Generalizations of the Competitive Facility Location Problem

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We consider a competitive facility location problem on a network, in which consumers are located on the vertices and wish to connect to the nearest facility. Knowing this, competitive players locate their facilities on vertices that capture the largest-possible market share. In this talk, we present relations between this problem and social choice theory, which allow us to establish equilibrium existence conditions. We also show that the winning strategies of the 2-player game coincide with solutions to the classic 1-median problem in certain classes of graphs, and generalize this to a class where the former solutions are a subset of the latter ones. Furthermore, we offer a characterization of the winning strategies for the case of 2 players that need to locate 2 facilities each for cycles and trees. Unfortunately, it is not obvious how to extend some of these results to more players or more facilities per player. For instance, we show some counterexamples to some of these possible extensions. Finally, we compare the Stackelberg equilibria and the Nash equilibria for some simple cases and establish that when there are two players, the game is robust and the order of play does not change the outcome of the game.