Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Percolation of localized attack on isolated and interdependent random networks SHUAI SHAO, XUQING HUANG, H. EUGENE STANLEY, Center for Polymer Studies and Department of Physics, Boston University, SHLOMO HAVLIN, Department of physics, Bar-Ilan University — Percolation properties of isolated and interdependent random networks have been investigated extensively. The focus of these studies has been on random attacks where each node in network is attacked with the same probability or targeted attack where each node is attacked with a probability being a function of its centrality, such as degree. Here we discuss a new type of realistic attacks which we call a localized attack where a group of neighboring nodes in the networks are attacked. We attack a randomly chosen node, its neighbors, and its neighbor of neighbors and so on, until removing a fraction $(1 - p)$ of the network. This type of attack reflects damages due to localized disasters, such as earthquakes, floods and war zones in real-world networks. We study, both analytically and by simulations the impact of localized attack on percolation properties of random networks with arbitrary degree distributions and discuss in detail random regular (RR) networks, Erdős-Rényi (ER) networks and scale-free (SF) networks. We extend and generalize our theoretical and simulation results of single isolated networks to networks formed of interdependent networks.

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Date submitted: 08 Nov 2013 Electronic form version 1.4