

TELCOM 2011: Telecommunications Seminar

Stochastic Network Calculus

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Network calculus is a theory dealing with queuing type problems encountered in computer networks with focus on performance guarantees. Central to the theory is the use of alternate algebras such as min-plus algebra and max-plus algebra to transform complex network systems into analytically tractable systems. To simplify the analysis, another idea is to characterize traffic and service processes using various bounds. Network calculus has developed along two tracks - deterministic and stochastic. While deterministic network calculus relies on worst-case analysis, stochastic network calculus takes into consideration the stochastic characteristics of traffic and service processes. The focus of this presentation is on stochastic network calculus. The content includes an introduction to the basic properties required for a network calculus, an overview of deterministic network calculus, some key models and results for stochastic network calculus. In addition, recent results relating stochastic network calculus to queuing theory are presented, followed by sample applications of stochastic network calculus. Moreover, open challenges and topics for future research are highlighted.

Bio of Speaker: Prof. Yuming Jiang received his BSc degree from Peking University, MEng degree from Beijing Institute of Technology, and PhD degree from the National University of Singapore. From 1996 to 1997, he worked with Motorola as a Technical Trainer. From 1999 to 2001, he was a Research Engineer at National University of Singapore. From 2001 to 2003, he was with the Institute for Infocomm Research, Singapore, as a Member of Technical Staff and Research Scientist. Since 2004, he has been with the Norwegian University of Science and Technology, where he is now a full Professor. His research interests include the provision of quality of service in communication networks, performance evaluation of communication networks, and network calculus. He is an author of the book "Stochastic Network Calculus", published by Springer, 2008.