

W^2F^2Q :

, , , *

Packet Fair Queuing in Wireless Packet Network

Yongho Seok, Yung Yi, Yanghee Choi, Dongwon Han *

School of Computer Science and Engineering, Seoul National University

*Electronics and Telecommunications Research Institute

가

가

Wireless Worst-case Fair Weighted Fair Queuing(W^2F^2Q)

General Processor Sharing(GPS)[1] 가

Worst-case Fair Packet Fair Queuing(WF^2Q)[3]

, (*leading*), (*lagging*), (*in ? sync*)[5]

Globally Bounded Timestamp(GBT)[6]

1.

가

Quality of Service(QoS)

가

GPS

가

Weighted Fair Queuing(WFQ),

GPS 가

WF^2Q

가

QoS

가

가

가 가

가

가

가 , GPS

WF^2Q

GBT

$F_i(t)$: Virtual finish time of session i

w_i : Weight of session i

2

3.2

GBT

WF²Q

(in sync) (leading), (lagging), [5] GBT

4

3.1. GBT

5

$$S_i(t) \leq \frac{L}{r_i} + V(t) \leq S_i(t) \leq \frac{L}{r_i} + V(t)$$

i GBT

[6]

2.

QoS

i

가

GPS

3.2. i w_i

GPS

가

$$V(t) \leq S_i(t) \leq \frac{L}{r_i} + V(t)$$

가

3.3. i w_i

GPS

, WFQ, WF²Q

WF²Q

$$S_i(t) \leq V(t) \leq \frac{L}{r_i} + V(t)$$

(virtual start time)

(virtual time)

3.3

GPS

가

WF²Q [3]

Idealized Wireless

가

가

Fair queuing (WFQ) [5], Channel Condition Independent Packet

fair queuing (CIFQ) [2], Wireless Fair Service (WFS) [4]

, 가

CIFQ

가

가 가

3.4. i $S_i(t), F_i(t)$

3. W²F²Q

$$S_i(t) \leq \begin{cases} F_i^k, & \text{if } Q_i(a_i^k) \leq 0 \\ \max(F_i, V(a_i^k)), & \text{if } Q_i(a_i^k) > 0 \end{cases}$$

3.1

$$F_i(t) \leq S_i \leq \frac{L_i^k}{r_i}$$

$V(t)$: System Virtual time

$S_i(t)$: Virtual start time of session i

3.4

$\theta_{i,max}$

$\theta_{i,max}$

3.5

i 가

θ, θ is global maximum leading/lagging amount

$$\theta_{i,max} \theta \theta \theta \frac{\theta_i}{\theta_{jF} \theta_j}$$

$$\theta_{i,max} \theta \theta \theta \frac{\theta_i}{\theta_{jF} \theta_j}$$

3.5

가

가 가 .[2]

가

가

4.

NS-2

, 4

0,1

2,3

가

2Mbps,

가

가

1

3.2, 3.3

가

가

2

가

2

가

2

가

가

3

1

가

5.

GPS

가

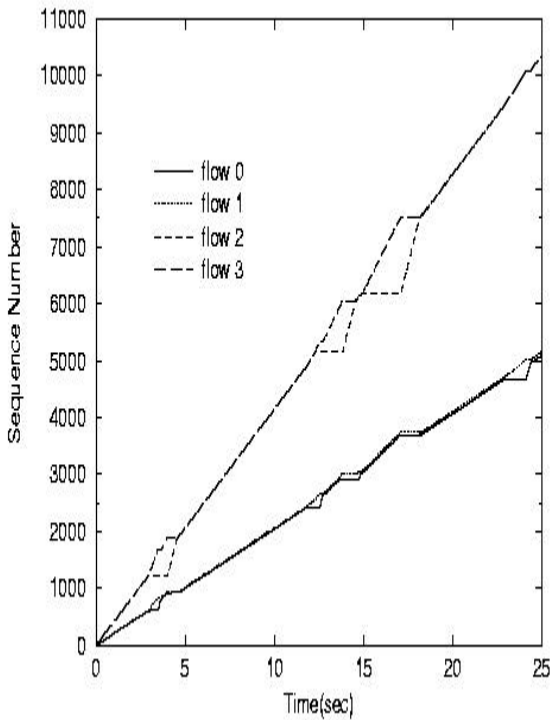
WF^2Q ?

W^2F^2Q

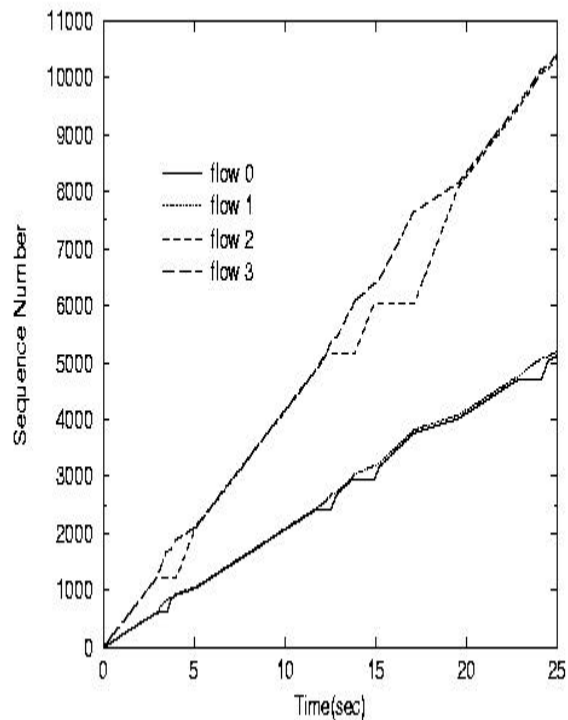
가

GBT

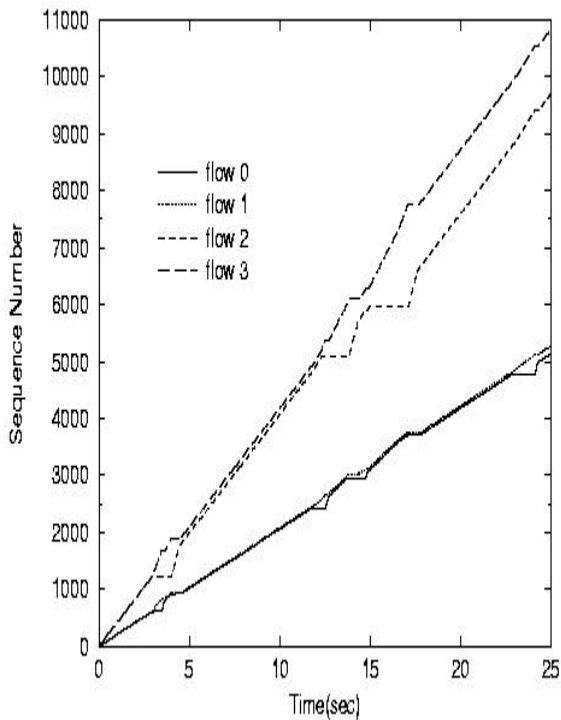
가



1- 3.2, 3.3



3- 3.5



2- 3.4

- [1] A. K. Parekh and R. G. Gallager, "A Generalized Processor Sharing Approach to Flow control in integrated services networks: The single node case", *IEEE/ACM Transactions on Networking*, vol. 1, no 3, pp. 344-357, June 1993.
- [2] T. S. Eugene Ng, I. Stoica, and H. Zhang, "Packet Fair Queuing Algorithms For Wireless Networks with Location-Dependent Errors", *INFOCOM'98*, Mar 1998.
- [3] J.C.R. Bennett and H. Zhang, "Hierarchical Packet Fair Queuing Algorithms", *IEEE/ACM Transactions on Networking*, vol 5, no 5, pp. 675-689, Oct 1997.
- [4] S. Lu, T. Nandagopal, and V. Bharghavan, "A Wireless Fair Service Algorithm for Packet Cellular Networks" *ACM Mobicom'98*, Oct 1998.
- [5] S. Lu, V. Bharghavan and R. Srikant, "Fair Scheduling in Wireless Packet Networks" *ACM Sigcomm '97*, Sep 1997.
- [6] D. C. Stephens, J. C. R. Bennett, and H. Zhang, "Implementing Scheduling Algorithms in High-Speed Networks", *IEEE JSAC* vol 17, no 6, pp. 1145-1159, June 1999.