# Limitations on the Simultaneous Maximization of Two Vulnerability Parameters

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The vulnerability parameter component order connectivity of a graph $G$ on $n$ nodes, denoted by $\kappa_c^{(k)}(G)$ where $1 \leq k \leq n$, is the minimum order of a set of nodes whose removal yields a surviving subgraph with each component having order $\leq k-1$. The vulnerability parameter connectivity of a graph $G$, denoted by $\kappa(G)$, is a measure of alternate routes between nonadjacent nodes. Thus, given a graph $G$ on $n$ nodes and $e$ edges, the simultaneous maximization of $\kappa_c^{(k)}$ (for a given $k$) and $\kappa$ is considered to be a strong network. Several years ago the Stevens/Seton Hall Graph Theory Group studied this phenomenon and determined a range of edge values for which it is impossible to simultaneously maximize both parameters. An extension of Turan's result on triangle-free graphs was used in determining this range. Subsequently, Balister and Bollobás generalized the extension. In this talk, we use their result to determine additional ranges for which simultaneous maximization is impossible and we also present a new positive result.

Keywords: connectivity, component order connectivity, maximization, vulnerability parameter