Computer Science > Information Theory

Performance Guarantee under Longest-Queue-First Schedule in Wireless Networks

Bo Li, Cem Boyaci, Ye Xia

(Submitted on 16 Jul 2011)

Efficient link scheduling in a wireless network is challenging. Typical optimal algorithms require solving an NP-hard sub-problem. To meet the challenge, one stream of research focuses on finding simpler sub-optimal algorithms that have low complexity but high efficiency in practice. In this paper, we study the performance guarantee of one such scheduling algorithm, the Longest-Queue-First (LQF) algorithm. It is known that the LQF algorithm achieves the full capacity region, Λ, when the interference graph satisfies the so-called local pooling condition. For a general graph G, LQF achieves (i.e., stabilizes) a part of the capacity region, $\sigma^*(G) \Lambda$, where $\sigma^*(G)$ is the overall local pooling factor of the interference graph G and $\sigma^*(G) \leq 1$. It has been shown later that LQF achieves a larger rate region, $\Sigma^*(G) \Lambda$, where $\Sigma^ (G)$ is a diagonal matrix. The contribution of this paper is to describe three new achievable rate regions, which are larger than the previously-known regions. In particular, the new regions include all the extreme points of the capacity region and are not convex in general. We also discover a counter-intuitive phenomenon in which increasing the arrival rate may sometime help to stabilize the network. This phenomenon can be well explained using the theory developed in the paper.

Comments: 27 pages, 7 figures
Subjects: **Information Theory (cs.IT)**
Cite as: **arXiv:1107.3199 [cs.IT]**
(or **arXiv:1107.3199v1 [cs.IT]** for this version)

Submission history

From: Bo Li [view email]
[v1] Sat, 16 Jul 2011 05:09:07 GMT (202kb)

Which authors of this paper are endorsers?