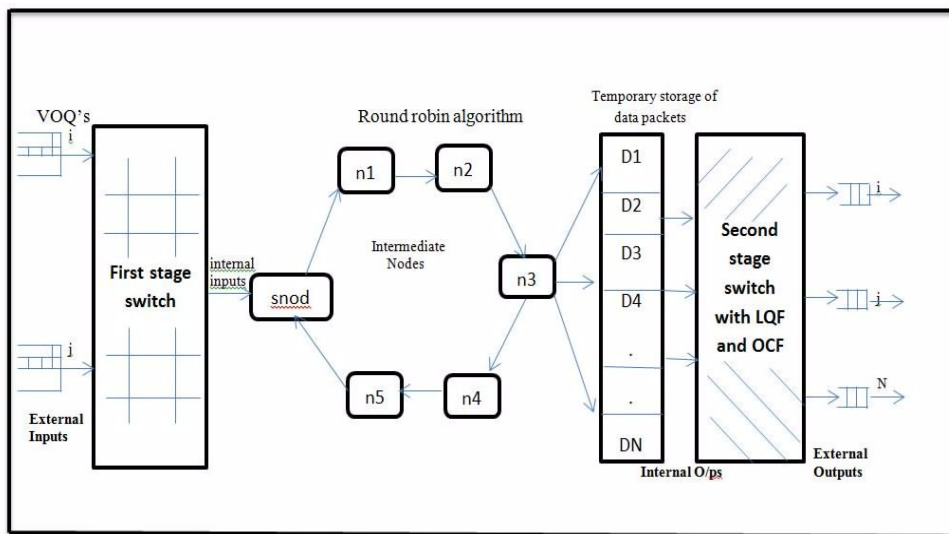


Fig1: Architecture of load balancing switch

1.2. ROUND ROBIN SCHEDULING ALGORITHM

Round robin scheduling is used to network schedulers in network computing. It is used to apply to scheduling problems in network architecture. It is similar to first in first out scheduling algorithm. Load balancing is a method to distribute workload on the multiple computers through network nodes or links to achieve the optimal utilization or maximize the throughput of data and minimize the overall response time. Load balancing is used for avoiding too much for overloading the resources in the traffic between the multiple servers. This algorithm is to minimize the total waiting time data packets in the temporary buffers to the destination. In this scheduling technique that utilize the principle of time slices of the data packets and partially it is used to divide the packets into equal slices and spend the equal time of data retrieval in the expected time interval.

1.2.1. RRS ALGORITHM:

```
Round_robin_scheduling_load_balancing()
{
Initialize hash_map with no entries;
While
Do
{

Data center packet queue requests;
Data center packet request the beginning of the queue;
If(hash_map has VOQ to the current requesting user && VOQ allocation status==READY)
{
The VOQ is reallocated to user request;
}
Else
{
Allocate a VOQ to user request using Round robin scheduling algorithm;
}
}
}
```

The round robin scheduling algorithm for increasing the speed consists of following steps:

1. The scheduler maintains a queue of ready processes and a list of blocked and swapped out data packets.
2. The process control block of newly created packets is added to end of ready queue
3. The process control block of terminating packets is removed from scheduling data's.
4. When a running data packet finishes its time slices, it is moved to end of queue and to the temporary data packets.
5. A time slice is an amount of time that each packet spends on the node of the round robin algorithm.
6. The unfinished packets will be returned to the tail of the starting node and return to the robin later.
7. When a packet is swapped out it process control block is removed else it performs another round until that packet is fully finished.

2. ELIMINATING THE MIS-SEQUENCING

In this section, we investigated the intra-flow interval and how it reduces the mis-sequencing problems. As mentioned in the introduction, the intra flow packets are arriving to the destination without mis matched of data. With the help of round robin scheduling algorithm we can done it.

The external inputs are stored in the VOQ (virtual output queues) and it sends to the first stage switch fabric. That switch splits the data into equal and unequal data packets and sends the internal inputs to the starting node (snod) of the round robin scheduling algorithm. The snod sends the data to the neighbor node like n1, after send to n2 and vice versa. When the data packet is send the nearest node to the temporary storage buffers that packets registered the top place named D1 and next packet is registered in d2 and vice versa. This is clearly described in the fig2 mentioned below.

After completing all the data packets in the RRS algorithm the data packets are partially stored in sequential fashion in the data buffers. Now all the equal and unequal data packets are arranged in the proper manner how the original appeared.

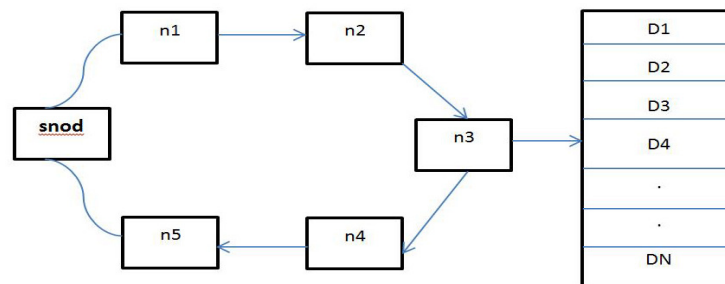


Fig2: Round robin scheduling algorithm

3. ACHIEVING 100% THROUGHPUT

In this paper we consider two maximum weight matching algorithms, Longest Queue first (LQF) and Oldest Cell First (OCF).

The one of the most scheduling policies to obtained 100% throughput in most wireless or wired networks is Longest Queue First scheduling algorithm. The well known policy and achieved that finds a maximal scheduling in a sequential manner is called the Longest Queue First scheduling policy. Its scheduling makes decisions based on queue length information as it starts with empty schedule, then it adds the link with the largest queue length to the schedule, then it links the largest queue length to the scheduling remaining links. The LQF scheduling algorithm is good performance of a variety of network, it is majorly used to optimizing a throughput results in the data packets. There has been many related recent works that investigated the performance of this algorithm under different interference models. The LQF considers the queue occupancy by signing a weight $w_{i,j}(n) = L_{i,j}(n)$. Queues with larger occupancy will be assigned a larger weight and are thus more likely to be served [11]. Thus LQF results in 100% throughput, However LQF can lead to the permanent starvation of a nonempty queue. To understand how this happens, consider a 2×2 switch with $L_{i,j}(0) = 1$ for all i,j and $\lambda = 1$. In the first timeslot, an arrival will occur at $Q_{1,1}$ and so $Q_{1,2}$ will remain unserved. In fact, because of the continuous arrivals to $Q_{1,1}$, $Q_{1,2}$ will remain unserved indefinitely.

Our second algorithm, OCF, overcomes this problem by considering the waiting times of cells at the head of each virtual queue. Unlike OCF algorithm does not empty or starve any queue, each and every unserved cell get older and become old enough to be served. OCF considers the time of waiting by assigning a weight $w_{i,j}(n) = W_{i,j}(n)$. Cells that have been waiting the longest time will be assigned a larger weight and are thus more likely to be server. It is clear that no queues will be starved of service indefinitely; if a cell is not served, its time of waiting will increase, eventually, it will increasing of weight to a value that ensures that it is served. The stability of OCF algorithm is queue vector whose elements can contains all the queue occupancies as the state of an input queued switch. We prove the stability of their waiting time and shows the stability of the waiting time implies the queue occupancy

In the Appendix, we prove and theorem of these two maximal scheduling algorithms is all uniform and non-uniform .independent arrival processes of data packets to maximize the 100% throughput.

4. COMPARISON RESULTS

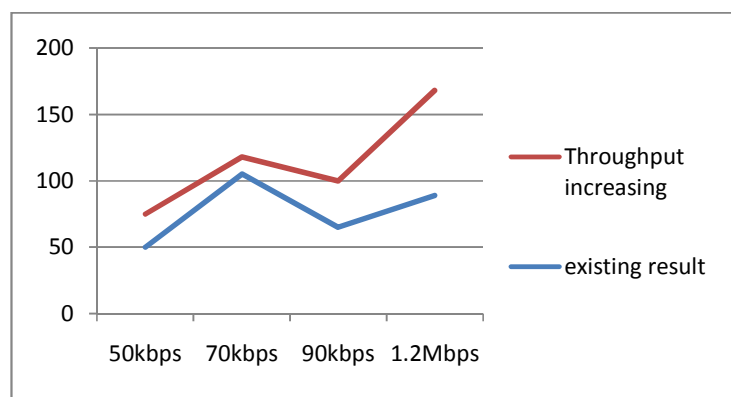


Fig3: Comparison Results

In fig3 the comparison results for achieving the 100% throughput results in the data packets and increasing the quality of the data has shown between the existing systems with Round robin scheduling algorithm. Theoretical analysis and the simulation results shows that the reduction of the mis matching of data packets and to achieving the 100% throughput results.

5. SIMULATION RESULTS

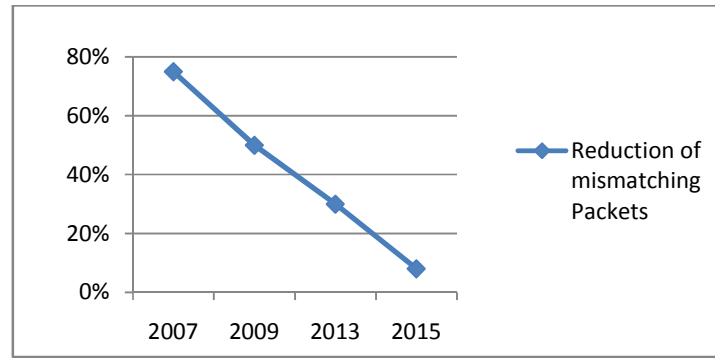


Fig4: Reduction of mismatching packets

The above fig4 shows the simulation results in the mis matching of data packets in the tcp applications. In 2007 the mis sequencing problem is occur very widely. Later some of the authors are tired to reduce the problem. With the help of QoS based load balanced switch it reduces the minimum of 10% of data packets mis matching. It is an important that this is theoretical and simulation results that maximize weight matching algorithms that we purpose in this paper. Furthermore in future it should be noted that aim of this paper is to finding the better algorithm that achieve 100% throughput for effort best in traffic.

6. CONCLUSION

Over the last few years, there have many results show the condition under two stage load balancing to eliminate the mis sequencing of data packets hinders the tcp applications and achieve the 100% throughput results of data packets. The two stage load balancing switch was introduced by Chang achieves a 100% throughput results as well as bound delay between it and an output queued load balanced switch.

In this simplest form of the two stage load balanced switch that occurs mis sequencing packets, hence motivating the work presented in this paper. The Round robin scheduling algorithm prevents the missequencing problem in the switch with the help of temporary storage of data buffers and using the two maximum weight matching algorithms LQF and OCF to achieve the 100% throughput results for all independent arrival packets. The effect of packet segmentation requires further research and will be part of our future endeavor

7. REFERENCES

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8. APPENDIX

THE LQF ALGORITHM

Theorem: The LQF maximum weight matching algorithm is stable for all admissible arrival processes[11].

Proof: In summary, we show that for an M x N switch scheduled using this algorithm, there is a -ve expected one-step drift in the sum of the squares. In mathematically we say

$$E[\underline{L}^T(n+1)\underline{L}(n+1) - \underline{L}^T(n)\underline{L}(n)|\underline{L}(n)] \leq -\varepsilon \|\underline{L}(n)\| + k$$

Where $k > 0$, $\varepsilon > 0$.

THE OCF ALGORITHM

Theorem: The OCF maximum weight matching algorithm is stable for all admissible arrival processes[11].

Proof: The proof consists of two steps. First, we done the stability of the waiting time. Then, we prove that the stability of the waiting time implies the stability of queue occupy, which proves above.

Likely to the LQF proof, we give that for an M x N switch scheduled using the OCF algorithm.

$$E[\underline{W}^T(n+1)\underline{TW}(n+1)-\underline{W}^T(n)\underline{TW}(n)|\underline{W}(n)] \leq -\varepsilon \|\underline{W}(n)\| + K$$

Where $K > 0$, $\varepsilon > 0$ and T is a positive definite matrix.