

## Packet routing in networks

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The packet routing problem deals with the problem of finding a schedule for transferring packets through a given network. Each packet has a source- and a destination vertex and a predefined path. The aim is to minimize the makespan, i.e., the time when the last packet reaches its destination. We present polynomial time algorithms for in- and out-trees. Then we give a factor 2-approximation algorithm for general trees. We prove that the packet routing problem is not only *NP*-hard, but it is already *NP*-hard to approximate it with an approximation ratio of  $6/5 - \epsilon$  for all  $\epsilon > 0$ . We present similar results for the same problem restricted to planar graphs, trees and grid graphs. Finally, we show that it is also *NP*-hard to approximate the packet routing problem with an absolute error of  $k$  for any positive integer  $k$ .