Review Form: 1st International Workshop on

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WEB MINDS

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Paper Number: 22
Paper Title: Packet Scheduling Scheme in the Next Generation High-Speed Wireless Packet Networks
Authors: Jing Qiu, Ping Zhang

Reviewer1:

Familiarity Rate your familiarity with the topic	1	2	**3X**	4	
	Novice	Some knowledge	Familiar	Expert	
Significance Technical relevance and practicality of ideas in the paper	1	**2X**	3		
	Not significant	Somewhat significant	Highly significant		
Novelty How original the problem and/or solution method is	1	**2X**	3		
	Not novel	Somewhat novel	Highly novel		
Quality of Presentation Writing and presentation style/accuracy	1	**2X**	3		
	Poorly written	Could be improved	Well written		
Overall Recommendation	1	**2X**	3	4	5
	Strong reject	Weak reject	Weak accept	Accept	Strong accept

Contributions

A scheduling algorithm is presented, based on adding a "starvation threshold" to Qualcomm Proportional Fair Scheduling (PFS) algorithm. By simulation it is shown that the time a station does not receive service is shortened (compared to Q-PFS), in two particular circumstances: when adding a new flow and when degrading one flow's link quality. Only best effort traffic is considered. Due to the empirical nature of the variation of Q-PFS, no in-depth analysis is presented. The "gain" over Q-PFS is not quantified.

Strengths and weaknesses

Broaching the issue of Q-PFS weaknesses and trying to minimize them is interesting, but the claim "this algorithm has better fairness" should be justified –simulation results are not overwhelming. No source for the channel model is given, and an analysis of the effects of the proposed threshold on fairness, throughput… is missing. The paper has a poor presentation, with even wrong references to figures. Shortening starvation for best effort traffic at the expense of some kind of "slow start" (Figure 2(a)) does not seem a significant advantage.

Detailed public comments

The paper analyses the performance of a “well-known” scheduling algorithm (Q-PFS) in only two particular cases: the addition of a new flow to the system, and the degradation of wireless link for a flow. These two circumstances lead to some kind of starvation to “well-behaved” users, which can be somewhat reduced by the proposed algorithm (ST-PFS). But the number of considered cases is so low that conclusions are weakly supported. Taking into account that only best-effort traffic is considered, this gain of ST-PFS over Q-PFS –if needed- should be stressed. The choice of the new parameter Ti seems arbitrary. More attention should be given to paper presentation (to both text –misspellings- and figures -wrong references with vague captions-). Comparison with related work (dealing with weaknesses of PFS algorithms) might help improving the paper.

Reviewer2:

Familiarity Rate your familiarity with the topic	1	2	***3X***	4
	Novice	Some knowledge	Familiar	Expert

Significance Technical relevance and practicality of ideas in the paper	1	***2X***	3
	Not significant	Somewhat significant	Highly significant
Novelty How original the problem and/or solution method is	***1X***	2	3
	Not novel	Somewhat novel	Highly novel
Quality of Presentation Writing and presentation style/accuracy	***1X***	2	3
	Poorly written	Could be improved	Well written

Overall Recommendation	***1X***	2	3	4	5
	Strong reject	Weak reject	Weak accept	Accept	Strong accept

Contributions

The paper proposes and evaluated a variant of the Proportional Fair Scheduling algorithm to be applied for the downlink scheduling problem in a high-speed wireless packet network. The proposed policy introduces a starvation threshold to achieve a better fairness in the resource allocation.
The performance evaluation of the proposed policy is conducted through simulation experiments with a comparison to the Proportional Fair scheduling algorithm.
The topic of the paper is interesting because the introduction of the high-speed downlink shared channel used by many users is a significant evolution of mobile communication technologies and requires the adoption of channel-state-aware packet scheduling algorithms because of the time-varying channel fluctuations of wireless links. However, the paper has a low technical depth and degree of novelty because it proposes only a very simple variant of the Proportional Fair scheme which represents the basic scheduler in terms of fairness and throughput. Moreover, the model for the scheduler is not clearly discussed, the performance evaluation is incomplete, and the details of the simulation model are not presented at all.

Strengths and weaknesses

The paper should be rejected for the following reasons: it does not present a significant novelty (see next section for details), the model for the scheduler and the simulation parameters are not clearly presented, and the paper organization and writing is poor.

Detailed public comments

The main concern with the paper regards the novelty of the proposed PF variant with starvation threshold. The long-term averaged throughput formula proposed in (4) seems to be a case of the throughput of the PF

scheme in (2) where T_c=n (being n the transmission slot). As T_c in (2) should be defined as min(n, c) with c a predetermined smoothing condition, it seems that the performance of the PF scheme can resemble that of the proposed policy under certain conditions. The authors do not comment at all on this similarity and do not provide the T_c value used in the simulation experiments.

The authors could write a longer paper (the current paper is only 5 pages of 8 allowed) with more details and background; for example the authors could better introduce the need of scheduling algorithms (see for example the paper by Andrews and Zhang in Proc of Infocom 2004).

In formula (1) t should be replaced with n, which is the transmission slot.

In the paper lacks at all a simulation model section. For example, what are the fluctuations of wireless links? How long is the simulation?

For the performance comparison, the authors could also consider the Maximum CIR and Round-Robin schedulers.

The authors should clearly identify the two scenarios and write in each caption figure to which scenario the figure refers. The figures have also a poor quality and are readable with difficulty.

The authors could also consider a figure plotting the probability of the time interval of the slot assignment in the PF and ST-PH schedulers.

The paper is poorly written and needs to be clearly checked for grammar prior to be reconsidered for a new submission. A lot of small language problems make it hard to understand various parts of the paper.

A final note regards the conclusion where the authors consider that the Proportional Fair scheme does not provide appropriate QoS for real time services such as voice and video and plan to consider this problem in future work. Such a problem has already been addressed, see for example the paper by Choi and Bahk, “WAF: Wireless-Adaptive Fair Scheduling for Multimedia Stream in Time Division Multiplexed Packet Cellular Systems”, Proc. of IEEE ISCC 2003.

Reviewer3:

Familiarity Rate your familiarity with the topic	1	**2X**	3	4	
	Novice	**Some knowledge**	Familiar	Expert	
Significance Technical relevance and practicality of ideas in the paper	1	**2X**	3		
	Not significant	**Somewhat significant**	Highly significant		
Novelty How original the problem and/or solution method is	1	**2X**	3		
	Not novel	**Somewhat novel**	Highly novel		
Quality of Presentation Writing and presentation style/accuracy	**1X**	2	3		
	Poorly written	Could be improved	Well written		
Overall Recommendation	1	**2X**	3	4	5
	Strong reject	**Weak reject**	Weak accept	Accept	Strong accept

Contributions
This paper proposes yet another variant of the Proportional Fair Scheduling algorithm for downlink problem in high-speed wireless networks. The proposed Proportional Fair Scheduling algorithm with starvation threshold guarantees that the starvation time of a user will not exceed a predefined threshold.

Strengths and weaknesses
The topic is important but the scientific contribution is poor. After a first part that describes the basic algorithms and its variants, the authors give us two pages of performance results without an adequate presentation of the test-bed system, simulation models and parameters. And no motivations about the results.

Detailed public comments
Although the innovation with respect to the existing algorithms is limited, I appreciate the idea and the importance of the subject. However, to be acceptable the authors should rewrite completely the second part of the paper and improve the overall presentation.

The authors are allowed to add other 3 pages. Acceptance should be subject to an accurate shepherding process.

The authors should at least add a description of the simulation model, experimental scenarios, accuracy or simplifying assumptions of the model. They should make some convincing cases that the proposed algorithms works and works better than what already exists.

Some references is missing. For example, I would consider:
- Wireless-adaptive fair scheduling for multimedia stream, Young-June Choi, Saewoong Bahk and Kwang Bok Lee
- WAF: Wireless-Adaptive Fair Scheduling for Multimedia Stream in Time Division Multiplexed Packet Cellular Systems", same authors
- QoS Provisioning in Wireless Networks, Dapeng Wu, and references therein