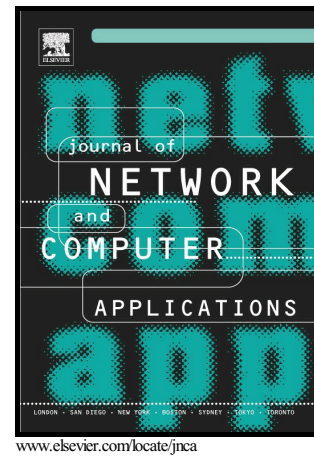


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Reliability Modeling and Analysis of Communication Networks

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Abstract

In recent times, the functioning of various aspects of modern society—ranging from the various infrastructural utilities such as electrical power, water to socio-economical aspects such as telecommunications, business, commerce, education—has become critically reliant on communication networks, and particularly on the Internet. With the migration of critical facilities to the Internet, it has become vitally important to ensure the reliability and availability of networks. In this paper, we study various modeling and analysis techniques that can aid in the study of reliability of communication networks. In this regard, we provide background on the modeling techniques (such as reliability block diagrams, fault trees, Markov chains, etc.) and analysis techniques (such as mathematical analytical methods, simulation methods, and formal methods). Apart from providing the necessary background, we also critically evaluate the pros and cons of different approaches, and provide a detailed survey of their applications in communication networks. To the best of our knowledge, this is the first in-depth review of the application of reliability modeling and analysis techniques in communication networks.

Keywords: Reliability Assessment, Communication Networks, Reliability Block Diagrams (RBDs), Fault Tree, Markov Chain, Simulation Tools, Formal Methods

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