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Measuring the performance of wireless networks represented as probabilistic graphs by application of network reliability models

In this talk we address the problem of measuring the performance of wireless networks by modeling these networks as probabilistic directed graphs. The communication between network's nodes a and b is modeled as stochastic directed link from a to b, whose probability of failure is the outrage probability, that is, the probability that the capacity of the communication channel is less than its transmission rate. In current literature wireless networks are usually represented as binary networks, i.e., an undirected edge exist connecting two communication nodes if both are within each other reach. Probabilistic networks allow differentiation of two nodes as they may have different transmitting/receiving characteristics, by introducing two antiparallel directed links connecting the nodes with possibly different probabilities of failure. Then to measure specific performance objectives of a network can be accomplished by application of new or classical network reliability mathematical models, the latter introduced in the 1960s. Moreover traditional optimization problems as for example finding dominating sets in undirected graphs to establish possible sets of backbone nodes in sensor networks can be equivalently accomplished in probabilistic networks by application of network reliability models. The pros and cons of modeling communication networks as probabilistic graphs versus traditional representations are discussed.

Biography

Louis Petingi obtained his PhD in Computer Science from Stevens Institute of Technology (New Jersey, USA) in the fields of Extremal Graph Theory and Network Reliability. He is currently a full Professor of Computer Science at the College of Staten Island (City University of New York). His research comprises: application of network reliability models to measure if performance objectives of communication networks are met and; to introduce new techniques to characterize graphs with maximum number of spanning trees among competing topologies with equal number of vertices and edges. The latter problem has been tackled by many graph theorists since the 1960's because of its applicability to the design of reliable networks.

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