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Defense in Complex Networks

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Complex networks with a heterogeneous distribution of loads may undergo a global cascade of overload failures when highly loaded nodes or edges are removed due to attacks or failures. Since a small attack or failure has the potential to trigger a global cascade, a fundamental question regards the possible strategies of defense to prevent the cascade from propagating through the entire network. Here I introduce and investigate a costless strategy of defense based on a selective further removal of nodes and edges, right after the initial attack or failure. This intentional removal of network elements is shown to drastically reduce the size of the cascade.