Graph-Based Modelling on the Robustness of Interconnected Networks under Attack

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Abstract

In this report a number of graph theoretical concepts are introduced and their relevance to network modelling is discussed, in particular the ability to capture the robustness of an internetwork. A novel graph model is described that successfully generates networks with realistic properties, in order to simulate various internetwork scenarios. The main objective was to devise a more robust method of interconnecting networks by considering different internetwork topologies and interconnection methods. A quantitative investigation was carried out using MATLAB to simulate abstract networks being attacked, and the analysis led to some qualitative conclusions. It was found that a strategy for choosing interconnecting nodes based on a preferential attachment basis may significantly increase internetwork robustness, and that internetwork topologies with a central intermediary network significantly increase the connectivity across the internetwork. These findings have significant implications for future graph-based network research, as more robust methods of creating internetworks can be devised from them.