Network Adaptability from Disaster Disruptions and Cascading Failures

Abstract

Recent disasters such as Hurricane Sandy demonstrate that our network infrastructures need to be better prepared to survive from such events. Employing techniques such as risk-aware provisioning, dynamic re-provisioning, multipath routing, and data replication, our methods perform the following: (1) Normal Disaster Preparedness (by accounting for risk of disasters in different parts of the infrastructure); (2) Enhanced Disaster Preparedness (under more-accurate intelligence on potential disasters); and (3) Post-Disaster Service Survivability (after a disaster, if full bandwidth cannot be guaranteed, the services should be provided with as much bandwidth as possible (degraded services)). While traditional approaches focus on protecting links and nodes (routers, switches, etc.) to provide “network connectivity”, the shifting paradigm towards cloud computing/storage require that we protect the data/content, so we develop the concept of “content connectivity” and methods to achieve this. Thus, we can significantly improve a telecom backbone network’s adaptability to survive disaster disruptions.

Biography

Dr. Biswanath (Bis) Mukherjee is a Distinguished Professor at University of California, Davis, where was also Chairman of Computer Science from 1997-2000. He received the BTech degree from Indian Institute of Technology, Kharagpur (1980) and Ph.D. degree from University of Washington, Seattle (1987). He was General Co-Chair of IEEE/OSA Optical Fiber Communications (OFC) in 2011, Technical Program Co-Chair of IEEE/OSA OFC 2009, and Technical Program Chair of IEEE INFOCOM 1996. He is currently the Editor of Springer's Optical Networks Book Series. He has also served on eight journal editorial boards, most notably IEEE/ACM Transactions on Networking and IEEE Network. In addition, he has guest edited special issues of Proceedings of the IEEE, IEEE/OSA Journal of Lightwave Technology, IEEE Journal on Selected Areas in Communications, and IEEE Communications. He has supervised 56 Ph.D. degrees to completion and currently mentors 17 advisees, mainly Ph.D. students. He is co-winner of the Optical Networking Symposium Best Paper Awards at IEEE Globecom 2007 and IEEE Globecom 22008. He is also author of the graduate-level textbook Optical WDM Networks (Springer, January 2006). Dr. Mukherjee served a 5-year term on Board of Directors of IPLocks, a Silicon Valley startup company, and has also served on technical advisory boards of several startup companies, including Teknovus (acquired by Broadcom). He is an IEEE Fellow.