Traffic Engineering and Quality of Service Management for IP-based NGNs

Prof. George Pavlou
University of Surrey
Guildford
Surrey GU2 7XH, UK
G.Pavlou@surrey.ac.uk

ABSTRACT

Next Generation IP-based Networks will offer Quality of Service (QoS) guarantees by deploying technologies such as Differentiated Services (DiffServ) and Multi-Protocol Label Switching (MPLS) for traffic engineering and network-wide resource management. Despite the progress already made, a number of issues still exist regarding edge-to-edge intra-domain and inter-domain QoS provisioning and management. This tutorial will start by providing background on technologies such as DiffServ, MPLS and their potential combination for QoS support. It will subsequently introduce trends in Service Level Agreements (SLAs) and Service Level Specifications (SLSs) for the subscription to QoS-based services It will then move to examine architectures and frameworks for the management and control of QoS-enabled networks, including the following aspects: approaches and algorithms for off-line traffic engineering and provisioning through explicit MPLS paths or through hop-by-hop IP routing; approaches for dynamic resource management to deal with traffic fluctuations outside the predicted envelope; a service management framework supporting a "resource provisioning cycle"; the derivation of expected traffic demand from subscribed SLSs and approaches for SLS invocation admission control; a monitoring architecture for scalable information collection supporting traffic engineering and service management; and realization issues given the current state-of-the-art of management protocols and monitoring support. The tutorial will also include coverage of emerging work towards inter-domain QoS provisioning, including aspects such as: an inter-domain business model; customer and peer provider SLSs; an architecture for the management and control of inter-domain services; inter-domain off-line traffic engineering; and QoS extensions to BGP for dynamic traffic engineering. Relevant industrial activities such as IPsphere will be also covered. In all these areas, recent research work will be presented, with pointers to bibliography and a specially tailored Web page with additional resources.

BIOGRAPHY

George Pavlou is Professor of Communication and Information Systems at the Center for Communication Systems Research, Department of Electronic Engineering, University of Surrey, UK, where he leads the activities of the Networks Research Group. He received a Diploma in Engineering from the National Technical University of Athens, Greece and MSc and PhD degrees in Computer Science from University College London, UK. His research interests focus on network management, networking and service engineering, including traffic engineering, policy-based management, programmable networks, multimedia service control and object-oriented communications middleware. He has been instrumental in a number of European and UK research projects and has contributed to standardization activities in ISO, ITU-T and IETF.

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