Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Cascades of failures in various models of interdependent networks
SERGEY BULDYREV, BENJAMIN KADISH, NATHANIEL SHERE, MITCHEL AHARON, GABRIEL CWILICH, Yeshiva University — Complex networks appear in almost every aspect of science and technology. Recently an analytical framework for studying the percolation properties of interacting networks has been developed [1]. These studies however have several limitations. The real networks do are not randomly connected. They are often embedded into two dimensional space. The dependency links are not connecting nodes at random but have tendency to connect nodes with similar degrees, or nodes which are close to each other in Euclidian space. Moreover, the network failures may occur not only to the loss of connectivity but also due to overload of nodes with high betweennes. We have study these situations analytically and by computer simulations and found the conditions at which networks collapse in an abrupt first order like transition when the entire network becomes non-functional or fail gradually like in a second order transition as a greater fraction of nodes is removed in the initial attack or failure.

[1] **S. V. Buldyrev**, R. Parshani, G. Paul, H. E. Stanley, and S. Havlin, "Catastrophic cascade of failures in interdependent networks," *Nature* **464**, 1025-1028 (2010)

Sergey Buldyrev
Yeshiva University

Date submitted: 21 Nov 2011 Electronic form version 1.4