

A Development of Efficient Packet Processing Unit for Scheduling Algorithm Method on IPv6 Router

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Abstract: This paper proposed packet processing scheduling algorithm that is important part in traffic performance on IPv6 router for efficient packet processing unit development.

We apply proposing scheduling algorithm to packet scheduler in router that is important element in integration service model, enforce service differentiation between packets. An experiment carries out to divide by source of sensitive Video and Audio in latency time and cell damage and general Data's source each 3 sessions. We generate traffic in process that Source packet reaches destination. So, with existent algorithm, I measure delay time that happened during each transmission by general routing method and routing method that apply proposing algorithm.

We prove efficiency of proposing algorithm in this paper that see by measuring and compare maximum delay time and average delay time at each session.

1. Introduction

From explosive increase of Internet service application, it is increasing that request of real-time multimedia service of better quality. But, there is limit as to satisfy this request the current Internet offers best-effort service.

Integration service network needs various support of application. IETF(Internet Engineering Task Force) presents the integrated service model which expands with the service model where the real-time service concept is included the internet service[1] which is used with only best-effort services of

existing. The integrated service model composes a traffic control module in order to provide the service of different quality to uses the classifier, a packet scheduler, a connection acceptance control and a resources reservation protocol[2]. Among these factors, scheduling algorithm applied to packet scheduler gives important influence in performance of real-time traffic through enforce service differentiation between packets and embodying method of traffic control function that provide real-time service to router[3].

In this paper, we apply priority order queuing scheduling in routing algorithm that do important part of traffic performance for efficient packet processing unit development, and execute a simulation, and proof the efficiency to compare the result of existing method.

2. The packet processing scheduling algorithm

The packet network is composed various branch path in between each stations, and there is no definite section for better path, and it has tendency the plane than the class. Primary function of the packet network is passing packet fast without damage to the destination. For this, sorts packet that wish to transmit and chooses priority order according to specification standard[4-5].

In this paper, we put gradation to real-time/non real-time service to transmit packet efficiently, applies routing scheduling algorithm that use priority order queuing scheduling when packet enters in router.

2.1 Packet processing for priority order

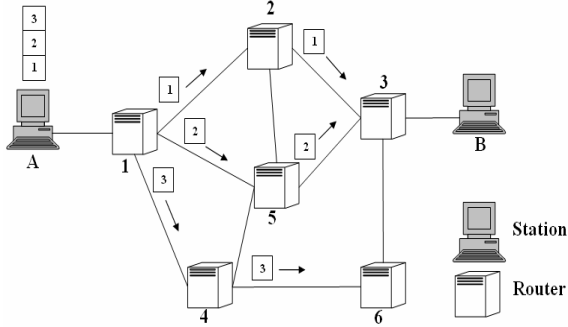


Figure 1. Datagram transport

As shown figure 1, source packet supposes that transfer via router to 1, ..., 6 until transfer from A Station to B Station.

Version	Traffic Class	Priority	Port	
Payload Length			Next Header	Hop Limit
Source Address				
Destination Address				

Figure 2. Structure of IPv6 header

Packet classification real-time/non-real-time service process following to traffic class that source packet includes in IPv6 header of figure 2, after decide priority order of packets to transmit in the destination station in priority area.

As following, declare that data bit value of Priority area is S, and destination value is D.

Source: $S = s_N s_{N-1} \dots s_1 s_0$

Destinations: $D^k = d_N^k d_{N-1}^k \dots d_1^k d_0^k, \{D^k | 0 \leq k \leq N\}$

In router inside such as figure 3, sender node is

$$S = s_2 s_1 s_0$$

Destination node is

$$D^k = d_2^k d_1^k d_0^k, \quad \{D^k | 0 \leq k \leq N\}$$

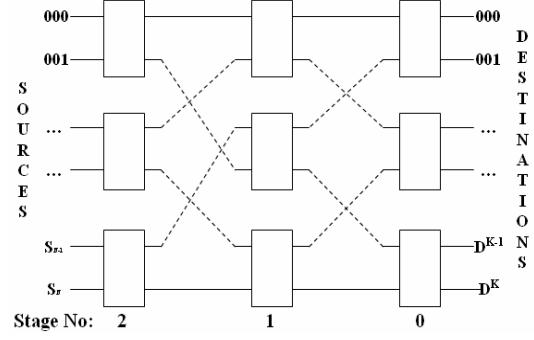


Figure 3. Packet path in router for N

As shown figure 3, input S_N and output D_N^k use router internal tree structure, and order of input compares with right basing left of each step, and establishes weight(w) of standard node, and add established weight of all paths, it becomes order of input packet S_N .

At each step, value of comparable node is

$$(w_{m,2n}, w_{m,2n+1}) = \begin{cases} (0,0) \\ (0,1) \end{cases} \text{ if } d_{m,2n} == d_{m,2n+1} \text{ otherwise}$$

with standard node, extent by

$$1 \leq m \leq \log N, \quad 0 \leq n \leq 2^{m-1} - 1$$

Sum of weight for each node of all paths is calculated by

$$W_{total} = \sum_{S_N}^{D_N^k} W_{\min \text{ path}}$$

Non-duplicated packet is linked by subsequent input in calculated order, and duplicated packet returned to previous network and re-transmission.

2.2 Proposed routing algorithm

This paper presents process such as figure 4 for transmit packet that apply proposing routing algorithm.

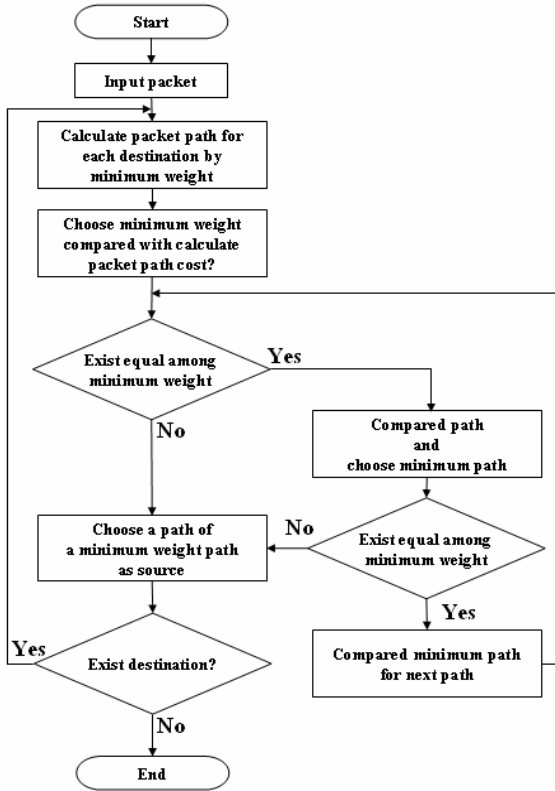


Figure 4. Routing Algorithm Flow

3. Experiment result

In this paper, composed network as seen from 2.1 temples for packet transmission performance analysis of proposing routing algorithm, and used simulator BONEs DESIGNER for result of an experiment. An experiment branch of three kinds packets of Video, Audio, Data, generate traffic when transmit Source packet, enforced each existent WFQ[6], SFQ[7] algorithm at the general router and router that apply proposed algorithm(RA), the sequence is seen comparing average delay with maximum latency time by weight of nodes.

Table 1. Maximum delay time

	Video	Audio	Data
WFQ	39.1	28.5	17.9
RA_WFQ	19.9	28.4	32.8
SFQ	33.4	24.7	16.4
RA_SFQ	18.9	15.3	16.4

Table 2. Average delay time

	Video	Audio	Data
WFQ	23.5	14.4	10.7
RA_WFQ	15.3	13.9	16.4
SFQ	17.2	11.6	8.52
RA_SFQ	12.1	9.7	11.3

Table 1 and table 2 shown measured maximum latency time, average delay time.

In the case of WFQ, maximum delay time decreased about 49.1% in case of Video session, and the case of Audio session decreased about 0.4%, and the case of Data session increased about 83.2%. The case of average delay time decreased about 34.9% in case of Video session, and the case of Audio session decreased about 3.5%, and the case of Data session increased about 53.2%.

In the case of SFQ, maximum delay time decreased about 43.4% in case of Video session, and the case of Audio session decreased about 38.1%, and the case of Data session decreased about 0.6%. The case of average delay decreased about 29.7% in occasion of Video session, and the case of Audio session decreased about 16.3%, and the case of Data session increased about 32.6%.

At the two scheduling algorithms, result that experiment traffic source dividing characteristic as in general case of sensitive Video and Audio session could confirm decrease present state at cell damage and delay time. But, delay time of general Data session could see increasing phenomenon.

Figure 5 and figure 6 is a graph about compare result using table 1 and table 2.

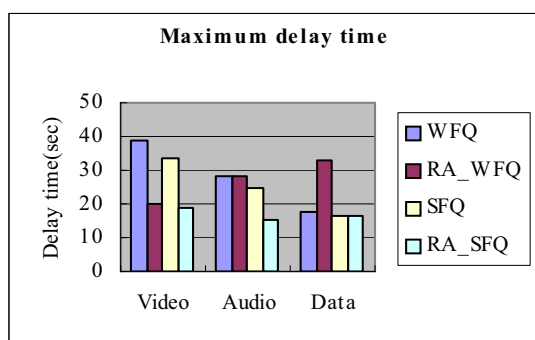


Figure 5. Maximum delay time comparison graph

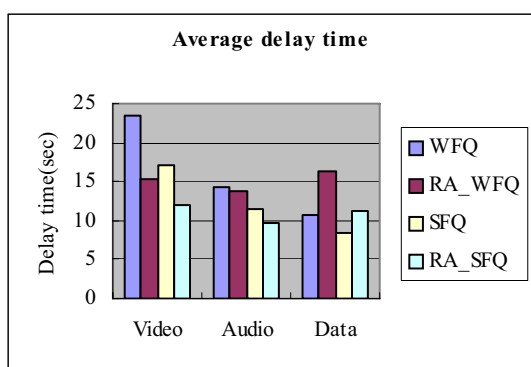


Figure 6. Average delay time comparison graph

4. Conclusion

In this paper, we apply priority order queuing scheduling in routing algorithm that an important part in traffic performance for improved packet processing device development, and proposed algorithm and existing algorithm did comparative analysis. An experiment executed about 3 sessions that classify by source of sensitive Video and Audio in latency time and cell damage and general Data source. We were shown result that analyze comparison by general Routing method and Routing method applied proposing algorithm about maximum delay time and average delay time of occurred traffic during transmission.

As can see through simulation, case of Video and Audio session, we can confirm decrease of maximum latency time and average delay, and specially, the case of WFQ can confirm decrease effect of maximum delay time and average delay time about result of Video session that apply

proposing method. But, the case of Data session could confirm a little increase.

Hereafter, we will have to study delay time decrease method about general Data session.

References

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