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Robustness of Heterogeneous Supply Networks–New Metrics and Model KANG ZHAO, College of Information Sciences and Technology, Penn State University, AKHIL KUMAR, Smeal College of Business, Penn State University, JOHN YEN, College of Information Sciences and Technology, Penn State University — Existing research on the robustness of complex networks often assumes that nodes in a network have homogeneous roles. Using a supply network as an example, this research develops new robustness metrics, including availability, proximity, accessibility, and connectivity, to reflect the heterogeneous roles of supply nodes and demand nodes in a supply chain. In addition, we propose a new supply network model, which is based on the rewiring of the scale-free network. With the help of computational simulations, we evaluate the new network's robustness under the new metrics. The results show that it outperforms a pure scale-free topology on the metrics of availability and connectivity when both random and targeted disruptions are likely to occur. The unique feature of our approach is that by tuning the rewiring parameter of our model, it is possible to design networks with very similar performance on the availability and accessibility metrics in the presence of both types of disruptions.

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