

# Network Creation Games: Foundations and Ongoing Work

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## Abstract

*Network creation game*, defined and introduced by Fabrikant, Luthra and Maneva in 2003, models the process of creation of autonomous networks, such as the Internet. Generally, it integrates the network design and the network routing problems by modeling by each node's creation cost and usage cost. Each node in the network, as a player in the strategic game setting, can create a link (or buy an edge) to any other node at a cost  $\alpha$ . The usage cost of a node is related to the distance to other nodes (e.g., sum of distance to all other nodes). The created edges then form a graph which is the result of the game. Each node is regarded as a selfish player who aims to minimize its own cost, that is, the sum of its creation cost and its usage cost. The social cost is then the sum of the costs of all the players. The central question of the network creation game is: *how bad is the network formed by the selfish players compared with the optimal one centrally planned?* When the network is an equilibrium, one can answer the question through the *price of anarchy*, which measures the worst possible ratio between the social cost of an equilibrium and the optimal social cost.

In this talk, we will review some previous work of the network creation game as well as its variants. Finally, we will introduce our ongoing work and the future work.