Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Cascading Failures in Networks with Proximate Dependent Nodes YOSEF KORNBLUTH, STEVEN LOWINGER, GABRIEL CWILICH, SERGEY BULDYREV, Department of Physics, Yeshiva University — We study a system composed of two identical, random regular, interdependent networks. When a fraction of nodes in the first network are eliminated by failure or attack, further nodes that become isolated or lose their dependent node fail in turn, initiating a process of cascading failures. In contrast to previous models, these networks are constructed such that interdependent nodes are no more than a set distance away, with the distance defined by the number of intervening nodes. We find that as the maximum distance and the degree of connectivity increase, the disintegration of the system shifts from being similar to that of a single network to resembling the failure found in other models of interdependent networks. As the distance and degree increase, the collapse at the critical threshold changes from a second-order transition to a first-order one. The critical threshold monotonically increases as the distance increases.

Yosef Kornbluth
Department of Physics, Yeshiva University

Date submitted: 09 Nov 2012 Electronic form version 1.4