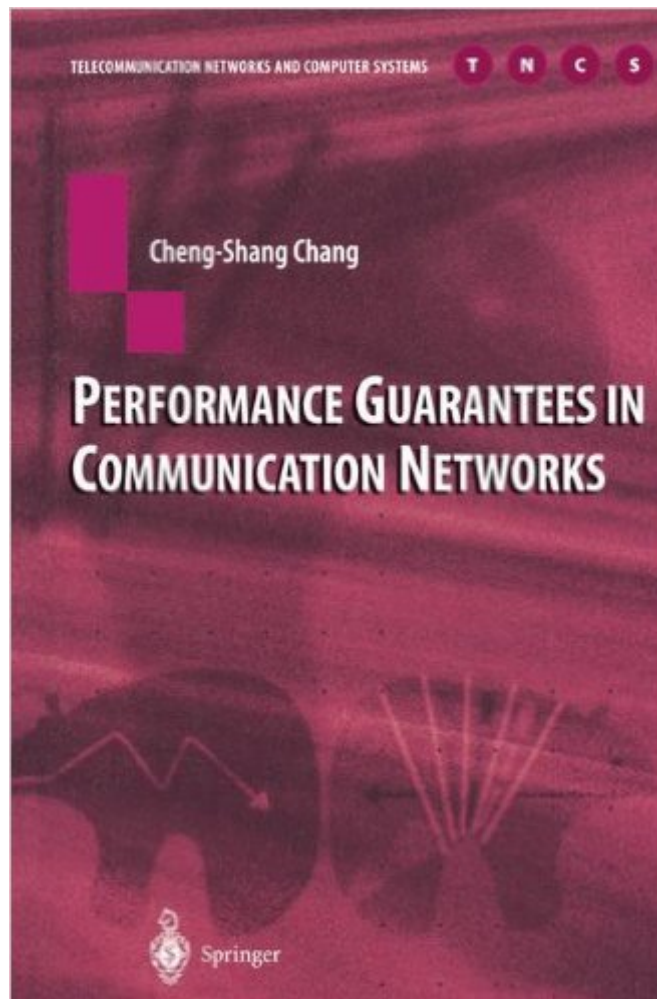# Performance Guarantees In Communication Networks (Telecommunication Networks And Computer Systems)

Synopsis

Providing performance guarantees is one of the most important issues for future telecommunication networks. This book describes theoretical developments in performance guarantees for telecommunication networks from the last decade. Written for the benefit of graduate students and scientists interested in telecommunications-network performance this book consists of two parts. The first introduces the recently-developed filtering theory for providing deterministic (hard) guarantees, such as bounded delay and queue length. The filtering theory is developed under the min-plus algebra, where one replaces the usual addition with the min operator and the usual multiplication with the addition operator. As in the classical linear system theory, the filtering theory treats an arrival process (or a departure process) as a signal and a network element as a system. Network elements, including traffic regulators and servers, can be modelled as linear filters under the min-plus algebra, and they can be joined by concatenation, "filter bank summation", and feedback to form a composite network element. The problem of providing deterministic guarantees is equivalent to finding the impulse response of composite network elements. This section contains material on:- (s, r)-calculus- Filtering theory for deterministic traffic regulation, service guarantees and networks with variable-length packets - Traffic specification- Networks with multiple inputs and outputs- Constrained traffic regulation The second part of the book addresses stochastic (soft) guarantees, focusing mainly on tail distributions of queue lengths and packet loss probabilities and contains material on:- $(s(q), r(q))$-calculus and q-envelope rates- The large deviation principle- The theory of effective bandwidthThe mathematical theory for stochastic guarantees is the theory of effective bandwidth. Based on the large deviation principle, the theory of effective bandwidth provides approximations for the bandwidths required to meet stochastic guarantees for both short-range dependent inputs and long-range dependent inputs.

Book Information

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Customer Reviews

This book provides a unified view of almost all work done in the field of formal performance guarantees for packets computer networks. The style is extremely formal and unless you already read some of the referring papers, you'll be lost within some couple of pages. It is however a very good book providing a different view of what is called performance guarantees using a deterministic formalism (opposed to statistical). Part two of the book called "stochastic guarantees" is somewhat difficult to read because it requires some important background in stochastic processes you're not due to know as a computer scientist. This second part requires learning advanced stochastic modeling concepts (Wolff for example)...The reason for not giving 5 stars is ... the lack of explanations that force the reader to search somewhere else in order to understand what the author is talking about !In summary, this is a good book .... But if you're involved in packet networks performance analysis, it's worth the effort....

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