

Minitrack: Telecommunications and Network Convergence: Theory and Practice

Samir Chatterjee

*School of Information Science
Claremont Graduate University
Samir.chatterjee@cgu.edu*

Amitava Dutta

*School of Management
George Mason University
adutta@som.gmu.edu*

Abstract

Introduction of digital technologies, telecommunications deregulation and significant advances in broadband networking are fueling convergence of the Public Switched Telephone Network (PSTN), PC-based enterprise data networks and the Internet. Only a few years ago, computing, telecommunications, broadcasting and media were completely separate industries each following distinct business logic and building on technologies that had little overlap. Today the Internet Protocol (IP) is clearly becoming a common global packet-platform over which several new and exciting applications and services can be offered. The rapid emergence of “converged networks” is already having far reaching impact on business processes. As the Internet continues to evolve into a critical global infrastructure, there is a clear need to understand the technical, economic and regulatory issues posed by convergence, before it can be used effectively for competitive advantage.

The Telecommunications and Network Convergence minitrack address different aspects of the phenomenon of network convergence, including technology, strategy and policy. By network convergence we imply the integration of several media applications (data, voice, video, images) onto a common packet-based platform provided by IP (Internet Protocol) with the global Internet now becoming a true multi-service infrastructure. Theoretical and simulation models, case studies, or field experiences were all appropriate research methodologies.

This year, we received a number of submissions dealing with various aspects of network convergence. In collaboration with the track chairs, we decided to organize only one session devoted to the minitrack and accepted three papers for full presentation. The *first* paper, “Optimal Pricing of Content Delivery Network (CDN) Services” by Kartik Hosnagar, Ramayya Krishnan, John Chuang and Michael D. Smith discusses Content Delivery Networks (CDNs) that intelligently cache content on behalf of content providers and deliver this content to end users. Although such CDN services are now available, these services remain difficult to price because of rapid changes in the price of bandwidth, economies of scale in content delivery, and variability in

traffic levels faced by content providers. They address this issue by developing analytic models to determine optimal CDN pricing policies. Their results suggest that, consistent with industry practices, CDN pricing functions should provide volume discounts to content providers. They also show that the most likely subscribers to CDN services are those content providers with high volume of traffic and with content having low security requirements. Significantly, their model also shows that larger CDN networks can charge higher prices in equilibrium, which should strengthen any technology-based economies of scale and make it more difficult for entrants to compete against incumbent firms.

The second paper, “Distributed Path Selection (DPS) A Traffic Engineering Protocol for IP-Networks” by Chris Loeser, Andre Brinkmann and Ulrich Reuckert addresses the path selection strategy of an autonomous system (AS). Such paths have got a strong impact on the latency of packets traveling through the AS and the throughput of the underlying network. In theoretical analysis it has been shown for a simple load balancing approach that it can achieve a near optimal packet throughput even in the case of a dynamically changing network and for adversarial packet injections. In this paper they examine the new routing protocol DPS (Distributed Path Selection) that is based on this simple load balancing approach. DPS overcomes its restrictions by the use of new protocol enhancements and is able to transfer the optimal properties of the load balancing approach into a routing protocol. Comparing DPS with OSPF and RIP by simulation, they show that DPS is able to significantly improve the properties of the path system by considering the network topology as well as the traffic pattern while calculating the path system in a reasonable amount of time.

The final paper, “A service environment for air traffic control based on SIP” by Klaus Darilion, Wolfgang Kampichler and Karl M. Goeschka presents a software architecture based on Session Initiation Protocol to integrate audio, video services in air traffic control systems. They further discuss a prototype implementation and related performance aspects of a large system.