

MAR05-2004-020119

Abstract for an Invited Paper
for the MAR05 Meeting of
the American Physical Society

Information Horizons in Complex Networks

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We investigate how the structure constrain specific communication in social-, man-made and biological networks. We find that human networks of governance and collaboration are predictable on teat-a-teat level, reflecting well defined pathways, but globally inefficient (1). In contrast, the Internet tends to have better overall communication abilities, more alternative pathways, and is therefore more robust. Between these extremes are the molecular network of living organisms. Further, for most real world networks we find that communication ability is favored by topology on small distances, but disfavored at larger distances (2,3,4). We discuss the topological implications in terms of modularity and the positioning of hubs in the networks (5,6). Finally we introduce some simple models which demonstarte how communication may shape the structure of in particular man made networks (7,8).

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