We consider a class of static two-player games that model attacks on sets of resources. One example is an attacker cutting a link of a graph to try to disrupt a spanning tree selected by the network manager. Another example is cutting a link of a graph to disrupt a flow of commodity that goes from a source to a destination.

Generally, there is a finite set S of resources and two collections A and D of subsets of S. The defender selects d in D and the attacker selects a in A. The cost to the defender is K(a, d), which models the damage caused by the attacker. The reward to the attacker is K(a, d) – c(a), where c(a) is the cost of attacking the subset a. In the first example, S is the set of links of a graph, A is the set of singletons, D is the set of spanning trees of the graph, and K(a, d) is one if d contains a and is zero otherwise.

We show that there is a class of such problems for which there is a polynomial algorithm to find the Nash equilibria. This class includes the two examples mentioned above. The analysis uses the characteristics of the blocker of specific polyhedra and the submodularity of functions associated to K(a, d). The results also provide some insight into the vulnerability of graphs to strategic attackers.