Routing protocols

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Routing is an important problem, as the new, intelligent systems make it possible to use more alternative paths simultaneously. Our aim is to minimize the latency-based characteristics of the network, that is, the cost. We face the same problems in fix and mobile networks.

The protocols used nowadays find the shortest path, one providing the widest bandwidth or some other one based on a subjective cost. These tend to overrate a route or a section of routes and make its characteristics worse with the exaggerated traffic directed to it. There are QoS-based routing protocols that select more paths in an ad-hoc manner and do not take the interdependence of the traffic into account. The traffic on the different routes forms the flow on the network. A flow is said to be at Nash equilibrium (or is a Nash flow) if no user can change their route to improve its latency. Nash flows always exist and are essentially unique. Since there can be such a flow in which no user can decrease their own latency by changing route, however they can improve the latency of others, the Nash flows are not always optimal considering the total latency (Total latency is what we get by summarizing the product of the latencies and the congestions on every link). Optimal flow minimizes the total latency, but it can be unfair to some traffic, i.e., some traffic might suffer a greater latency in the optimal flow than the Nash flow.

In the literature total latency is minimized. In this paper we take the greatest latency into account. The reason is that in real-time - for example speech traffic - we have to consider the worst supply. The social cost we use is an important characteristics of the flows on telecommunication networks, because every traffic has to reach its destination node in time. The flow minimizing the social cost can eliminate the unfairness properties of the minimum-latency flow and the sub- optimality of the Nash flow.