Reliability Analysis of Communication Systems

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Abstract

Reliability is defined to be the ability of a system or component to perform its required functions under stated conditions for a specified period of time. In the world of broadband network, different types of communication networks are facing a large demand due to its high-speed wireless data transmission, extensive coverage from base stations, and a luxury of upgrading protocol software. In this talk, an analytical model is discussed to determine reliability attributes of third generation and beyond Universal Mobile Telecommunication Systems (UMTS), Voice over Internet Protocol (VoIP), Long-Term Evolution Advanced (LTE-A), Vehicular Ad hoc Network (VANET), High-Altitude Platform (HAP) networks. These networks are modeled using stochastic models such as Markov chains, semi-Markov process, reliability block diagrams and Markov reward models to obtain these attributes. Numerical results illustrate the applicability of the proposed analytical model. In addition, it can help the guarantee of network connectivity after any failure, without over dimensioning the networks.

Biography:

S. Dharmaraja earned his B.Sc. degree in Mathematics from Presidency College, Chennai, in 1992, M.Sc. degree in Applied Mathematics from Anna University, College of Engineering, Guindy, Chennai, in 1994 and Ph.D. degree in Mathematics from the Indian Institute of Technology Madras, Chennai, in 1999. From 1999 to 2002, he was a post-doctoral fellow at the Department of Electrical and Computer Engineering, Duke University, USA. From 2002 to 2003, he was a research associate at the TRLabs, Winnipeg, Canada.

He has been with the Department of Mathematics, IIT Delhi, since 2003, where he is currently a **Professor**, Department of Mathematics and joint faculty of Bharti School of Telecommunication Technology and Management from June 2013. He is a '**Professor (HAG)**' from Oct. 2020 and he appointed as '**Institute Chair Professor**' from July 2019 to June 2024. During Sept. 2020 and Aug. 2022, July 2014 and August 2017, he served as **Head**, Department of Mathematics. He appointed as '**Jaswinder & Tarvinder Chadha Chair Professor**' for teaching and research in the area of Operations Research from May 2010 to July 2015. He has held visiting positions at the New York University, USA, Duke University, USA, Emory University, USA, University of Calgary, Canada, University of Los Andes, Bogota, Colombia, National University of Colombia, Bogota, Colombia, University of Verona, Verona, Italy, Sungkyunkwan University, Suwon, Korea, Universita degli Studi di Salerno, Fisciano, Italy and University of New South Wales, Sydney, Australia.

His research interests include applied probability, queueing theory, stochastic modeling, performance analysis of computer and communication systems and financial mathematics. He has published over 90 papers in refereed international journals and over 40 papers in refereed international conferences in these areas. He is an Associate Editor of International Journal of Communication Systems (published by Wiley) and an Associate Editor of Opsearch (published by Springer). He is co-author of a text book entitled "Introduction to Probability and Stochastic

Processes with Applications" in John Wiley (US Edition, New Jersey, June 2012) and (Asian Edition, New Delhi, Jan. 2016), co-author of a text book entitled "Financial Mathematics: An Introduction" in Narosa, Nov. 2012 and co-author of a text book entitled "Introduction to Statistical Methods, Design of Experiments and Statistical Quality Control" in Springer (Asian Edition, Sept. 2018). Recently, he is co-author of a monograph book entitled "Reliability Assessment of Tethered High-altitude Unmanned Telecommunication Platforms: k-out-of-n Reliability Models and Applications" in Springer Verlag (Singapore, 1st edition, March 2024) and co-author of a text book entitled "Introduction to Probability, Statistical Methods, Design of Experiments and Statistical Quality Control" in Springer (Second Edition, April 2024).