MAR06-2006-040295

Abstract for an Invited Paper
for the MAR06 Meeting of
the American Physical Society

Statistical Mechanics of Complex Networks: From the Internet to Cell Biology

ALBERT-LÁSZLÓ BARABÁSI, Center for Cancer Systems Biology, Dana Farber Cancer Inst., Harvard Univ., and Center for Network Research and Dept. of Physics, Univ. of Notre Dame

Networks with complex topology describe systems as diverse as the cell, the World Wide Web or the society. In the past few years we have learned that their evolution is driven by self-organizing processes that are governed by simple but generic scaling laws, leading to the emergence of a vibrant interdisciplinary field that uses the tools of statistical physics to explain the origin and the dynamics of real networks. One of the most surprising finding is that despite their apparent differences, cells and complex man-made networks, such as the Internet or the World Wide Web, and many communication networks share the same large-scale topology, each having a scale-free structure. I will show that the scale-free topology of these complex webs have important consequences on their robustness against failures and attacks, with implications on drug design, the Internet's ability to survive attacks and failures, and our ability to understand the functional role of genes.

For further information and papers, see http://www.nd.edu/∼networks