

io-port 06114789**Räcke, Harald; Rosén, Adi****Approximation algorithms for time-constrained scheduling on line networks.**

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Summary: We consider the problem of time-constrained scheduling of packets in a communication network. Each packet has, in addition to its source and its destination, a release time and a deadline. The goal of an algorithm is to maximize the number of packets that arrive to their destinations by their respective deadlines, given the network constraints. We consider the line network, and a setting where each node has a buffer of size B packets (where B can be finite or infinite), and each edge has capacity $C \geq 1$. To the best of our knowledge this is the first work to study time-constrained scheduling in a setting when buffers can be of limited size. We give approximation algorithms that achieve expected approximation ratio of $O(\max\{\log^* n - \log^* B, 1\} + \max\{\log^* \Sigma - \log^* C, 1\})$, where n is the length of the line and Σ is the maximum slack a message can have (the slack is the number of time steps a message can be idle and still arrive within its deadline). A special case of our setting is the setting of buffers of unlimited capacity and edge capacities 1, which has been previously studied by *M. Adler* et al. [ibid. 35, No. 6, 599–623 (2002; Zbl 1012.68024)]. For this case our results considerably improve upon previous results: We obtain an approximation ratio of $O(\min\{\log^* n, \log^* \Sigma, \log^* M\})$ (where M is the number of messages in the instance), which is a significant improvement upon the results of Adler et al. who obtained a guarantee of $O(\min\{\log n, \log \Sigma, \log M\})$.

Keywords: approximation algorithms; packet scheduling; time constraints; line networks

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